Healthcare - Where to from here?

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CONFERENCE ARTICLES

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IN THIS ISSUE

This issue is the fourth and final issue of the Journal for 2021. It reflects a widespread interest in the Asia Pacific with 24 articles from 11 countries. These countries include Australia, India, Iran, Indonesia, the Philippines, Saudi Arabia, Bangladesh. Vietnam, Thailand, Turkey and Hong Kong, China. This represents a significant collaboration of healthcare managers, leaders, academics, students, and health professionals from diverse health systems. This is a credit to them all and our reviewers.

The topics addressed within the issue continue to be dominated by Covid_19 but are also more extensive than that topic. The topics include leadership, engagement, health literacy, employee performance, job satisfaction, mentoring, , artificial intelligence, big data to name many but not all. This is extensive collection of health management topics that should be of interest.

Another continuing feature of this issue is the interest in publishing articles from international conferences. There are articles from four recent conferences. These included the 2021 Shape Symposium conducted from Australia and online, "Shaping the future for health management education and research in a time of flux and uncertainty", held online in July and available at http://shape.org.au/. The Hong Kong Polytechnic University's College of Professional and Continuing Education (CPCE) Conference "Post-pandemic health and long-term care: A new paradigm". September 2021 with online and 'in presence' attendance.

Two conferences highlighted in this issue are recognised from India with some eight articles published from these conferences. The conferences were the AICTE sponsored International Conference on Circular Economy, Management and Industry Leading towards Sustainability, October 2021 and the 2nd Conference on Business Data Analytics, November 2021 We wish to specifically mention these conferences and recognise the conference

organisers and our guest co-editors on this occasion, who assisted us with the 8 selected articles.

The guest co-editors are Mr. Anuj Kumar, Assistant Professor, Apeejay School of Management, Dwarka, Delhi, India https://www.apeejay.edu/asm/?utm_source=google&utm_medium=google+business+listing&utm_campaign=organic. (Top PGDM Colleges Delhi NCR) and Dr. Nimit Gupta, Professor, School of Management, The NorthCap University, Gurugram, India https://www.ncuindia.edu/educate-india-society/.

On behalf of my colleague Yaping Liu and myself and APJHM may we extend the seasons greetings to you all, our authors, reviewers and readers for your support and future contributions.

DS Briggs
Editor in Chief

WELCOME TO THE FINAL ISSUE OF THE JOURNAL FOR 2021

Dr. Neale Fong FCHSM

President of Australasian College of Health Service Management

It has been another extraordinary year for the health system and its leaders across the globe as the pandemic wrought unplanned and unplotted transformation. It seems apparent that the pace of change is with us to stay and casting forward in 2022, we can expect more challenges as we grapple with some of the unknowns of living with Covid.

As health leaders, managers and executives, we are extremely aware that we step forward to "living with COVID" with an exhausted workforce, a potential tsunami of demand on our own mental health care capabilities, and indeed the demand from all those previously usual activities that have been left untended in the past two years. It is in these times that we must lead with compassion – the need for empathic, caring leadership has never been greater. I hope, too, that we understand that we are not alone and that it is the support of our peers that will make this journey forward a little bit easier.

A key aim of the College is to equip, empower and encourage our members not just when times are good but even more so when times are tough. In 2022 we will focus on creating networks that support members, wherever they are, through connection and comradery. It is our hope that you choose to reach out to your peers to support and be supported, as together we are better and stronger.

While it is important to support others and lead with compassion, we must do so by also taking care of ourselves. I ask each of you to ponder over the coming seasonal festivities and end of year celebrations just what you need to take care of yourself and know that in taking action to do so, ensure you have the resources to take care of your teams.

I would like to take this opportunity to thank Dr David Briggs AO for his steady and committed leadership of the College's Journal over many, many years. In doing so he has given back so much to the health sector in which he has worked for many decades. Thank you, David.

Dr. Neale Fong FCHSM
President of Australasian College of Health Service Management

HEALTHCARE - WHERE TO FROM HERE?

DS Briggs AM, Editor in Chief

In writing an editorial it is difficult to ignore the impact and ramifications of addressing the Covid Pandemic. In Australia, there is emerging political and media signals that are saying we must start to move on and get people back to work and living normally. At the same time our health bureaucracies are pointing to higher vaccination rates, new variants, the need for 'booster shots' and continued reticence in some about opening state and national borders.

At the same time, we are seeing 'degrees of anxieties' about the continued need for protection and surety of care, together with protests about mandated vaccinations or just plain antagonism about lost freedoms and being 'rewarded' for compliance. In rural areas we are dealing with substantial flooding at harvest time, as well. All these tensions exist side by side in a country that comparatively has done relatively well.

We have had Royal Commissions into aspects of the Australian health systems, a senate Inquiry into current state and former Government reforms to outer metropolitan, rural and regional GP services and their impact on GPs and in the State of NSW an ongoing Upper House Inquiry into rural health services. Closure of borders to international students have seen reactive contraction of courses and staffing at universities at a time when the health workforce is in short supply. We also discovered that the previously available international students were also an important part of our general workforce. Their imminent return will be welcomed.

The federated system in Australia of differing levels of government responsibility for healthcare seems to be haphazard but remains resilient to change and reform. One exception to the rule appears to be the networked and collaborative Tropical Australian Academic Research Centre in a presentation by Emeritus Professor Ian Wronski AO, Chair of that organisation, that seems to be able to

align research education and health planning and provision together in a cooperative geographic fashion, so much more than others have been able. The centre is located in the north of Queensland and the presentation was at the recent SHAPE Symposium.

In contrast, in Thailand in a National health system, the primary healthcare system is being separated out to become more of local government and provincial responsibility while the Health Ministry retains responsibility for other health services. An area health board at provincial level is being considered to ensure the systems are connected and collaborate.

At another conference, in Hong Kong, The CPCE Conference, our Colleague, Professor Peter Yuen, questioned what might happen to the health system, post pandemic. His data suggests that the Hong Kong health system was already under stress pre-pandemic and that past reform of that system have failed. He questions the use of public money in that system. His data suggests an overreliance on institutional and residential care for the elderly, higher than Australia but not much more than a percentage point. He emphasises that end of life care in Hong Kong is predominantly in hospitals and institutions, unlike the predominance of home and community care in other comparable countries. Professor Yuen suggests that the dominant use of inpatient hospital care exists where the evidence is that 50% of all public hospital conditions in Hong Kong 'were ambulatory care sensitive' and could be treated on an outpatient treatment basis to provide substantial cost savings. Some important thinking and challenges for us all.

The pandemic, concepts of innovation, advancing technology, big data and the internet of things are also presenting us with new opportunities to address these challenges to address the system inertia and, deal with the

'strife of interests', as Sidney Sax once said and improve healthcare.

There is much for us to do within existing systems if government and bureaucracy and the other structural interests, stepped back, allowed us space, and gave permission for cross sectorial, collaborative, and networked health service delivery. A lot to be done, best wishes to you all in your future professional endeavors in 2022.

DS Briggs AM

Editor in Chief

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FROM PROCRASTINATION TO REACTION! WHAT LEADERSHIP IS REQUIRED TO SHAPE THE FUTURE OF HEALTHCARE?

----The Chris Selby Smith Oration – July 2021*

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PREAMBLE

It is a privilege to be asked to present this Oration. Like many similar events, it pays tribute to a well-respected, revered, and past leader in our profession, in education, economics and life in general. Someone, who most of us would not have known personally nor about his involvement in the health system, particularly, SHAPE.

I have an abiding interest in health policy and health reform and how that has shaped our leadership and management of health services. Also, I have a view that healthcare should be viewed as a human service with differing groups of mostly health professionals providing care and services to individuals, groups, and communities. I see this in terms of engagement, wholistic and integrated and patient centred care. Some might say clients and suggest person centred care. Others in the quality and safety sector and the private health care industry, might suggest that people are consumers or even customers. For someone like me predominantly involved in the primary healthcare sector, we talk in addition to patients, in terms of communities, populations and of providers. Our language even goes to commissioning services rather than funding them.

Immediately just by looking at the language we all use, we can see how it reflects our own bias based on our professional backgrounds and lived experiences. It also might suggest that healthcare is complex and continues to be 'siloed' and diverse in priorities and focus on how it might best be delivered. However, the issue of language

and its meaning in healthcare is more than where we come from or where we work in the system.

Recently, I suggested that:

> The intensity of the use of the term 'health reform' also seems to be in decline with the main language in the literature, being focused on safety and improved quality of care. This emphasis also has seemed to have reached a stable state suggesting to me that health reform should or might be shifting to an increased emphasis on health development. [2]

For inspiration, for this oration I went back to the 2017 Oration, presented by Professor Stephen Leeder [1] entitled 'The desirability of zero tolerance for procrastination'. An oration I enjoyed Immensely. That oration had some exquisite use of language. So, this preamble establishes my challenges and the parameters for the Oration.

The uniqueness of SHAPE, in my view is that it very effectively brought together health management academics and students, particularly doctoral students from across universities, together for the annual SHAPE Symposium, mostly in physical proximity together, but today through the medium of modern Zoom technology. This demonstrates an affinity between teacher and student that has added meaning to mentorship, role models and, a very distinct, caring and encouraging culture, enabling us to be collegiate.

This had a significant impact on me personally, in that my doctoral research that I presented at an earlier SHAPE symposium became adopted by SHAPE and published as the 'SHAPE Declaration' [4], as an important policy perspective on health management and leadership. That discussion and the formulation of the SHAPE declaration occurred at the 2008 National SHAPE Symposium and was launched in the Asia Pacific Journal of Health Management [4] with an editorial by the then SHAPE President Godfrey Isouard and with an accompanying contribution from the then National President of the then ACHSE, Robert Grima.

The Declaration aimed to promote public debate on the reform of the organisation and management of health services. It arose from research that sought the perceptions and experience of senior health services managers from across Australia and New Zealand about the impact on their leadership and management roles during extensive health reform. This Declaration proposes a public debate about how health services might best be organized and effectively managed and proposes principles and parameters for reform. Well-qualified and experienced health managers are of central importance to the effective organisation and management of health services and to the success of future health reform. [4, p.11-12]

Subsequently in 2009 in Phitsanulok, Thailand at the 1st International Conference on Health Service Delivery Management, the 450 delegates, concluded the conference with a further Declaration, that comes after thirty years of the Alma Alta Declaration with a focus on the importance of capacity building, leadership, and health management. This declaration states that:

> Priority in resourcing and policy implementation should be given to developing leadership, management and governance as the means to strengthen health systems development.

> Successful management of health services requires leadership and teamwork from managers who have positive personal and professional values and self-perceptions and, are empowered to engage with individuals and communities and to respond to the needs of the poor and to marginalised groups.

> Leadership for health systems, public health and PHC requires that managers have access to high quality education, training and experiential health context and knowledge that equips them to operate effectively in health systems and;

> A research culture is required that networks and engages in collaborative research to develop health management capacity and evidence as a basis for decisions, to guide policy development and that both challenges and aligns, researchers and operational health system professionals, citizens, and communities and importantly for us here today:

> Outcomes identified from this conference for leadership and health management education training and research be conveyed to health organisations, professional bodies, local government, Ministry(s) of Health and Education and research funding bodies. [2]

These declarations are as relevant now, if not more so, while we live in the shadow of the Covid pandemic, sorely testing our public and political leadership and that of health systems.

Leeder in the 2018 Oration expressed frustration labelling the lost opportunities in healthcare as procrastination and plain bad management. In this 2021 Oration I take a similar perspective but see the 'devil' as an increase towards reactionary management, similarly wasteful and, dangerous when wrapped in the populism of State politics in a Federation, seems to have taken the leadership away from any unifying concept of a national health service. There is a lack of confidence and assuredness in our political and health system leadership. This context is raising serious concerns about trust and who de we turn to for advice and certainty of direction. We need to resist what I see as a tendency towards reactive leadership and management.

At the time of my research there had been continuous reform of health systems and two judicial or special commissions of Inquiry into health systems in Australia, in NSW and Queensland. Enormous and largely ineffective reform was a regular occurrence then. So, it is reasonable to state that the health manager role is complex, varied and contextualized because it is central to health reform and can be described as a unique role in implementing reform in professionally dominated organisations.

To the extent that managers have formally developed management skills, they are mostly trained in and utilize rational and normative management theory and practice. Research suggests that the relationship between managers and professionals is a defining issue in health and introduces a particular kind of complexity, the powerful influence of professional subcultures and the constraining nature of that influence, is critical in the enactment of management roles.[5]

So, in earlier research, than mine it was suggested that health management needed to be seen in managing, professionally dominated complex adaptive health systems. This is said to involve relationship building, loose coupling, complicating, diversifying, sensemaking, learning, improvising, and thinking about the future. My subsequent research suggested that the central role of managers and leaders was sensemaking. I saw that in terms of communication and engagement, interpretation and understanding, flexible thinking, managing competing interests, critical thinking, big picture thinking, understanding, and managing self, resilience, and self-confidence.[5]

It is often said that 'a paradoxical pattern of policy development' is described as 'reform without change and change without reform'. This author suggests that in highly centralised governance, health reform is difficult. [2,6] Huber and colleagues suggest that the original WHO definition of health development in 1948, was based on a 'state of complete physical, mental and social wellbeing…' is no longer appropriate and in fact is counterproductive. Huber and colleagues go on to suggest that the existing definition 'minimises the role of the human capacity to cope autonomously with life's ever changing physical, emotional, and social challenges and to function with fulfilment and, a feeling of wellbeing with a chronic disease or disability'. [2, 7]

These authors [7] go on to suggest that the diseases of the modern world are impacted by ageing and chronic disease. Even in developing countries where they may still address communicable diseases, they are also having to respond to ageing and chronic disease and that in all cases a complete absence of disease is unrealistic and unattainable. The current emphasis on Coronavirus (COVID-19) reinforces the fact that a complete absence of disease and not having to deal with communicable diseases are, both unrealistic and unattainable.

In my research and publications, I make much of engagement. I have previously stated [8 p.5-6] that 'we the citizens and our communities substantially fund the health system' and 'that we have a collective responsibility for the moral stewardship of the resources'. According to Hofmeyer and colleagues [9 p.149] 'the bureaucratic domination of health systems have seen community engagement reduced to an 'advisory role'. The solution of course is for health organisations to have 'a broader focus on corporate citizenship' while moving to networks of cross sectorial delivery mechanisms, at the more local level.

There are compelling reasons for improved community and stakeholder engagement in healthcare it should be a compelling feature of democratic societies. The value of community engagement is evidenced in policies such as localism and in the principle of subsidiarity [8] and essentially suggest that services should be delivered and managed locally to meet local needs and decision-making should be made at the lowest level of government that can effectively be achieved. In addition, in health systems If communities are not engaged, then it is difficult to suggest that others have the capacity to solve those problems on their behalf.

Engagement implies receiving and giving advice, and demonstrating empathy, which is another important aspect of health language, that in this Covid age seems to have been corrupted and become reactive. Initially in Australia and most nation States advice on Covid was seen as authoritative, considered, and cautious. However, we are now recipients of conflicting advice from some of those sources that suggests political populism and a view from some health professionals that they not only know what is best for us but intend making that decision on our behalf, denying the autonomy of an individual's right to make their own decisions and to exercise their right to democratic freedoms!

In the wider primary healthcare context, we adopt the vision of an organisation as 'healthy people and communities.[10] This suggests that we need to value health above healthcare. [11,12] Health professionals and their organisations need to engage with people and communities in planning and decision-making about their health and how they might access the care required. This will require innovative across sector approaches [13] and this will require an understanding of the principles of localism, subsidiarity, and the concept of distributed networks of practice (DNOP) to engage and provide care.

While writing this oration I also sit and listen to the daily missive of our State Premiers, flanked by a Minister for Health, a Chief Health Officer and warningly a senior police officer. The personalities differ from State to State. While I accept that this is well intended, I need to suggest that data they use are raw figures without analysis or context that does not contribute to confidence and surety but increases community anxiety. Without that context it leads us to ill-informed or misinformed assumptions and decisions. In the post-covid period we now see a welcome departure, in some cases from this approach.

You can see missteps between lockdowns, while you see other nation States not locking down! Agrawal and colleagues [7] in a briefing paper, not at the time, peer reviewed but with international context, examine the impact of SIP, "sheltering in place', a US euphemism for our 'lockdown' approach, that suggests that there is little evidence of the efficacy of these measures and in fact, in some contexts suggest that they may also have negative consequences. There needs to be some serious sensemaking brought into the context of the public debate on measures that appear to be mostly implemented as a whim and, without any evidence that supports that the measure is best practice.

We are entering dangerous ground here with trusted advice, informed advice, media, and social media advice from all and sundry. If ever there is a need for health professionals to demonstrate trust and to act and engage ethically, it is now. If ever there was a threat to pursuit of national health service policies and to our need to respond actively to ageing populations, disability, mental health, and suicide, it is now. We will as in the past move beyond the pandemic, but can we reunify and work towards a more national perspective of health policy and healthcare?

In my view the biggest challenge we all face in the next decade will not be covid but how do we ensure that we can train and educate an adequate health workforce to respond to the need and funding promised by government from the recent Royal Commissions of aged care and disability. We are well placed to suggest to universities that now is not the time to pause and cut the education of health professionals, particularly in health management. Instead, they should be engaged with health systems to see how they can effectively engage in the workforce challenge!

A question here for you all. Are our universities aware that these Royal Commissions and the government response to them suggests there will be a need for an immense increase in the health workforce? Do you and your university feel confident that you can respond to that demand and increased demand? My sense is that universities are in a retraction phase, 'pausing' programs reducing staffing all because of a loss of international students? Am I correct?

Turning to leadership and management, in a recent editorial [14, p.2], I focused on some contemporary perspectives. I quoted, Elon Musk as saying:

> top leaders spend too much time in front of spreadsheets and at meetings and not enough time thinking creatively and making things happen.

McKay [14, p.2] in that same editorial, emphasises that the 'strategic capacity of our leaders is the single – most important determinant of personal and organisational success.' Importantly, strategic leadership just happens to be 'all about context'. According to McKay [14, p.2] this means asking 'What are we not seeing? Being strategic requires five critical skills around being flexible, making good decisions, being a systems thinker, being focused and being an influencer.

In my research, that I asserted as the basis of the SHAPE Declaration is that healthcare managers and leaders need to:

> Possess a deep contextual understanding of health systems, public policy, professional cultures, and politics. Have competency in organisational sensemaking as negotiators of meaning, active participants, constructors, organisers, and persuaders within health systems. [4, p,11-12]

I further stated principles that in part included that public policy should focus on improving health outcomes, not be prescriptive but provide frameworks of responsibility and cooperation at the program delivery level and should focus on the needs of communities and populations. Structural arrangements and providers should be organised to meet the diversity of need and demonstrate good governance and management through proper engagement of structural interests.

Amongst other aspects, health service structures should reflect the diversity of need and differences in geographic location of populations, culture, and healthcare needs and, have capacity to achieve intersectoral collaboration and, consider how adequate levels of accountability, trust and stewardship can be restored to the health system.

In a recently published article Olley [16 p.7] describes the theoretical construct of 'authentic leadership' as being about 'self-awareness, relational transparency, balanced processing and having an internalised moral perspective'. This author then describes the five principles of ethical leadership, which are respect, service, community, justice, and honesty. The author then confirms that the concepts of authentic leadership and ethical leadership are linked. He then invites us as leaders. to think about four aspects of leadership (virtues, values, vision, and voice) and align internal beliefs and values with the external behaviours to pursue the common good as they apply in a particular context. [16 p.7]

At this point I would like to ask you, the reader a series of questions. I want to challenge you to think critically and constructively about what I have suggested in this oration as being:

1. Is your organization active and supportive of health development and innovative public policy?

2. Is your organisation fit for purpose? Does the culture of your organisation adequately align with its purpose?

3. Are your staff predisposed to that purpose? In addition, is your management of staff holistic, humane, and integrated?

4. Is your organisation evidenced based and innovative, collaborative, multidisciplinary, providing stepped care or appropriate care?

5. Are we as researchers and academics educating and training health professionals that advances health professionals to engage in this future? [2]

Earlier researchers than I always used to ask the question 'Whose interests are being served?' and the other question was 'what problem are we attempting to solve?'. [8] You will note that in the references to authentic leadership by Olley [16] the quote focusses on authenticity and ethical leadership and suggests enacting this approach requires voice. The question is are we prepared to speak to

demonstrate authentic and ethical leadership and see it develop in our public position, in our students and into the mainstream thinking of health leaders and managers? I am sure that there would be little debate where Chris Selby Smith might have stood in this discourse.

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REVIEW ARTICLE

IN SEARCH OF A CONTEMPORARY DEFINITION OF MEANINGFUL ENGAGEMENT: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Consumer engagement is emerging as an important trend in a contemporary health care environment. Yet, a universal definition of meaningful consumer engagement has not been determined. This paper presents our systematic literature review findings, which intended to consolidate the definition of consumer engagement (or related terms) in the context of health care to date to arrive at a definition for meaningful consumer engagement in healthcare. Literature searches were performed in MEDLINE, CINAHL, Embase and PsychINFO in June 2021. Using a combination of medical subject headings (MeSH) terms, Emtree search headings and free text words, a total of 82 records were identified. After reviewing in line with PRISMA methodology, 23 articles were considered relevant to the development of the definition of consumer engagement. The methodology of these papers was analysed using the revised Mixed Methods Appraisal Tool (MMAT) (2018). A total of 13 of these papers were then further analysed for a definition of meaningful consumer engagement or characteristics of consumer engagement. None of the definitions found comprehensively defined meaningful consumer engagement but instead, five described meaningful consumer engagement. Therefore, a new definition of meaningful consumer engagement is proposed, which is based upon the synthesis of the characteristics of meaningful consumer engagement and person-centred care. This new definition speaks to what is it means to be consumers of health care rather than patients and acknowledged the importance of the reciprocity of the exchange relationship of 'consumers', the importance of leadership, and the emerging evidence around diversity and inclusion trust and partnership which requires active involvement and participation.

KEYWORDS

consumer engagement, meaningful, healthcare, person-centred care, definition, quality assessment, characteristics, qualitative research, systematic literature, quality appraisal

INTRODUCTION

Consumer engagement has emerged as an important trend in contemporary health services. [1] By providing unique insights and perspectives, consumers help organisations better understand their needs and enhance the value of healthcare solutions and systems being developed. [1, 2] There is a growing body of evidence which suggests that engagement of consumers and their families leads to more empowered patients and more engaged patients have better perceived health outcomes

[3, 4] and improved quality of care. [5] Thus, an understanding of how to engage consumers effectively is needed.

Recently, Majid [6] explored the concept of tokenism in the context of consumer engagement and found that there is a lack of clarity regarding the meaning of and implications for tokenism on consumer engagement. As part of the study, the four dimensions of tokenism: unequal power, limited impact, ulterior motives, and opposite of meaningful patient engagement were reviewed in the context of levels of engagement outlined in the International Association of the Public Participation spectrum. [16] Importantly, this review suggests that there are two gradations of tokenism and whilst tokenism represents unequal power relationships in favour of health care professionals, this may lead to either limited or no meaningful change or change that is primarily aligned with the personal and professional goals of clinicians, managers, and decision-makers. [6]

Carmen and colleagues [7] acknowledge consumer engagement spans across a continuum of care for patients and families and across funding and policy jurisdictions. The engagement continuum itself can range from consultation to partnership as well as shared leadership, including decision-making authority. [7] At one end of the continuum, consumers are involved in their health care but have limited power or decision-making authority. [7] At the other end of the continuum, engagement is characterised by shared power and responsibility, with consumers considered active partners in shaping agendas and making health care decisions. [7] Consumer engagement can occur at multiple levels throughout the health care system, from a direct care setting right through to incorporating patient engagement into organisational design, governance, and policy making. [7] In addition, the level of consumer engagement in health care organisations is determined by three things: first, the level of participation that a health care organisation will support, second, the level that is advocated for by consumers, and third, the confidence, knowledge, and skill levels of consumers and their families. [8] Furthermore, Halabi [9] who also developed a conceptual framework the phases of "patient participation" found the common goal across the framework was the inclusion of the patient in the healthcare system.

According to Higgins and colleagues' [8] engaged patient/ consumer-professional partnerships are needed across all levels in healthcare organisations. Yet the basis of their proposed framework uses loosely defined terms such as consumer, community and engagement, that are often not agreed upon definitions in the literature. For example, Evans [10] found that 'community' has been used to describe patients, consumers, citizens, clients, service users and carers (in relation to patients) amongst many other terms. Further, the use of the term engagement varies from the 'principles' of engagement, including patient or consumer participation or choice to the 'practice' of engagement, including examples such as patient or consumer surveys, patient networks, complaints mechanisms, consumer councils or citizens juries. [2]

Consequently, there is variation in the definition of consumer engagement. The variation in definitions and the inter-changing of terminology could, in part, be reflective of the spectrum of continuum of engagement that occurs in health care, and, therefore, a comprehensive and inclusive definition of "consumer engagement" needs to be agreed upon.

This paper argues that the currently used definitions of consumer engagement do not indicate that meaningful engagement and exchanges have occurred between patients and their families and health care providers. A meaningful social exchange relationship that is required between consumers and their families and health care providers ranges from undertaking relatively simple tasks (such as the creation of a brochure) and co-designing complex care issues, such as changes to a model of care.

The required social exchange relationships for successful and meaningful engagement between an organisation and its consumers are theorised within Social Exchange Theory (SET), which focuses attention on the relations between actors and the factors that explain the emergence, maintenance and termination of exchange. The exchange relationship can be viewed strictly as dyadic [11] or can be viewed as connected to form networks of exchanges. [12,13, 14] This exchange relationship is essential when engaging with consumers.

CONCEPTUAL FRAMEWORK
Social Exchange Theory (SET) weaves together disciplines such as anthropology [15], social psychology [16], and sociology. [17] Blau [17] states that SET involves a series of social and economic interactions and exchanges that generate obligations to reciprocate which, in turn, engenders feelings of personal obligations, gratitude, and

trust. It is worth noting that social exchange differs from an economic exchange in terms of resources exchanged, type and strength of obligations, reciprocity, and the quality of the relationship developed over time. [18] Further, whilst economic exchange involves defined provisions of the interactions between parties and is predominated by extrinsic rewards particularly material rewards, social exchange is characterised by indeterminate personal obligations and trust as well as both intrinsic and extrinsic rewards. [17]

The basic assumption of exchange theory is that individuals establish and continue social relations on the basis of their expectations that such relations will be mutually advantageous. [17] In the context of consumer representation, individual consumers establish and continue social relations with each other and with employees in health service organisations on the basis that that such relations are mutually advantageous. [17]

The aim of this systematic literature review is to analyse the existing definitions of consumer engagement in order to best define 'meaningful consumer engagement' in the health care context. 'Meaningfulness', in part, can be derived from the exchange relationship. The development of a single definition of 'meaningful consumer engagement' will give rise to a shared understanding of the depth and breadth of consumer engagement for researchers, academics, policy makers and clinicians which, in turn, has the potential to improve health and health outcomes for patients and their families.

METHODS

The study was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement. [19] PRISMA is an evidence-based minimum set of items for reporting in systematic reviews and meta-analyses. The methods of the analysis and inclusion for this Systematic Literature Review were specified in a protocol. The PRISMA statement consists of both the 27-item checklist and the four-phase flow chart. [19] (see Figure 2) The search strategy and study selection used in the systematic literature review is detailed below. A systematic review was selected as the explicit type of review typology, given such a review is aligned to the principal purpose of the review being to summarise what is known as well as provide recommendations for both practice and future research. [20]

SEARCH STRATEGY AND STUDY SELECTION

A comprehensive electronic database search was conducted by one author on the 12th January 2020. The literature search was conducted in Literature Analysis and Retrieval System (MEDLINE), Cumulative Index to Allied Health Research (CINAHL) Embase and PsychINF0 for primary qualitative, quantitative, or mixed methods studies. These two databases were recommended for use by the librarian and also form the basis of similar systematic literature reviews on similar topics. [21The search terms were initially determined through reviewing a selection of key papers and an initial scoping search. One researcher ran the combination of these strategies in the appropriate databases. The key search terms are outlined in Appendices 1,2, 3 and 4. Given the variable terms used to describe the same or similar topic, a broad search strategy with a high sensitivity was used. The search strategy included a combination of medical subject headings (MeSH), embase subject headings (emtree) and free text words.

ELIGIBILITY CRITERIA

Two reviewers screened titles and abstracts of all articles that met the search strategy order to determine studies eligible for inclusion). A third reviewer was available if consensus was unable to be researched however this was not required. For convenience, articles had to be published in English and be available in an electronic format. Other formats and languages were excluded. Studies were considered from the year of inception of the online database to June2021 (see Table 1). If insufficient information was available in the title and abstract of an article, a full- text evaluation was undertaken. Following this, the same reviewer assessed the full text of potentially relevant non-duplicated articles and conference proceeding or poster presentations.

The articles that met the inclusion criteria were selected and entered to the final analysis. These studies contained a definition of consumer engagement or a related term. That is, they were selected according to the review objectives and Population, Intervention, Comparison, Outcomes, and Study design (PICOS) criteria (see Table 1).

TABLE 1: PICOS CRITERIA FOR THE STUDY

CRITERIA	INCLUSION
Population	The population related to consumer engagement in health care
Intervention	Definition of meaningful consumer engagement or related term, or characteristics of meaningful engagement or related term
Comparator	No definition of meaningful consumer engagement or related term or characteristics of meaningful engagement or related term
Outcomes	Contemporary definition of meaningful consumer engagement
Study design	The systematic literature review focused on a definition of meaningful consumer engagement in health care.
	Articles had to be published in English and be available in an electronic format via the electronic databases or the internet.

FIGURE 1. PRISMA FLOW CHART: SYSTEMATIC LITERATURE REVIEW
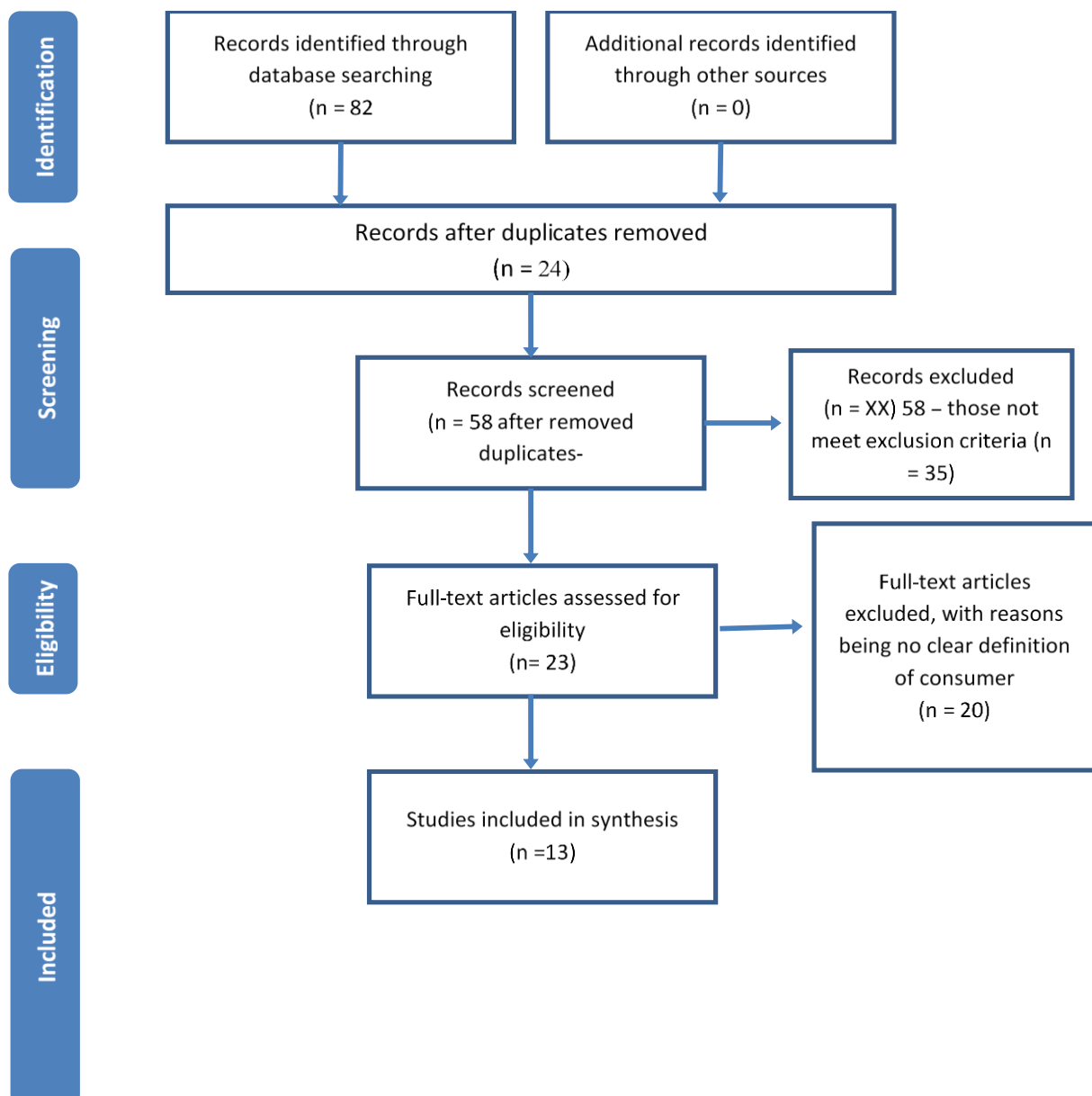
QUALITY ASSESSMENT

The revised Mixed Methods Appraisal Tool (MMAT) [22] was the quality assessment tool selected given it assesses the quality of qualitative, quantitative, and mixed methods studies. Further, it focuses on methodological criteria and includes five core quality criteria for each of the following five categories of study designs: (a) qualitative, (b) randomised controlled, (c) nonrandomized, (d) quantitative descriptive, and (e) mixed methods. Majid and Vanstone [23] suggested that the decision of which appraisal tool to use depends on the objectives of the evidence synthesis, the expertise of the researchers, and the time and resources available. A series of 23 articles were reviewed using MMAT. Of these, 13 articles meet both screening criteria and were subsequently brought forward for further analysis (see Table 2). Seven of the articles (see Table 3) did not meet the screening criteria for the MMAT evaluation. That is, these seven articles did not clearly articulate a research question and the data collection method did not allow for the answering of the research question.

RESULTS

This review summarises the findings from 13 articles that focused on either, a definition of meaningful consumer engagement (related term) or discussed the characteristics of meaningful consumer engagement (or related terms) (see Table 3). The scope of the review related to a definition at a service or organisational level or associated characteristics that could be used to form part of the definition. Of the 82 articles, 13 articles made it through the Quality Assessment using MMAT, a total of 5 articles provided a definition of meaningful consumer engagement or a similar term or characteristics of consumer engagement at a service or organisational level. Table 3 summarises the range of definitions or characteristics of consumer engagement.

By way of classification the definitions were compared to each other using the continuum of engagement outlined by Carmen and colleagues [7] and depicted in Figure 1. The definitions are also categorised as either relating to patients, families, staff or health care organisations (see Table 4). The definitions are categorised according to their depiction of direct care, organizational design and governance and/or policy making. Given the number of articles that relate to research that formed part of the review, 'research' was added as a category which was not originally detailed by Carmen and colleagues. [7] The papers written by Phillips et al [24] and Westlake, Ekman, Britten and Lloyd [25] were focuses on individual patient and clinician partnerships but were seen as applicable at a service level and organisational level engagement. More specifically, Phillips et al [24], who undertook semi-structured individual interviews to address the knowledge gap relating to the evidence around effective engagement with consumers from ethnic minority backgrounds found that recognising diversity within communities and individuals in those communities was as pivotal to effective engagement. Further, Westlake and colleagues [25], who conducted a secondary analysis of qualitative data in developing a framework which identified contextual factors and mechanisms likely to contribute to effective engagement (see Table 3).

TABLE3. CLASSIFICATION OF DEFINITIONS ACCORDING TO ASPECTS OF ENGAGEMENT AND STAKEHOLDERS CONSIDERED

ARTICLE	ASPECTS OF ENGAGEMENT CONSIDERED	STAKEHOLDERS CONSIDERED
Westlake et al. [25]	Direct Care	Patients and public Individual
Majid and Gagliardi [26]	Organisational Design and Governance Policy making	Patients and public Individuals Health care organisations
Pinsoncult et al [27]	Direct Care	Patients and public Individual
Warren et al [28]	Direct Care	Patients and public Individuals

		Other - research
Phillips et al 24]	Direct Care	Patients and public Individuals
Newell and Jordan [29]	Direct Care	Individuals
Kane et al [30]	Direct Care	Individuals
DeCamp et al [31]	Direct Care	Individuals
Sapir et al [32]	Direct Care	Individuals
Sloan and Knowles [(33]	Direct Care	Individuals
Harrison et al [34]	Direct Care Organisational Design and Governance Policy making	Patients and public Individuals Health care organisations
Perfetto et al [35]	Direct Care Organisational Design and Governance Policy making	Patients and public Individuals Health h care organisation
Needham et al [36]	Direct Care Organisational Design and Governance	Other - research

None of the five articles (Westlake, Ekman, Britten, and Lloyd [26], Majid and Gagliardi [27]; Phillip et al. [24], Perfetto, Oehrlein, Boutin, Reid, and Gascho. [35], Harrison et al. [34]), provided a definition of meaningful consumer engagement or a similar term but all spoke to characteristics of meaningful consumer engagement in health care (see Table 4).

TABLE 4. CHARACTERISTICS OF MEANINGFUL CONSUMER

ARTICLE	CHARACTERISTICS
Majid and Gagliardi [26]	Collaboration, Co-operation, Co-production, Active involvement, Partnership, and Consumer peer leadership
Westlake et al [25]	Care partnership Trust Patient's sense of candidacy
Phillip et al [24]	Patient-clinician partnership, Benefits, Barriers

	Applicability
Perfetto et al [35]	Partnership, Transparency, Inclusiveness, Diversity, Outcomes, Data sources
Harrison et al [34]	Building foundations of trust and respect, Diversify communication channels, Generate system, service and community partnerships, 'Taking the time'

There are commonalities and differences between the five articles in their description of characteristics of meaningful consumer engagement. While all articles stress the partnerships between consumers and health care providers. Some researchers focus on the behaviours or actions that organisations and consumers can take (e.g., Westlake et al [25], Majid & Gagliardi [26]), with researchers, such as Majid and Gagliardi [26] discuss the need for active involvement. Others such as, Harrison et al.[34] and Perfetto et al. [35] stress the importance of diversity. A number of researchers spoke to the importance of trust and respect. [25,34] Thus, trust, respect, partnerships and active involvement within organisations were central to describing meaningful consumer engagement in the articles reviewed.

Upon reviewing the characteristics that pertain to meaningful consumer engagement, it was found that enabling consumers to take on leadership roles within an organisation were identified as central to meaningful engagement of consumers. For example, patients as consumer/peer leaders were recognized as professionals who managed administrative and organisational activities and were compensated for their work [Majid & Gagliardi, 26]. In this way, consumer/peer leadership appeared to be a more reputable and legitimized form of consumer engagement accepted within organisations for real change to occur. Perfetto et al. [34] also identified that the level of meaningfulness in consumer engagement could be categorised through a Rubric framework assessment map. This framework was proposed to include a self-assessment of the level of partnership, transparency, inclusiveness, diversity, outcomes, and data sources that were embedded within the organisation [26] Additionally, a

patient's sense of candidacy was identified as an important characteristic identified by Westlake, and colleagues where consumes felt that there was a shared understanding of purpose, clarity of expectation and power sharing that existed to enable a true partnership with the organisation. [25]

DISCUSSION

This Systematic Literature Review was undertaken to determine if a definition of, or characteristics of, meaningful consumer engagement at a service organisational level exists within the literature in the health care context. Upon analysis and synthesis no existing definition was found to comprehensively describe meaningful consumer engagement within the health care context.

Thus, this paper presents a consolidated definition of meaningful consumer engagement, which encompasses the core characteristics identified in the literature. Subsequently, meaningful consumer engagement is defined as, "the desire and capability of patients, families working in partnership with health care professionals and health care organisation, at various levels across the health care system to make improvements in the outcomes and experiences of care through actively involvement and participation that takes into consideration the establishment of trust, recognises the importance of clinical and patient leadership, and respects diversity and inclusiveness in all efforts. ".

The developed definition is significant, as it blends both the traditional characteristics of consumer engagement [24,

25], 26] with the emerging concepts of patient leadership [26] and diversity and inclusion [34, 35], trust [25, 34] and partnerships. [24, 25, 34, 35] Importantly, the proposed definition focuses on mutual relationships and exchanges that exist between stakeholders to improve outcomes and experiences of care and emphasises the importance of social and mutual exchanges in this engagement activity. The proposed new definition also aligns with the far end of the continuum described in Figure 1, where meaningful engagement is characterised by shared power and responsibility and an active partnership between consumers and the health care organisation as highlighted by Carmen et al. [7] In addition, the proposed definition focuses on consumer engagement at the top two layers of the health care system depicted in Figure 1, namely organisational design and policy making.

Importantly, the definition emphasises collaborative partnerships between patients (and caregiver as defined by the patient) and health professionals as an essential ingredient of improved care and health. The collaborative and active partnerships arguably contribute to the meaningfulness of their definition. Further, it is reinforced by the concept of Social Exchange theory and importantly the norm of reciprocity. [45] That is, the high-quality relationships that can been generated by inter-dependent social exchanges are theoretically underpinned by the meaningfulness of the consumer engagement that can occur in health care.

STRENGTHS AND LIMITATIONS

It is clear that a consolidated definition of meaningful consumer engagement is needed in the literature that encompasses the core characteristics as well as the importance of meaningfulness.

Further, it is acknowledged that there is a variety of terminology used for the same or similar concepts relating to consumer engagement. As result of this, the concept of 'meaningful' in consumer engagement was imbued as part the review through the inclusion of synonyms of meaningfulness as search terms including active, genuine, optimal, effective, partnership, co-leadership, as part of the systematic literature review.

Further, some of the definitions or characteristics of meaningful consumer engagement or similar phrase may have been picked up due to the key words used within these articles. Therefore, while all care was taken to be inclusive, not all papers related to consumer engagement may have been identified within this systematic literature

review. This is important because health policy increasingly demands organisations to meaningfully engage consumers in its practices and as such, understanding salient characteristics of consumer engagement as well as the significance of consumer engagement is essential to this aim. Thus, a review of the literature served to provide the opportunity to explore a definition or characterises of 'meaningful consumer engagement'.

The development of a single definition of 'meaningful consumer engagement' at each level of the engagement continuum allows for greater understanding of the depth and breadth of consumer engagement for researchers, academics, policy makers and clinicians which, in turn, has the potential to improve health and health outcomes for patients and their families. Future empirical evidence is needed to explore if the new definition accurately addresses the entire continuum of consumer engagement that exists in practice today. Another limitation of the methodological design was a sole reliance on a systematic literature review to determine the definition of engagement. Ideally in determining a definition or characteristics it is best practice to engage those involved in this process: patients, clinical and non-clinical professionals, and institutions.

Thus, is it clear that a consolidated definition of meaningful consumer engagement is needed in the literature that encompasses the core characteristics as well as the importance of meaningfulness. Further, it may be helpful for multiple definitions of meaningful consumer engagement be developed for clinician, researchers, and consumer alike to utilised based upon the context of an activity been undertaken along the engagement continuum. In addition, the proposed definition focuses on consumer engagement at all three layers of the health care system depicted in Figure 1, namely, direct care setting right through to organisational design and policy making.

CONCLUSION

Consumer engagement has emerged as an important trend in a contemporary health care environment. This paper reports the findings of a systematic literature review which aimed to consolidate the research to date to arrive at a definition or characteristics for meaningful consumer engagement at a service or organisational level. Lack of an existing definition of meaningful consumer engagement in health care at a service or organisation level does

underpin the need for a consolidated definition of meaningful consumer that encompasses the core characteristics as well as the importance of meaningfulness. Further, it may be helpful for multiple definitions of meaningful consumer engagement be developed for clinician, researchers, and consumer alike to utilised based upon the context of an activity been undertaken along the engagement continuum.

Importantly, the development of a single definition of 'meaningful consumer engagement' gives rise to a shared understand of the depth and breadth of consumer engagement across the continuum of engagement for researchers, academics, policy makers and clinicians, which, in turn, has the potential to improve health and health outcomes for patients and their families. Finally, a definition of meaningful consumer engagement that speaks to what is means to be consumers of health care rather than patients and acknowledges the importance of the reciprocity of the exchange relationship of 'consumers' of health care and staff in health care organisations is important.

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APPENDIX 1

SEARCH STRATEGIES FOR SYSTEMATIC LITERATURE USING MEDICAL LITERATURE ANALYSIS AND RETRIEVAL SYSTEM (MEDLINE)

CODE	SEARCH TERMS
S1	AB "patient-centred care" OR AB "patient-centered care" OR AB "patient-centred healthcare" OR AB "patient-centered healthcare" OR AB "patient-centred medicine" OR AB "patient-centered medicine" OR AB "person-centred care" OR AB "person centered care" OR AB "person-centred practice" OR AB "person-centered practice" OR AB "person-centred healthcare" OR AB "person-centered healthcare"
S2	AB "client-centred practice" OR AB "client-centered practice" OR AB "consumer-centred care" OR AB "consumer-centred care" OR AB "personali?ed care" OR AB "family-centred care" OR AB 'family-centered care" OR AB "patient and family centred care" OR AB "patient and family centered care" OR AB "mutual healthcare" OR AB "customer-focused care"
S3	(MH "Patient-Centered Care")
S4	AB "patient centred care" OR AB "patient centered care" OR AB "patient centred healthcare" OR AB "patient centered healthcare" OR AB "patient centred medicine" OR AB "patient centered medicine" OR AB "patient centred care" OR AB "person centred care" OR AB "person centred practice" OR AB "person centred practice" OR AB "person centred healthcare" OR AB "person centered healthcare"
S5	AB "client centred practice" OR AB "client centered practice" OR AB "consumer centred care" OR AB "personali?ed care" OR AB "family centred care" OR AB "family centered care" OR AB "patient and family centred care" OR AB "patient and family centered care" OR AB "mutual health care" OR AB "customer focused care"
S6	S1 OR S2 OR S3 OR S4 OR S5
S7	AB Involvement OR AB participation OR AB meaningful OR AB genuine OR AB effective
S10	AB partnership OR AB collaboration OR AB co-creation OR AB cocreation OR AB "co creation"
S11	AB "Patient engagement" OR "Consumer engagement" OR "Community engagement"
S12	S6 AND S7 AND S10 AND S11

APPENDIX 2

SEARCH STRATEGIES FOR SYSTEMATIC LITERATURE USING CUMULATIVE INDEX TO NURSING AND ALLIED HEALTH LITERATURE (CINAHL)

CODE	SEARCH TERMS
S1	AB "patient-centred care" OR AB "patient-centered care" OR AB "patient-centred healthcare" OR AB "patient-centered healthcare" OR AB "patient-centred medicine" OR AB "patient-centered medicine" OR AB "person-centred care" OR AB "person centered care" OR AB "person-centred practice" OR AB "person-centered practice" OR AB "person-centred healthcare" OR AB "person-centered healthcare"
S2	AB "client-centred practice" OR AB "client-centered practice" OR AB "consumer-centred care" OR AB "consumer-centred care" OR AB "personali?ed care" OR AB "family-centred care" OR AB 'family-centered care" OR AB "patient and family centred care" OR AB "patient and family centered care" OR AB "mutual healthcare" OR AB "customer-focused care"
S3	(MH "Patient-Centered Care") or (MH 'person-centred care')
S4	AB "patient centred care" OR AB "patient centered care" OR AB "patient centred healthcare" OR AB "patient centered healthcare" OR AB "patient centred medicine" OR AB "patient centered medicine" OR AB "patient centred care" OR AB "person centered care" OR AB "person centred practice" OR AB "person centred practice" OR AB "person centred healthcare" OR AB "person centered healthcare"
S5	AB "client centred practice" OR AB "client centered practice" OR AB "consumer centred care" OR AB "personali?ed care" OR AB "family centred care" OR AB "family centered care" OR AB "patient and family centred care" OR AB "patient and family centered care" OR AB "mutual health care" OR AB "customer focused care
S6	S1 OR S2 OR S3 OR S4 OR S5
S7	AB Involvement OR AB participation OR AB meaningful OR AB genuine OR AB effective
S8	AB partnership OR AB collaboration OR AB co-creation OR AB cocreation OR AB "co creation"
S9	AB "Patient engagement" OR "Consumer engagement" OR "Community engagement"
S10	S6 AND S7 AND S8 AND S9

APPENDIX 3

SEARCH STRATEGIES FOR SYSTEMATIC LITERATURE USING EMBASE

CODE	SEARCH TERMS
S1	AB "patient-centred care" OR AB "patient-centered care" OR AB "patient-centred healthcare" OR AB "patient-centered healthcare" OR AB "patient-centred medicine" OR AB "patient-centered medicine" OR AB "person-centred care" OR AB "person centered care" OR AB "person-centred practice" OR AB "person-centered practice" OR AB "person-centred healthcare" OR AB "person-centered healthcare"
S2	AB "client-centred practice" OR AB "client-centered practice" OR AB "consumer-centred care" OR AB "consumer-centred care" OR AB "personali?ed care" OR AB "family-centred care" OR AB 'family-centered care" OR AB "patient and family centred care" OR AB "patient and family centered care" OR AB "mutual healthcare" OR AB "customer-focused care"
S3	(MH "Patient-Centered Care")
S4	AB "patient centred care" OR AB "patient centered care" OR AB "patient centred healthcare" OR AB "patient centered healthcare" OR AB "patient centred medicine" OR AB "patient centered medicine" OR AB "patient centred care" OR AB "person centered care" OR AB "person centred practice" OR AB "person centred practice" OR AB "person centred healthcare" OR AB "person centered healthcare"
S5	AB "client centred practice" OR AB "client centered practice" OR AB "consumer centred care" OR AB "personali?ed care" OR AB "family centred care" OR AB "family centered care" OR AB "patient and family centred care" OR AB "patient and family centered care" OR AB "mutual health care" OR AB "customer focused care"
S6	S1 OR S2 OR S3 OR S4 OR S5
S7	AB Involvement OR AB participation OR AB meaningful OR AB genuine OR AB effective
S10	AB partnership OR AB collaboration OR AB co-creation OR AB cocreation OR AB "co creation"
S11	AB "Patient engagement" OR "Consumer engagement" OR "Community engagement"
S12	S6 AND S7 AND S10 AND S17 (old codes)

APPENDIX 4

SEARCH STRATEGIES FOR SYSTEMATIC LITERATURE USING PSYCHINFO

CODE	SEARCH TERMS
S1	AB "patient-centred care" OR AB "patient-centered care" OR AB "patient-centred healthcare" OR AB "patient-centered healthcare" OR AB "patient-centred medicine" OR AB "patient-centered medicine" OR AB "person-centred care" OR AB "person centered care" OR AB "person-centred practice" OR AB "person-centered practice" OR AB "person-centred healthcare" OR AB "person-centered healthcare"
S2	AB "client-centred practice" OR AB "client-centered practice" OR AB "consumer-centred care" OR AB "consumer-centred care" OR AB "personali?ed care" OR AB "family-centred care" OR AB 'family-centered care" OR AB "patient and family centred care" OR AB "patient and family centered care" OR AB "mutual healthcare" OR AB "customer-focused care"
S3	(MH "Patient-Centered Care")
S4	AB "patient centred care" OR AB "patient centered care" OR AB "patient centred healthcare" OR AB "patient centered healthcare" OR AB "patient centred medicine" OR AB "patient centered medicine" OR AB "patient centred care" OR AB "person centered care" OR AB "person centred practice" OR AB "person centred practice" OR AB "person centred healthcare" OR AB "person centered healthcare"
S5	AB "client centred practice" OR AB "client centered practice" OR AB "consumer centred care" OR AB "personali?ed care" OR AB "family centred care" OR AB "family centered care" OR AB "patient and family centred care" OR AB "patient and family centered care" OR AB "mutual health care" OR AB "customer focused care"
S6	S1 OR S2 OR S3 OR S4 OR S5
S7	AB Involvement OR AB participation OR AB meaningful OR AB genuine OR AB effective
S10	AB partnership OR AB collaboration OR AB co-creation OR AB cocreation OR AB "co creation"
S11	AB "Patient engagement" OR "Consumer engagement" OR "Community engagement"
S12	S6 AND S7 AND S10 AND S11

APPENDIX 5: TABLE 2: MIXED MEDTHODS APPRAISAL TOOL (MMAT) [22]

	Needman et al (2021)	Westlake et al [25]	Majid & Gagliardi [26]	Bernstein et al [38]	Bar et al [39]	Pinsoncult et al [27]	Smith et al [43]	Warren et al [28]	Carman et al [7]	Pushparj et al [27]	Phillips et al [24]
Screening questions (for all types)											
S1. Are there clear research questions?	x	✓	✓	x	x	✓	x	✓	x	x	✓
S2. Do the collected data a low to address the research questions?	x	✓	✓	x	x	✓	x	✓	x	x	✓
Qualitative											
1.1 Is the qualitative approach appropriate to answer the question?	x	✓	✓			✓		x			✓
1.2 Are the qualitative data collection methods adequate to address the research questions?	x	✓	✓			✓		x			✓
1.3 Are the findings adequately derived from the data?	x	✓	✓			✓		x			✓
1.4 Is the interpretation of the results sufficiently substantiated by data?	x	✓	✓			✓		x			✓
1.5 Is there coherence between qualitative data sources, collection, analysis, and interpretation?	x	✓	✓			✓		x			✓
Quantitative randomised control trial											
2.1 Is randomistaion appropriately performed											
2.2. Are the groups comparable at baseline?											
2.3 Are there compete data outcome?											
2.4 Are outcomes assessors blind to the intervention provided?											
2.5 Did the participants adhere to the assigned intervention?											
Quantitative non-randomised											
3.1 Are the participants representative of the target population?											
3.2 Are measurements appropriate											

regarding both the outcome and the intervention (or exposure)?											
3.3. Are the complete outcome data?											
3.4 Are the confounders accounted for in the design and analysis?											
3.5 During the study period, is the intervention administered (or exposure occurred) as intended?											
Quantitative descriptive											
4.1 Is the sampling strategy relevant to address the research question?											
4.2 Is there sample representative of the target population?											
4.3 Are the measurements appropriate?											
4.4. Is the risk of nonresponse bias low?											
4.5 Is the statistical analysis appropriate to answer the research question?											
Mixed methods											
5.1 Is there adequate rationale for using a mixed methods design to address the research question?											
5.2 Are the different components of the study effectively integrated to answer the research question?											
5.3 Are the measurements appropriate?											
5.4 Are divergences and inconsistencies between quantitative and qualitative research adequately addressed?											
5.5. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?											

	Newell & Jordon [29]	Kane et al. [30]	Perfetto et al [35]	DeCamp et al. [31]	Sapir et al [32]	Purificacion et al [38]	Laurance et al. [40]	Thornton et al [41]	Leonhard [42]	Maslowski [44]	Sloan & Knowles [33]	Harrison et al [34]
Screening questions (for all types)												
S1. Are there clear research questions?	✓	✓	✓	✓	✓	✓	x	x	x	x	✓	✓
S2. Do the collected data a low to address the research questions?	✓	✓	✓	✓	✓	x	x	x	x	x	✓	✓
Qualitative												
1.1 Is the qualitative approach appropriate to answer the question?	x	✓	✓	✓		✓					✓	✓
1.2 Are the qualitative data collection methods adequate to address the research questions?	x	✓	✓	✓		x					✓	✓
1.3 Are the findings adequately derived from the data?	x	✓	✓	✓		✓					✓	✓
1.4 Is the interpretation of the results sufficiently substantiated by data?	x	✓	✓	✓		✓					✓	✓
1.5 Is there coherence between qualitative data sources, collection, analysis, and interpretation?	x	✓	✓	✓		✓					✓	✓
Quantitative randomised control trial												
2.1 Is randomistaion appropriately performed												
2.2. Are the groups comparable at baseline?												
2.3 Are there compete data outcome?												
2.4 Are outcomes assessors blind to the intervention provided?												
2.5 Did the participants adhere to the assigned intervention?												
Quantitative non-randomised												
3.1 Are the participants representative of the target population?												
3.2 Are measurements appropriate regarding both the outcome and the intervention (or exposure)?												
3.3. Are the complete outcome data?												
3.4 Are the confounders accounted for in the design and analysis?												
3.5 During the study period, is the intervention administered (or exposure occurred) as intended?												
Quantitative descriptive												
4.1 Is the sampling strategy relevant to address the research question?		✓			✓							

4.2 Is there sample representative of the target population?		✓			✓							
4.3 Are the measurements appropriate?		✓			N/A							
4.4. Is the risk of nonresponse bias low?		x			N/A							
4.5 Is the statistical analysis appropriate to answer the research question?		x			✓							
Mixed methods												
5.1 Is there adequate rationale for using a mixed methods design to address the research question?		✓										
5.2 Are the different components of the study effectively integrated to answer the research question?		✓										
5.3 Are the measurements appropriate?		✓										
5.4 Are divergences and inconsistencies between quantitative and qualitative research adequately addressed?		x										
5.5. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?		✓										

COMPARISON OF KEYWORD SEARCH TECHNIQUES WITH RESPECT TO ELECTRONIC HEALTH RECORDS

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ABSTRACT

As the world progresses towards automation, manual search for data from large databases also needs to keep pace. When the database includes health data, even minute aspects need careful scrutiny. Keyword search techniques are helpful in extracting data from large databases. There are two keyword search techniques: Exact and Approximate. When the user wants to search through EHR, a short search time is expected. To this end, this work investigates Metaphone (Exact search) and Similar_Text (approximate search) Techniques. We have applied keyword search to the data, which includes the symptoms and names of medicines. Our results indicate that the search time for Similar_text is better than for Metaphone.

KEYWORDS

Electronic Health Records (EHR), Keyword search, Approximate keyword search, Exact keyword search, Metaphone, Similar_text

INTRODUCTION

As the use of Electronic Health Records (EHR) gains momentum, there are immense opportunities for their use in healthcare research and patient treatment. Every patient-doctor interaction has queries related to the previous ailment and medicines prescribed therefor. A mere 10.9% of the patients could memorize drug names [2], which poses difficulties to the doctor in keeping track of previous medication. This creates an enormous scope for EHR. For instance, if the doctor requires the patient's history of hypertension or needs to access data on previous medication, all the physician needs to do is to pull out the HER, for ready access to the information.

EHR comprises data relating to medical history, demographics, lab reports, etc., all of which make EHR voluminous. A manual search of such huge data would be extremely laborious and time-consuming. Consequently, keyword search is the more efficient and expeditious alternative to manual search.

Keywords are ideas and topics that define what the content is about. They are the words and phrases that users enter into search engines. Such keywords can be classified as exact match keywords and approximate match keywords.

This paper aims to quantify the performance of these two techniques, in the context of EHR. We have used the

Metaphone algorithm for exact keyword search and the Similar_text algorithm for approximate search.

LITERATURE REVIEW

Our search was initiated with "Keyword search in EHR," but did not elicit appropriate and relevant articles. We hence modified our search to "Natural language processing in Electronic Health Records." The timeline selected was 2016-2021. This yielded a total of 1945 articles in the first stage, which were filtered for relevance based on the abstracts, reducing the article count to 378. After the perusal of the full articles, we could select 54 for final review. These 54 articles work on seven different levels, of which the phonetic level works on exact keyword search, and as the morphological level deals with insertion, deletion, suffixes, and prefixes, it falls under the category of approximate keyword search. Of these, one paper used exact keyword search, while 3 papers used approximate keyword search. The following table summarizes the literature review.

TABLE 1: LITERATURE REVIEW OF KEYWORD SEARCH

ARTICLE	CONCEPT	LIMITATIONS	KEYWORD SEARCH TYPE
[4]	Uses a combination of string and phonetic search to analyze unstructured medical data. The results show that the combination produces better results than the traditional string distance metrics for misspelled words. The technique is applied to drug names.	Limited to Portuguese language, drug names	Exact keyword search
[6]	Uses surgical pathology and emergency department notes to identify misspelling by using Levenshtein distance algorithm	Uses small corpora of surgical pathology and emergency department documents.	Uses Levenshtein distance algorithm-approximate keyword search
[3]	Automated HIV risk analysis from EHR	No performance improvement with the use of empirical methods; Unigram model did not account for Unigram; negation consideration; information loss due to use of template notes; external validation of model, lack of interoperability	Used approximate keyword search

The aforesaid studies are confined to a particular disease or department, for instance, Cancer or the Emergency Department. However, when it comes to drug interaction, the doctor requires information regarding the medications currently used by the patient. The physician also needs to study drug interaction, because when the patient is taking multiple medicines, he/she is susceptible to side effects. Drug interaction refers to the impact one medicine has on another. Medicines can also interact with alcohol and even some food items; some of these interactions can be serious, even life-threatening. We have hence taken data from every patient-doctor interaction and applied keyword search to symptoms and medicine names. Applying the Metaphone and Similar_text algorithms, we evaluated the comparative benefits of exact and approximate search.

KEYWORD SEARCH

When we input words to locate information, the words we search with are called 'keywords.' Keywords are the keys to unlocking the information we require. This section focuses on the different algorithms used to match keywords, based on the sound or spelling difference.

EXACT KEYWORD SEARCH TECHNIQUES:

[1] studied the SoundEx technique. While translating a string into canonical form, a code of maximum 4-letters is used. The algorithm depends on the first character. This technique has a few limitations like noise intolerance, differing transcription systems, names with particles, silent consonants, name syntax inconsistencies, weak precision, etc. It is suitable for applications with high false-positive and high false negatives.

[5] Henry name matching is based on the Rusell SoundEx method, with the important difference that the earlier method used a 3-letter code. This technique is suitable for the French language.[5] investigated the Metaphone algorithm, in which the system ignores the vowels after the first letter or retains vowels as they are if the string starts with

a vowel. It ignores double letters. It substitutes 'o' for 'th' and 'X' for 'sh'. [5] explored the K-approximation method, which attempts to ascertain the difference between the entered string and a string that is part of the text. [5] mentioned Guth name matching, which performs a letter-by-letter comparison. As per the findings of [5], the Metaphone algorithm has the highest accuracy and average execution time. Though the SoundEx too has the same accuracy as Metaphone, due to the aforesaid limitations of the SoundEx algorithm, we considered the Metaphone algorithm for implementation and comparison.

APPROXIMATE KEYWORD SEARCH TECHNIQUES:

A similar text algorithm system checks for variations in the string by insertion, deletion, and substitution. The number of matching characters is calculated by finding the longest first common substring and repeating the procedure for the prefixes and the suffixes, recursively. The lengths of all the common sub-strings found are added. The Levenshtein algorithm checks the similarity of two strings by calculating single-letter edits (insertion, deletion, substitution).

IMPLEMENTATION AND RESULTS

We have implemented the algorithms using the WAMP server with PHP and MySQL. We have created databases in MySQL incorporating information relating to doctors, patients, and relatives. The patient database includes fields such as the name of the patient, his/her unique id, date of record insertion, symptoms, doctor's specialization, medicines, and 'Medication_till_date'. To complete this database, we sourced data from 'webMD' and drug.com websites. This data includes names of medicines and symptoms to which the medicines are applied. A Random function was used to create records in Excel. We imported this database to MySQL in the WAMP server.

After implementing the algorithms, we applied them to the database of 1062 records. The results are depicted in Table 2 below.

TABLE 2: PERFORMANCE OF KEYWORD SEARCH TECHNIQUES

		SEARCH TIME IN SECONDS		
Medicine	Occurrence	Metaphone	Similar_Text	Comments
Atovaquone	7	0.01473	0.00691	
Atovaquone and Proguanil	12	0.02778	0.01146	No result for Metaphone

Clindamycin	7	0.03208	0.01146	
Doxycycline	7	0.03208	0.01189	
Doxycycline tablets and capsules	49	0.05114	0.01531	No result for Metaphone
primaquine	7	0.02184	0.00978	
Adoxa CK	7	0.02314	0.01035	No result for Metaphone
Adoxa Pak	7	0.02314	0.01272	No result for Metaphone
Adoxa TT	7	0.02129	0.01044	No result for Metaphone
Alodox	6	0.02038	0.00971	
Amoxicillin	7	0.03210	0.01041	
Amoxicillin and Clavulanate Potassium	26	0.03303	0.01202	No result for Metaphone
AmoxicillinA	43	0.02196	0.01002	
Amoxil	7	0.02020	0.00944	
Artemether and Lumefantrine	7	0.02997	0.01176	No result for Metaphone
Avidoxy	7	0.01605	0.01605	
Azelastine HCL drops	19	0.02664	0.01001	No result for Metaphone
Azithromycin	43	0.02543	0.01023	
Carbinoxamine syrup	23	0.02779	0.01007	No result for Metaphone
Crocin	25	0.01199	0.00916	
Cyproheptadine HCL	682	0.04867	0.00657	
Desloratadine	690	0.01533	0.00876	
Doryx	7	0.00919	0.00507	
Doxycycline delayed released tablets	954	0.01646	0.00873	No result for Metaphone
Emadine	19	0.01022	0.00445	
Hydroxycloroquine	19	0.01772	0.00986	
Hydroxyzine HCL	7	0.01913	0.0913	No result for Metaphone
Levocetrizine Dihydrochloride	1062	0.02193	0.00730	No result for Metaphone
Livostine	7	0.01597	0.00807	
Mefloquine	7	0.01464	0.00862	
Metronidazole	1062	0.01502	0.00884	
Morgidox	13	0.02264	0.01023	
Moxatag	7	0.01077	0.00662	
Oracea	7	0.01077	0.00419	
Paracetamol	7	0.01636	0.00616	
Qunidine	1062	0.00487	0.00251	

Rantack	13	0.01960	0.00940	
Sinarest	13	0.07571	0.01583	
Trimox	7	0.02822	0.00954	

TABLE 3: COMPARISON OF ALGORITHMS:

POINTS	METAPHONE ALGORITHM	SIMILAR_TEXT
Concept	Search based on sound	Search based on character sequences
Result	Displays words with a similar sound	Displays words with a similar character sequence
Best	When spelling matches with sound	When character sequences match
Execution time for 1000 records	0.039 seconds	0.013 seconds
Execution time for string length 3(Min Length)	0.014 seconds	0.006 seconds
Execution time for string length 14 (Max length)	0.035 seconds	0.010
Execution time for String length 8 (average length)	0.016 seconds	0.006 seconds
Spaces in keywords	Not accepted	Accepted
Execution time for string length 14 with 1 character change	0.024 seconds	0.010 seconds
Execution time for string length 14 with 2 character changes	0.024 seconds	0.010 seconds
Execution time for string length 14 with 1 character change	0.029 seconds	0.010 seconds

DISCUSSION

The main contribution of this work is the use of keyword search to expedite access to and perusal of EHR. This system attempts to search through the entire EHR. We used both the exact and approximate keyword searches. Our results demonstrated that the approximate keyword search with Similar_Text is faster than the exact keyword search, using Metaphone. We can hence conclude that the search time for the Metaphone algorithm depends on string length. However, in the case of Similar_Text, the search time remains constant for the minimum and average string lengths (3 and 8 characters respectively). It changes when the user desires to search a string with the maximum number of characters. In the case of a misspelled string with 1 and 2-character change using Metaphone, the search time remains constant, i.e., 0.024 seconds. When the maximum length string with a 3-character change is searched, it took 0.029 seconds. Search time for 1, 2, and 3-character changes remained constant for Similar_Text, at 0.010 seconds. For Similar_Text, the in-between string spaces are accepted, which is not possible with Metaphone.

We have used only 1000 records. It is possible to apply and verify results with larger datasets. When we entered the keyword Adoxa tt, the system checked for titi and not for the sound 't.' Further, it did not consider the in-between spaces, which resulted in more false negatives with Metaphone.

Our keyword search technique has several potential clinical applications. For example, it can be used to assist physicians at the point of care to quickly review the patient's history. Additionally, this system facilitates studying

drug interaction. For example, when the patient is under medication for hypertension and also suffers from an allergy, the physician can explore whether the allergy could be due to the beta-blocker in the hypertension medicine. The system helps review patient history when the patient forgets to present the file of previous prescriptions and cannot remember the names of the medicines.

LIMITATIONS AND FUTURE WORK:

By using the keyword search, we are dealing with the phonetic and morphological levels of NLP; to study drug interaction in greater depth, the application of a pragmatic level of NLP to EHR is essential. This is a topic for future study. For example, from the previous symptoms and medications, the system could predict the possible side effects the patient could experience. Future work should study possible performance improvement of Metaphone when there is the inclusion of spaces.

CONCLUSION

For studying the performance of keyword search techniques in her, we used two techniques: exact and approximate search, with Metaphone and Similar_Text. This approach demonstrates the potential support to physicians to have a quick overview of patient history and to prepare a new treatment approach. Similar_Text is faster than Metaphone, which is helpful during an emergency when timely retrieval of information is critical. As Metaphone has not worked well on texts with spaces, there is scope for improving its performance.

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RESEARCH ARTICLE

THE EFFECTIVENESS OF EMPLOYEE PERFORMANCE APPRAISAL SYSTEM IN HEALTH SECTOR: EVIDENCE FROM IRANIAN ORGANIZATIONS

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ABSTRACT

INTRODUCTION:

Performance appraisal is a formal process to review and improve the organizational performance of employees regularly. Despite the appropriate organizational frameworks for performance appraisal, they are not apparently addressing the operational realities of health care organizations. This study thus aimed to examine the effectiveness of the current performance appraisal system of employees at Tehran University of Medical Sciences (TUMS) from the perspective of employees.

METHODS:

The data were collected from 504 TUMS employees using researcher-developed questionnaire following the validation. It consisted of 46 questions covering such various dimensions as performance expectations, communication of performance objectives to employees, self-assessment, performance metrics, surveyors, and performance appraisal results. ANOVA, t-test, Post hoc and Tukey statistical tests were used during analysis process by SPSS 22.

RESULTS:

The performance appraisal system was not found as effective as expected from the employees' perspective and the scores for all its dimensions dropped below the average. The overall performance appraisal score was 2.71 (out of 5). There was also a significant correlation between the employees' education and organizational job group and the score of performance appraisal (p<0.0001).

CONCLUSION:

The current appraisal system according to the results is not well functioning. Therefore, it seems necessary to make urgent changes. The lack of active participation from employees and managers in performance appraisal development process, and the subsequent low motivation to improve their performance seems to be a persistent challenge. A fairly desirable solution might be to decentralize the appraisal processes rendering more authority to managers and supervisors along with empowering managers.

KEYWORDS

Performance appraisal; Effectiveness; Health system.

INTRODUCTION

Health care organizations (HCOs) play a crucial role in societies, as each individual might visit one of these organizations during their lifetime, even before "the cradle to the grave". These organizations employ a variety of financial, human, information, structural and technological resources. Manpower is inter alia considered as "dominant resources" as they are intelligent, trainable, can utilize and optimize the use of other resources and cannot be easily set aside and moved. [1]

Human resources (HRs) contribute substantially in providing health services to society, and are deemed as the best competitive advantage for organizations. In fact, employees are the costliest resource of HCOs whose activities are highly required to be aligned with the mission of such organizations. Serious focus on the competency boost of employees and improving their performance can significantly enhance the performance of organizations. [2, 3] Human resource management (HRM) in HCOs is apparently essential for promoting efficient and effective services and customer satisfaction, [4] as well as achieving better results regarding the health system performance and also people's access to quality health services. [5, 6] Employee performance appraisal (EPA), a key step in HRM cycle, is given special attention in modern management. It is said to be more important than financial management, [7] hence, needs to be under continuous scrutiny especially when the outcome of health system is related to life and health. EPA is a 'formal process by which the work activities of organizations' employees are regularly reviewed and evaluated'.[8] It is fundamental within the complex HRM practices, and stands as a prerequisite for other activities such as feedback, rewarding and punishment, staff development and training in organizations. [9] Proper evaluation of employees' performance through measuring, monitoring, and creating a system of self-control and self-assessment, might have a very crucial role in improving their accountability and ultimately in the improvement of organizational performance. [10, 11] The main purpose of performance appraisal in HCOs is also to monitor performance, boost employee motivation and ultimately improve the overall performance of organization resulting in an increase in the patient satisfaction. [12] In addition, performance appraisal can be useful in designing an educational system to address employee weaknesses as well as in developing an incentive and punishment system.

The poor performance of health system staff may threaten life of people or at least adversely affect their health. Therefore, existence of a well-designed performance appraisal system in HCOs is a compelling need, and performance of employees should be monitored and rectified professionally and regularly. [13]

There are some methods that have been proposed to evaluate employee performance such as the rating scale, grading, reporting sensitive events, management-by-objectives (MBO), checklists, talking and listening, and 360-degree evaluation method. [14]

EPA SYSTEM IN THE IRANIAN HEALTH SYSTEM

Ministry of Health (MoH) is the main body responsible for the process of appraising employee performance in the country. It is practically entrusted to the medical universities, placed under the deputy for resource planning and development, within the purview of the administrative transformation office.

All non-academic staff working in the public HCOs are annually appraised. The jobs are classified into six groups under which, several professions exist; including, information technology, social, financial and administrative, culture and education, health care and engineering. It should be noted that health care category encompasses the largest number of employees, followed by the financial and administrative group among the employees. The EPA has been recently modified. It has become fully electronic, and employees could partly provide suggested indicators for their performance appraisal.

The performance measurement indicators are divided into two categories; general and specific, representing for 100 score points overall; 60 points for general indicators and 40 for specific indicators. General indicators are similar for all job groups representing mainly initiative and innovation, education and training and customer satisfaction. Specific indicators, instead varies depending on the tasks, requirements and qualifications of different job groups.

A study showed that organizational context of public hospitals is now more convenient and receptive to performance appraisal, however, the system itself does not reflect the realities at hospitals [15]. It also found that the existing EPA was ineffective and could not measure the actual staff performance. Despite the great importance of employees' performance evaluation in achieving

organizational goals, it is suffering from some flaws in the HCOs, including mainly; the centralized metric development, lack of attention to the work results and poor performance measurement. [15] Therefore, the purpose of this study was to measure the perceived effectiveness of the current performance appraisal system in accordance to the perspective of employees at TUMS.

METHODS

This descriptive-analytical, cross sectional study was conducted in 2020. The research population included all permanent and contracted employees working in the hospitals, schools, deputies and health care centers of TUMS, the biggest university in the country which is under the auspices of the MoH.

According to this formula and considering N = 14000 and 95% confidence interval and d=0.05 and p and q equal to 0.5, the sample size was calculated 373.

$$n = \frac{\dfrac{Z^2 pq}{d^2}}{1 + \dfrac{1}{N}\left(\dfrac{Z^2 pq}{d^2} - 1\right)}$$

Given the clustering strategy in the sampling, this number was multiplied by 1.2 as a cluster coefficient and finally the sample size was calculated 448. However, we distributed 610 to avoid the possible attrition, which around 501 questionnaires returned (response rate=82.1%).

Due to the fact that staff of TUMS are divided into six general job categories including; information technology, social, financial and administrative, culture and education, health care and engineering, the ratio was considered per category, and the questionnaires were distributed among employees accordingly. Therefore, 317 questionnaires were handed to health care workers, 97 to financial and administrative, 49 to social and culture and education, and 40 questionnaires to information technology and engineering employees.

A researcher developed and administered questionnaire was utilized for data collection. It consists of two main parts: employees' sociodemographic characteristics including

organization name, age, sex, marital status, education, work experience, job group and employment status. The second part contained 46 questions on the various dimensions of EPA system; performance expectations (8 questions), communication of performance expectations to employees (2 questions), self-assessment (4 questions), performance metrics (10 questions), measurement (5 questions), time and feedback (4 questions), surveyors (3 questions), performance appraisal output (4 questions), performance appraisal outcome (5 questions) as well as a question on the staff general evaluation of' EPA system. Some questions include 'I take the EPA serious, EPA results matter for the managers, EPA is a fair system. A five-point Likert-type scale was used; from the complete agreement scoring 5 till complete disagreement with score 1.

In the validation process of questionnaires, the content validity index (CVI) and content validity ratio (CVR) were calculated (0.89 and 0.61, respectively), to represent the importance, simplicity, relevance and clarity of each question, seeking the relevant experts' views; including hospital managers, nursing managers, human resources managers (all with at least five years of job experience) and subject matter experts in HRM. As such, for its reliability, a pilot study of 20 employees was conducted at 2-week intervals on the basis of test-retest, then, R was 0.89.

Prior to completing questionnaires, the study objectives and questionnaire content were briefly explained to the staff members, and the questionnaire was handed if they were willing to take part. It is noteworthy that a total of 610 questionnaires were distributed, and 501 were completed and included for analysis. SPSS (version 22.0) was used for analysis by applying ANOVA, t-test, Post hoc and Tukey statistical tests. The significance level was under 0.05.

RESULTS

Out of the 501 participants, the majority was female (82.2%). In terms of academic degree, 71.1% had bachelor's degree and 22.8% had master degree or higher. More than 55% of respondents had work experience between 6 and 15 years. Regarding job group, most people were from health care category (63%). About 44% were formal employees, roughly 41% were on formal contract-based work and the rest were informal contract workers, and finally, most of the participants (about 25%) were in the age range of 36 to 40 years (Table 1).

TABLE 1. SOCIODEMOGRAPHIC CHARACTERISTICS OF THE PARTICIPANTS

VARIABLE	CATEGORY	NUMBER	PERCENTAGE
Education	Above diploma	30	6
	BSc	352	70.3
	Postgraduate	113	22.6
	No answer	6	1.1
Work experience (years)	0 – 5	62	12.4
	6 – 10	139	27.7
	11 – 15	135	26.9
	16 – 20	71	14.2
	21 – 25	49	9.8
	> 25	38	7.6
	No answer	7	1.4
Job group	Health care	316	63.1
	Financial -administrative	96	19.1
	Culture-education	49	9.8
	IT and engineering	40	8
Job nature	Permanent	185	36.9
	Contract (formal)	60	12
	Contract (informal)	174	34.7
	No answer	82	16.4
Age (years)	≤ 30	107	21.3
	31 – 35	109	21.8
	36 – 40	125	24.9
	41 – 45	85	17
	46 – 50	52	10.4
	> 50	23	4.6

TABLE 2: PERCEIVED EFFECTIVENESS OF THE EPA DIMENSIONS

DIMENSION OF EPA	MEAN (OUT OF 5)	STANDARD DEVIATION
Performance expectations	2.85	0.92
Communicating performance objectives	2.83	1.01
Self-assessment	2.74	0.96
Performance appraisal indicators	2.74	0.84
Performance measurement	2.6	0.88
Time and feedback	2.73	0.94
Surveyors	2.97	1.08
Performance appraisal output	2.52	0.98
Performance appraisal results	2.42	0.98
Overall assessment	2.71	0.82

Table 2 shows mean and standard deviation for different dimensions of performance appraisal from perspective of study respondents.

The highest score among EPA dimensions is associated with "surveyors" (mean = 2.97), while the lowest score was related to the dimension of performance evaluation results (mean = 2.42). Interestingly, the effectiveness of all dimensions of performance appraisal system was below the average (maximum score 5, minimum 1 and average score 3).

The participants' perceptions toward the performance of EPA were significantly different in terms of their education level and job group (table 3).
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TABLE 3. THE PARTICIPANTS' PERCEIVED EFFECTIVENESS OF EPA AND THEIR EDUCATION AND JOB GROUP

VARIABLE	CATEGORY	MEAN	SD	P-VALUE
Educational level	Upper-diploma	126.44	39.37	<0.0001
	BSc	116.76	36.85	
	Postgraduate	137.52	32.14	
Job group	Health care	113.70	36.66	<0.0001
	Financial -administrative	140.89	33.90	
	Culture-education	130.07	25.41	
	IT and engineering	131.60	37.12	

According to the table, the average score of perceived effectiveness of EPA in postgraduates was 137.5, the highest rate compared to the participants from other educational levels. As such, the differences in the perceived effectiveness of the appraisal system in terms of job category were also statistically significant (p-value <0.0001). The highest mean score belonged to the administrative and financial group (140.89±33.90), and the lowest to the health care group (113.70±36.66).

In terms of the participants' age, work experience, job group and marital status, no significant relationship was found among their views on the effectiveness of EPA.

DISCUSSION

This study aimed to evaluate the effectiveness of the EPA system at TUMS. To this end, the perspective of employees was elicited on the EPA's nine dimensions including; the EPA's performance expectations, communicating expectations, self-assessment, metrics, performance measurement, time and feedback, surveyors, appraisal output and outcomes.

AMO (ability, motivation and opportunity) theory is the basic framework for explaining employee performance in organizations. [16] It simply and operationally provides the possibility for diagnosing poor performance of employees in the organization, and implies the underlying ways of improvement. Moreover, several other variables such as employee personality, external expectations, organizational culture, commitment and work conscience of employees, nature of work and environment might affect the level of employee performance and serve as a workable framework for performance evaluation. [17-19] Therefore, the effectiveness of an EPA system can highly depend on the accurate measurement of these variables and their relationships. This is crucial as performance appraisal could serve as an employee motivational process affected by the interactions between employees and their managers. [20] Drawing on the findings, it seems that the organizational climate in the organizations is not suitable or the assessment relationship between the employees and managers as their first supervisor is questionable. This might be partly attributed to the lack of managers' significant role in designing evaluation indicators of the employee performance, and also the shortage of their enough power and capacity to utilize the results of performance evaluation. Therefore, employees

briefing upon their performance appraisal objectives, in line with Drucker's theory of management by objectives, has not been apparently shaped and subsequently employee feedback on performance not sought. [21] As such, the employees are not aware of the real effect of performance appraisal on their performance, and do not recognize the consequences of their desirable or poor performance, even though, regardless of the principle of objectivity in performance appraisal. The good-performing employees in such situations might lose their momentum in maintaining or improving their performance. [22] If organizations simply use a top-down approach to setting the appraisal goals, this is likely to reduce the employee participation and motivation and cause resistance towards the performance appraisal, [23] while the modern approaches are demanding more involvement and participation from various groups. The 360-degree or 720-degree, as decent modern examples, allow for evaluation, once and twice respectively, by peers, subordinates, managers, internal and external customers of organization and, if possible, by suppliers. [24] This is poorly attended in the current EPA. For example, the patients' satisfaction or complaints about employees such as nurses, laboratory staff and imaging technicians could be assimilated in their performance appraisal scores. A recent relevant study indicated that current appraisal system is mostly causing discouragement, indifference or even hostility in the workplace, instead of encouraging and nurturing the abilities and thoughts of the employees. It also should that the staff were unaware of the purpose of performance appraisal. [15] Furthermore, the performance expectations and goals were not properly communicated to employees alluding to the paucity of a dynamic interaction between the employees and their manager or supervisor undermining their participation in performance appraisal process. Roberts points to the importance of employee participation in performance appraisal and its strong association with the high levels of employee satisfaction and their receptivity of appraising [25]. Buchelt also reiterates the importance of employee participation in EPA. [26]

The link between rewards and one's performance, neglected in the current system, is key in the effectiveness of EPAs [21] as it is providing feedback to the employees of their performance. [27] Feedback is more effective when it is provided regularly, objectively, and also given shortly after appraisal. In 'no feedback' situations the good-performing employees might get demotivated, and those of poor performance will persist. Choudhary and Puranik

similarly stressed on the flexibility and appropriateness of EPA for HCOs, clarity of its goals, well development of its indicators and continuous feedback on employee performance. [27] Performance appraisal indicators are considered as the core of EPAs. They were perceived as inappropriate and incompatible which might be partly as they were mostly developed centrally with minimum involvement of staff. They described as subjective and incompatible with the realities of jobs. Rolle and Klinger [28] mention subjectivity of evaluation indicators, over-documentation and also the abuse of performance evaluation results as a tool for punishing employees as the most prominent challenges faced by EPAs. Most of the participants complained about their unawareness of indicators, assessment methods and the subsequent use of their appraisal results and feedback.

The most challenging and critical step in EPA is measuring the actual performance of employees. Standardized measurement instrument including valid and objective metrics and oriented and fair assessors are key for this stage. Employees de facto need to recognize that the measurement and scoring are fair. The participants were dissatisfied with this dimension and assigned low score. Some supervisors might be more strict and conservative and subsequently evaluate their employee harshly leading into perceived unfairness. Therefore, the supervisors and surveyors are recommended to be entirely trained and oriented. Equity theory also postulates the fact that employees always compare their outputs and throughputs with their peers. [29] Gregorodis proposes the use of normal distribution diagrams for a united and fair evaluation of employees. [13]

Highly educated employees obtained higher appraisal score and were more satisfied with the performance appraisal. This might be because of the education and research related performance indicator from which they could easily earn higher score. Besides, the career development and promotion was available for well-trained, qualified and higher-educated staff.

Overall, our results consistent with few similar studies dare to indicate that the current system is not functioning well. It further agree with Zaboli et al. arguing that if this process is continued as in the past and present, it might reduce the employees' motivation and even increase their hostility in the workplace. [15]

The key limitation of study was the hesitation and reluctance of employees to participate in the research, due to their concerns over the effect of their opinions on their performance appraisal score, which was almost resolved by the explanations and reassurance provided by the researcher to keep the confidentiality and privacy high.

CONCLUSION

Performance appraisal is a critical step in HRM that, if done properly, is highly expected to improve employee and ultimately organizations' performance. Evidently, an EPA is more likely to be effective and taken serious, among all, if those are assessed have some 'say' and feedback in its development and implementation. Moreover, it is of a firm link with employees' career and payment system. Otherwise, these system could easily turn into some sort of 'formality' inside organizations. Centralized EPAs might kill the incentives for improvement, thus room for contextualized flexibility for those organizations whose employees are assessed is recommended.

The current system suffered to a large extent from several challenges. Most of the employees and organizations did not recognize the importance of performance appraisal and even care about. They were clearly not involved in performance appraisal process, and were not given feedback on evaluation results. Managers and supervisors also did not possess the adequate authority and capacity to use the results of performance appraisal due to the centralized system of appraisal. Performance-based assessment and payment is a key 'way forward' in developing effective EPAs.

Despite improvements that have been made in recent years to enhance the quality of performance appraisal indicators, they have not been able to serve the specific objectives related to each job.

With all costs and efforts put into employees' appraisal, there should be always a serious concern upon and regular scrutiny and refinement of the effectiveness of in action appraisal systems among policy makers and managers.

CONFLICT OF INTEREST:
The authors have no conflict of interest to declare.

ETHICAL CONSIDERATION:

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RESEARCH ARTICLE

WRITING FOR THE WIDER PUBLIC - READABILITY OF PUBLICLY AVAILABLE BOARD REPORTS

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ABSTRACT

OBJECTIVE

This work aims to evaluate the readability of publicly available board reports from the Local Health Networks (LHNs) in South Australia and the National Health Service (NHS) Trusts in England.

METHOD

Publicly available board reports from the LHNs in South Australia and NHS Trusts in England were identified, screened, and evaluated from January 2020 to August 2020.

RESULTS

The average Flesch Reading Ease score for all LHNs reviewed ranged from 34 ± 10.2 to 57 ± 0.0 (Difficult to Fairly Difficult). In comparison, the average Flesch Reading Ease score for all the NHS Foundation Trusts ranged from 46 ± 1.7 to 60 ± 3.0 (Difficult to Standard). The average Reading Ease score for metropolitan and non-metropolitan LHNs was 43 ± 8.1 and 41 ± 6.0 (Difficult to read). In contrast, the average Reading Ease score for metropolitan and non-metropolitan NHS Trust was Fairly Difficult with 53 ± 4.2 and 50 ± 3.5 respectively.

CONCLUSION

The evaluation results suggest that there is scope for improving the quality of publicly available board reports from the boards reviewed in terms of their readability by the public.

KEYWORDS

Public Reporting, Governance Board, Health Service Management, Readability, Public Engagement, Accountability, Transparency

BACKGROUD

Recently, healthcare organisations have increasingly been placed under the control and direction of healthcare governing boards. [1-3] In 2019, the South Australian Government introduced governing board oversight for all the Local Health Networks (LHNs) as a strategic reform of t he healthcare system. [4] In establishing the boards, a charter was also created. The charter details the roles and responsibilities of the Boards. [5] This included the timely publication of the agenda and minutes of meetings as a mechanism to ensure transparency and accountability, and as a means to gain public engagement.

The English National Health Service (NHS) has a more extended history of striving to achieve good board governance. Other countries, including Australia, have compared their health systems to the NHS. Both nation's healthcare governance boards are primarily responsible for providing strategic oversight and guidance to health facilities and systems within their jurisdictions as required, mainly through law.[5, 6]

Public reporting is a critical mechanism for stakeholder engagement and ensuring accountability and transparency of governing boards. [7-10] Accountability *"encompasses the procedures and processes by which one party justifies and takes responsibility for its activities such as for achieving various organisational goals.*[7]*"* Board reports often contain valuable information relating to resource allocation and future plans for healthcare delivery. [9,11] It is crucial that the public, who are primary stakeholders of the boards, understand the reasons, context, and environment for governance boards' plans and decisions. [1,12] Primary stakeholders are individuals that directly benefit or are impacted by decisions or actions caused by others. [13] Existing research suggests that more desirable health outcomes are achieved when the public or consumers are appropriately engaged and participate in decision-making. [14,15] The NHS Trusts and LHNs boards are required by legislation to engage their communities in decision-making processes by publishing their board meeting reports on accessible websites free of charge. [5,6] Indeed, the charter of the LHNs in South Australia require Boards to engage with the community and therefore reports should be accessible. [5]

The notion of readability matters when considering reports published for the general public. Readability can be defined as how easy a text is to understand due to the style of writing. [16] The use of readability formulae have been the most common and quickest way to measure text readability. [16] Developed in the early 20th century, most readability formulae are simple algorithms that aid in the objective evaluation of the readability of a text.

Much of the current literature examining governing board public reports have so far focused on issues such as the clinical focus and content of board meetings reports. [1,3,17]; the engagement of health service boards with quality-of-care issues [2,18]; public reporting of health outcomes, quality and costs [19-21]; and the ease of obtaining information from boards. [22] There has been little research focusing on the quality of these board reports in terms of readability by the general public. [20]. Therefore, this work aims to examine the readability of publicly available board reports from the Local Health Networks in South Australia and the NHS Trusts in England.

RESEARCH METHOD

Data Sample Collection and Screening

Publicly available board reports were collected from the web pages of all ten Local Health Networks (LHNs) in South Australia (SA) from January 2020 to August 2020.

For NHS Trusts in England, a total of 493 NHS Trusts were initially identified through a comprehensive web search. The identified NHS Trusts were then screened using the following criteria or steps.

First, all abolished NHS Trusts were removed from the sample. Second, NHS Foundation Trusts were selected because they are the newest type of NHS Trusts. Third, NHS Foundation Trusts with a hospital component, similar to the LHNs in SA, were selected.[23] Fourth, NHS Foundation Trusts that were rated "outstanding" in the Care Quality Commission (CQC)'s "well-led" and "overall" rating scales for 2020 were selected.[24,25]) Finally, duplicate NHS Foundation Trusts were removed, bringing the final sample number to 9. The published board reports from the 9 NHS Foundation Trusts were then collected from January 2020 to August 2020. The flowchart in Figure 1 below illustrates the selection, as mentioned above, for the NHS Trusts.

FIGURE 1: A FLOW CHART SHOWING THE SEARCH, SCREENING, AND VERIFICATION PROCESS
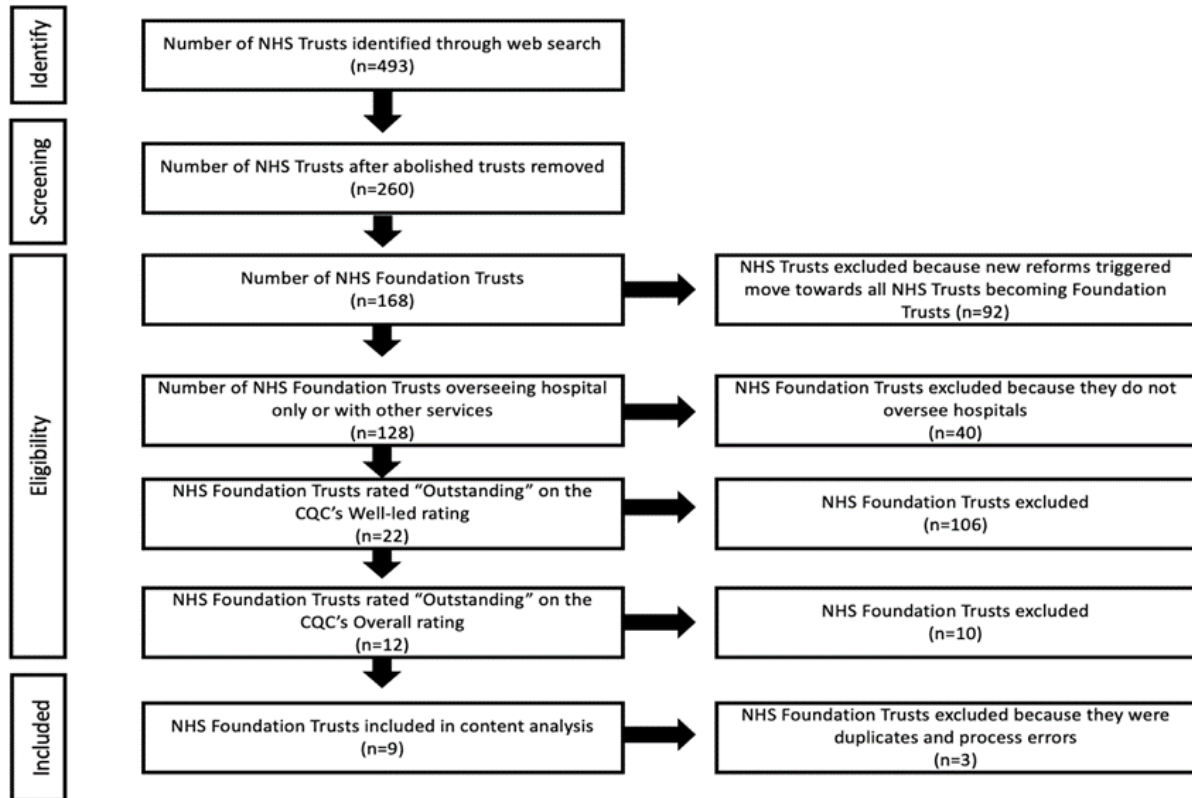
Data Analysis

We used the Flesch Reading Ease Score to evaluate the readability of publicly available board reports from the Local Health Networks in South Australia and the NHS Trusts in England. The Flesch Reading Ease Score is a readability test developed by Rudolph Flesch in 1948. [26] The Flesch Reading Ease Score is a well-established instrument often freely available in word-processing software such as Microsoft® Word. It often proxies as a gold-standard comprehension test and has a correlation coefficient of >0.9 with other comprehension tests.[27]

The test calculates the level of education a person needs to easily read a piece of text by assessing the average sentence length and syllables per word.[27] A web-based application called "Readable", which uses the Flesch mathematical formula to measure the readability of each board report collected, was applied: [16,28,29]

$$206.835 - 1.015\left(\frac{total\ words}{total\ sentences}\right) - 84.6\left(\frac{total\ syllables}{total\ words}\right)$$

The Flesch Reading Ease formula scores texts between 0 to 100. A higher score means a text is more readable, and a lower score means the text is less readable.

Grade Scale

We used the reading grade scale corresponding to the United States (US) grade level of education, as this is the most utilised grade scale in publications. [16] (16). As shown in Table 1, the US school grade levels are equivalent to the Australian education framework, and one year ahead of the United Kingdom (UK) schooling system. [30]

TABLE 1: US AND AUSTRALIAN SCHOOL GRADE LEVELS

Flesch Reading Ease Score	US & Australian education level	Readability Rating
0–29	College graduate	Very difficult
30–49	High school or 1-2 years of college	Difficult
50–59	10th–12th Grade	Fairly difficult
60–69	8th-9th Grade	Standard
70-79	7th Grade	Fairly easy
80–89	6th Grade	Easy
90–100	5th Grade	Very Easy

TABLE 2: SHOWS THE TOTAL NUMBER OF BOARDS REPORTS REVIEWED FROM JANUARY 2020 TO AUGUST 2020

Regions	Name of Health Service	Board Reports Reviewed (Jan 2020 - Aug 2020)
South Australia	Barossa Hills Fleurieu Local Health Network	7
	Central Adelaide Local Health Network	3
	Eyre and Far North Local Health Network	6
	Flinders and Upper North Local Health Network	7
	Limestone Coast Local Health Network	7
	Northern Adelaide Local Health Network	7
	Riverland Mallee Coorong Local Health Network	8
	Southern Adelaide Local Health Network	7
	Women's and Children's Health Network	5
	Yorke and Northern Local Health Network	6
England	Kingston Hospital NHS Foundation Trust	3
	Royal Papworth Hospital NHS Foundation Trust	6
	Salford Royal NHS Foundation Trust	5
	South Warwickshire NHS Foundation Trust	6
	The Christie NHS Foundation Trust	1
	The Newcastle Upon Tyne Hospitals NHS Foundation Trust	5
	The Royal Marsden NHS Foundation Trust	2
	University Hospitals Bristol and Weston NHS Foundation Trust	2
	Western Sussex Hospitals NHS Foundation Trust	3
Total Board Reports Reviewed		96
Average Board Reports Reviewed		5
Maximum Number of Reports Reviewed per Health Service Board		8
Minimum Number of Reports Reviewed per Health Service Board		1

RESULT

For the LHNs in SA (Figure 2), the average (± standard deviation) Flesch Reading Ease score for the metropolitan, non-metropolitan, and state-wide local health network was 43 ± 8.1 (Difficult: College Level), 41± 6.0 (Difficult: College Level) and 57 ± 0.0 (Fairly Difficult: High School Senior Level), respectively. All the metropolitan and non-metropolitan local health networks had reading ease scores less than 50 (Difficult to read). Flinders and Upper North Local Health Network, a non-metropolitan organisation, had the most difficult board reports to read with an average score of 34 ± 10.2 (College Level). In contrast, the State-wide LHN had a comparably more desirable reading ease score of 57 ± 0.0 (Fairly Difficult). No LHN had a reading ease score of more than 60 (Standard Readability Level). The average Flesch Reading Ease score for all LHNs reviewed ranged from 34 to 57 (Difficult to Fairly Difficult).

FIGURE 2: LHNS IN SA – AVERAGE FLESCH READING EASE SCORE BY REGION (JAN 2020 – AUG 2020)
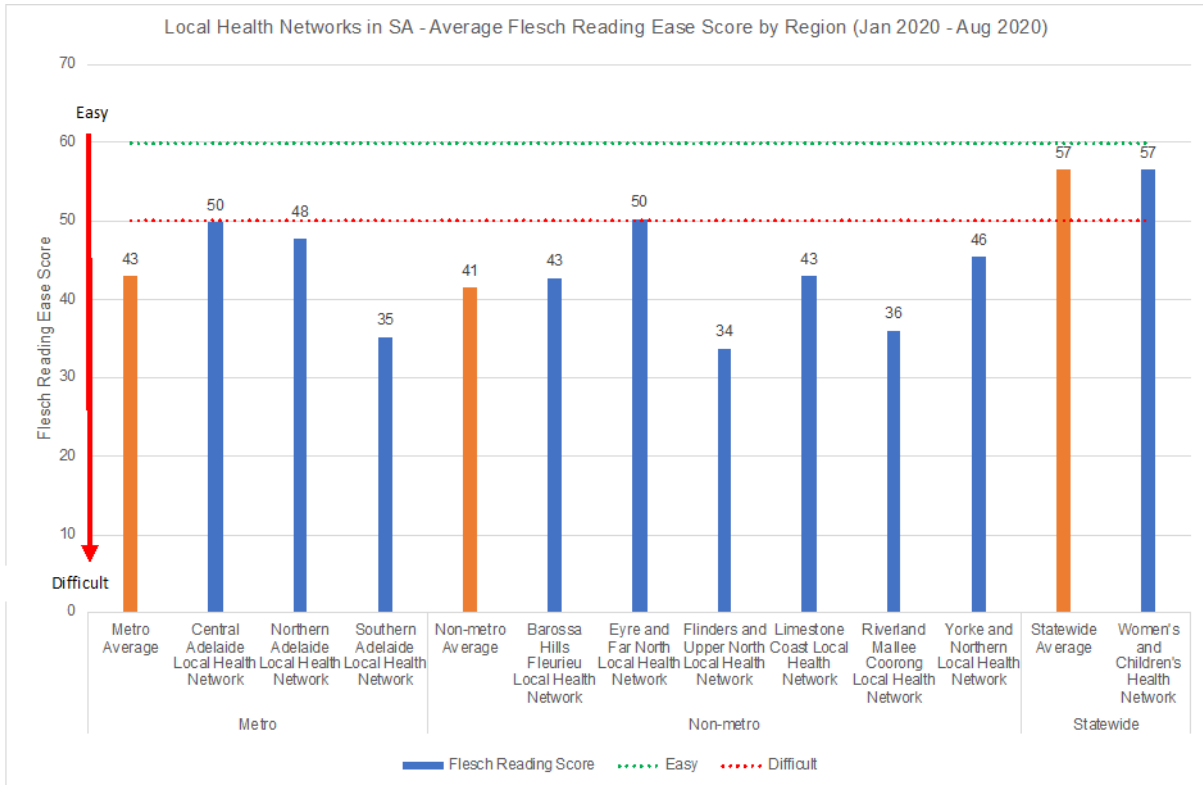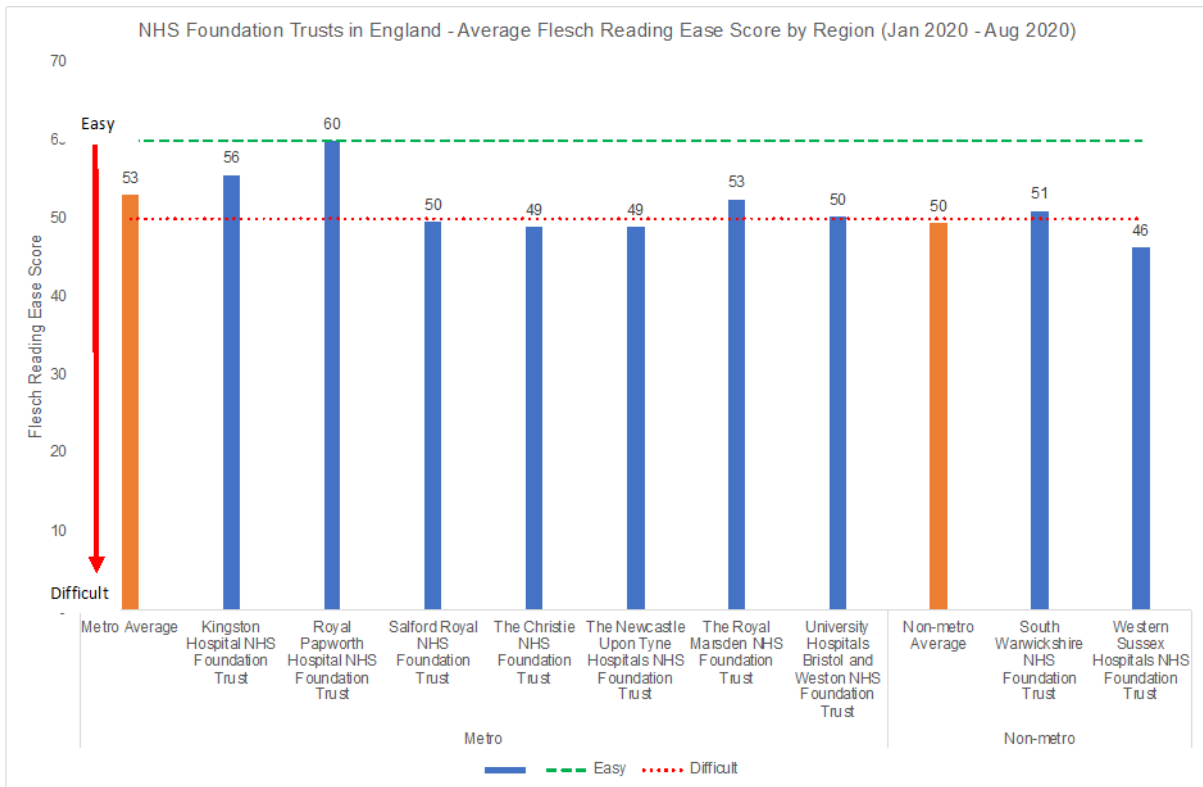

FIGURE 3: NHS FOUNDATION TRUSTS IN ENGLAND – AVERAGE FLESCH READING EASE SCORE BY REGION (JAN 2020 – AUG 2020)

For the NHS Foundation Trusts in England (Figure 3), the average (± standard deviation) Flesch Reading Ease score for the metropolitan and non-metropolitan was 56 ± 4.2 (Fairly Difficult: High School Senior Level) and 50 ± 3.5 (Difficult: College Level), respectively. 3 metropolitan NHS Foundation Trust had reading ease scores between 50 and 60 (Fairly Difficult to Standard). The NHS Foundation Trust,

Royal Papworth Hospital NHS Foundation Trust had a reading ease score of 60 ± 3.0 (Standard: Grade 8-9). In contrast, a non-metropolitan NHS Foundation Trust, Western Sussex Hospitals NHS Foundation Trust, had the most difficult to read score of 48 ± 1.7. The average Flesch Reading Ease score ranged from 46 to 60 (Difficult to Standard).

TABLE 3: DISPLAYS THE MEAN, STANDARD DEVIATION, MAXIMUM AND MINIMUM FLESCH READING EASE SCORES FOR NHS TRUSTS AND LHNS.

Regions	Name of Health Service	Mean Flesch Reading Ease Score	StdDev. Flesch Reading Ease Score	Max. Flesch Reading Ease Score	Min. Flesch Reading Ease Score
South Australia	Barossa Hills Fleurieu Local Health Network	43	2.4	46	38
	Central Adelaide Local Health Network	50	2.3	53	48
	Eyre and Far North Local Health Network	50	1.7	52	47
	Flinders and Upper North Local Health Network	34	10.2	50	22
	Limestone Coast Local Health Network	43	1.5	45	41
	Northern Adelaide Local Health Network	48	6.8	54	34
	Riverland Mallee Coorong Local Health Network	36	1.8	38	33
	Southern Adelaide Local Health Network	35	18.5	44	-7
	Women's and Children's Health Network	57	3.3	60	52
	Yorke and Northern Local Health Network	46	4.3	52	41
	Metropolitan LHNs	44	8.1	50	25
	Non-metropolitan LHNs	42	6.0	47	37
	State-wide LHN	57	0.0	60	52
England	Kingston Hospital NHS Foundation Trust	56	0.8	56	55
	Royal Papworth Hospital NHS Foundation Trust	60	3.0	64	57
	Salford Royal NHS Foundation Trust	50	5.0	55	42
	South Warwickshire NHS Foundation Trust	51	3.4	56	47
	The Christie NHS Foundation Trust	49	0.0	49	49
	The Newcastle Upon Tyne Hospitals NHS Foundation Trust	49	3.0	52	46
	The Royal Marsden NHS Foundation Trust	53	1.5	54	52
	University Hospitals Bristol and Weston NHS Foundation Trust	50	0.7	51	50
	Western Sussex Hospitals NHS Foundation Trust	46	1.7	48	45
	Metropolitan NHS Trusts	52	4.2	54	50
	Non-metropolitan NHS Trusts	49	3.5	52	46

DISCUSSION

The public health sector represents a significant investment of resources. For instance, the total spending on health in 2019-20 is estimated to be $81.8 billion, 16.3% of the Australian Government's total expenditure.[31] Therefore, it is imperative that there is transparency and accountability by those charged with running public health care organisations and that the wider public can engage with public records. This work set out to assess the readability of publicly available board reports from the Local Health Networks in South Australia and the NHS Trusts in England. The result suggests there is scope for improving the quality of publicly available board reports in terms of their readability by the general public.

Perhaps the most striking finding is that only one governing board, the Royal Papworth Hospital NHS Foundation Trust, had board reports with an average Flesh Reading Ease score of 60 ± 3.0 (Standard: Grade 8-9). A text with a score of 60 or more is considered accessible to the general public.[30] Other governing boards had reports ranging from Difficult [34] to Fairly Difficult. [59] This means that only members of the public with College or High School Senior Educational Levels can easily understand the contents of the publicly available reports. According to the Australian Charter of Healthcare Rights, the general public, without exemption, have the right to be informed and participate in health service planning and decision making in a clear and open way (32). In order to achieve meaningful public engagement, transparency and accountability, board

reports should be created with the aim of informing the least educated or literate members of the public. Although the solution could simply mean publishing report versions specifically prepared to cater to those with a lower literacy level, it has been suggested that such reports could lead to disengagement. [33,34] This may be so for subject matter experts but not necessarily the general public, who often are individuals with low literacy levels. [30,35]

Another important finding was that the most difficult board report to read belonged to a non-metropolitan organisation, Flinders and Upper North Local Health Network, with a Reading Ease Score of 34 ± 10.2. Generally, members of the public living in non-metropolitan areas tend to have only high school educational level.[36] On average, according to the Australian Institute of Health and Welfare, Australians living in rural and remote areas have poorer health outcomes partly due to a level of disadvantage related to education. [37] Furthermore, the other metropolitan and non-metropolitan LHNs had scores less than 50 (Difficult to read). In contrast, the average Reading Ease score for metropolitan and non-metropolitan NHS Trust was rated Fairly Difficult with 53 ± 4.2 and 50 ± 3.5, respectively. The difficult reading levels suggest that even if the public is interested in the publicly available reports, it is likely that there would be low levels of public engagement with the reports as a consequence of how the material is written.

Readability formulae have been subject to criticism as being too simplistic. For example, the formulae do not consider the readers' comprehension and detect the use of concise but technical words.[33,34,38] However, even critics contend that results derived from readability formulae could serve as a foundation for further analysis on other aspects of readability, such as the readers understanding of the context.[30,34,39] There are calls for developing more complex instruments that objectively examine visual or infographics used by international organisations such as the World Health Organisation to communicate complex information to the general public.[30] The analysis of video communications used by Governance Boards in England NHS was outside the scope of this research but could serve as an additional means of public reporting and engagement by LHNs in South Australia.

The result above reflects the need to review the relevant laws on public reporting to include a focus on the quality of published reports in terms of readability. This will ensure improved public engagement and not merely compliance to publish reports.

Our findings in this evaluation open the door to future research to review the readability of publicly available reports from other governing boards in Australia and England as a proxy to accessing the degree of genuine public engagement by governing boards.

ETHICS APPROVAL
Not applicable.

COMPETING INTERESTS
The authors declare no competing interests.

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FROM CHAPLAINCY TO SPIRITUAL CARE: TURNING POINTS FOR AN EMERGING HEALTH PROFESSION

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ABSTRACT

OBJECTIVES

National standards in Australia acknowledge the significance of spiritual care in the provision of holistic care, understanding that peoples' beliefs and values impact their experience and health outcomes. While spiritual care has been provided in Australian hospitals for many decades little attention has been given to changes in the workforce and the implications for quality of care. This study aimed to further understanding of the key influences and mechanisms for change to ensure safe and high-quality spiritual care provision in Australia by a qualified and credentialed workforce.

METHODS

This study used a qualitative case study design which included interviews and analysis of archived records. Narrative analysis produced an extensive organisational case study from which a timeline of key changes significant to the spiritual care workforce was constructed to inform this paper.

RESULTS

There have been movements towards a professional spiritual care workforce, but progress has been slow, and inconsistency persists across Australia. Five key influences were identified that provide a basis for future progress: the need for evidence, cooperation amongst stakeholders, investment by government and health service management, and leadership and advocacy from spiritual care peak bodies.

CONCLUSIONS

Attention to historical turning points enables understanding of the influences for change. These can become opportunities for health management to further progress towards a qualified and credentialed spiritual care workforce able to deliver safe and high-quality spiritual care.

KEYWORDS

quality and safety, spiritual care, workforce, hospitals

INTRODUCTION

There is a long history of spiritual care provision in Australian hospitals and yet little has been published on the changes to models of care over these decades, and the implications of these for the quality of care received by patients, families and staff. One publication was identified that details the history of chaplaincy in two hospitals in Brisbane [1] and serves to illustrate the inconsistent approach to spiritual care when contrasted with the state of Victoria. In Brisbane, hospital chaplains have remained religiously identified and solely employed by faith communities, a model reinforced by the recently released *Framework for the Integration of Spiritual Care in Queensland Health Facilities*. [2] In contrast, Victoria has increasing numbers of spiritual care practitioners from a diverse range of backgrounds employed directly by health services and working as members of the multi-disciplinary team. [3] Qualified and credentialed spiritual care practitioners are an expectation of the Victorian model. [4] The question of professional identity of those providing spiritual care continues to garner international attention and should be of interest to health management with responsibility for ensuring high standards of care. [5, 6] The expectation for spiritual care is apparent in current Australian standards, [7, 8] and pastoral care is included as a common health profession in the Health Professionals and Support Services Award 2020. [9] Yet there is no national agreement on the workforce required to deliver this care and spiritual care continues to be provided by a range of people with varying skills, competencies and accountabilities. To date, evaluation of this workforce in Australia has been limited. [10, 11] Confusion is further exacerbated because the roles and scope of practice for different providers are not adequately defined. [12] These variations pose a risk to the quality of spiritual care and the safety of those receiving this care. This should be of concern to the spiritual care sector, and to the health service management and governments responsible for providing safe, quality health care. Spiritual health is one of the domains of care, [13] and it is therefore incumbent upon governments and health services to ensure equitable access to safe, quality spiritual care. Endorsement and recognition of qualified and credentialled spiritual care practitioners as health professionals would be a significant first step in this process.

This paper contributes to this goal through the analysis of data from a case study of an organisation based in

Victoria. In writing of the difficulties of addressing health workforce issues, Boyce (2008) acknowledges the 'benefit of looking back before rushing forward'. [14] The data covers nearly seven decades and provides a rich source from which to understand the key turning points that have led to progress in Victoria, and to posit the steps required to reach a nationally consistent approach to recognition and endorsement of a professional spiritual care workforce.

METHOD

The data for this paper come from a larger project involving the development of an extensive case study of Spiritual Health Victoria (since 2019 known as the Spiritual Health Association). Case study research is a qualitative method involving the exploration of "a real-life, contemporary bounded system (a case)…over time, through detailed, in-depth data collection involving multiple sources of information". [15]

The development of the case study was informed by three sources of data.

1. Hard copy records from organisational archives 1955-2006
2. Electronic organisational records 2006-2018
3. Interviews with 17 participants.

Data Collection

Data were collected through two main methods:

1. Documentation (hard copy and electronic): archival records held by Spiritual Health Victoria (SHV) included minutes of meetings, letters, publications, conference proceedings and annual reports. Permission to access organisational records was sought and granted from the Chair of the Board of Spiritual Health Victoria.

2. Narrative Interviews: A letter or email inviting participation was sent to past SHV committee members; hospital executives; and Government personnel with a Participant Information Statement included with the letter/email of invitation. Potential participants were invited to contact the researcher to participate and signed consent was received prior to the commencement of the interview. Ethics approval to conduct interviews was received from La Trobe University, Melbourne, reference number HEC18055. Seventeen narrative interviews were conducted using an unstructured, in-depth form and followed a

narration schema as described by Jovchelovitch and Bauer. [16] All interviews were audio recorded.

Data Analysis

Narrative analysis can be applied to both archival materials and interviews [17, 18] thus providing converging lines of inquiry in a triangulation allowing a full description of the case. [19] Transcripts were made of all narrative interviews. Data were analysed with a focus on providing a chronological ordering of events. Data were entered into Excel spread sheets and timelines created for each decade to highlight significant transitions. Multiple sources of data enabled cross checking of factual information and enabled a thick description to be developed to 'help facilitate understanding of a culture'. [20] For this article only data relevant to the spiritual care workforce are presented. Key changes were identified from the timelines created for each decade to construct a timeline from the 1950s to 2010s.

RESULTS

The key changes identified in the data of significance to the spiritual care workforce in Victoria (and in some cases more broadly in Australia) since the 1950s are provided chronologically in Table 1 below.

TABLE 1 KEY CHANGES SIGNIFICANT TO THE SPIRITUAL CARE WORKFORCE FROM 1950-2019

DECADE	KEY CHANGES RELATED TO THE SPIRITUAL CARE WORKFORCE	YEAR
1950s	1. Key church leader influenced by the model of full-time chaplains employed by the National Health Service (NHS) in the United Kingdom.	Mid-1950s
	2. Key church leader influenced by the Clinical Pastoral Education (CPE) method used to train hospital chaplains in the USA.	Mid-1950s
	3. Government agrees to a request from the churches to provide a grant towards the costs incurred by them employing chaplains in hospitals	1955
	4. Churches Advisory Council (CAC) (Hospital Chaplains) formed to advise Victorian Government	1956
1960s	1. CPE flourishes leading to increased numbers of trained chaplains.	1960s
	2. Increased numbers of chaplaincy appointments by the Christian churches supported by the Government grant.	
1970s	1. Increasing acknowledgment of the specialist and integral role of the hospital chaplain by the CAC	(1972, 1973)
	2. Establishment of the Interchurch Chaplaincy Committee of Victoria (ICCV) to advocate for Interchurch Chaplains (those able to work across denominational boundaries)	1974
	3. Australian Health & Welfare Chaplains Association (AHWCA) commenced (chaplains increasingly seeing themselves as distinct workforce)	1974
	4. Two Victorian hospitals directly employ full-time chaplains	1975, 1978
	5. First strategic seminar held including key Government stakeholders, hospital executives and chaplains raising profile of growing field of chaplaincy	1979
1980s	1. ICCV produced a paper, *The Interchurch Chaplain* and *Standards and Procedures for Appointment of Full-time Chaplains in Hospitals and Institutions*	1983
	2. Second strategic seminar held including key Government stakeholders, hospital executives and chaplains. Questions raised about the difference between chaplains employed by	1983

	health services and those employed by the churches and the challenges of creating a team concept among persons with different employers	
	3. Noted the movement from chaplains seen as 'outside visitors' to 'integral part of the staff'	Seminar 1983
	4. Noted the setting up of Pastoral Care Departments within hospitals, with some hospitals funding positions	Seminar 1983
	5. CAC produced a *Statement of Policy for Chaplaincy in General Hospitals* recognising the model of full-time chaplains as the most appropriate way to provide ministry in a major hospital and outlining the need for specialist training	1983
	6. Increased emphasis on accountability with expectation of chaplaincy reported data at Austin Hospital	1986
	7. Australian College of Chaplains formed to increase professionalisation	1987
1990s	1. Revision of the 1970s *Standards and Procedures for the Appointment of Full-time Chaplains in Hospitals and Institutions*	1990
	2. ICCV consolidate Inter-church role by strengthening chaplains' accountability through issuing of Interchurch Authorities	Mid-1990s
	3. Department of Health & Community Services invite ICCV to enter into Health Service Agreement for first time	1994
	4. ICCV influenced by USA, begin to discuss need for interfaith focus	1997
	5. ICCV hold first strategic planning day to set future directions	1999
2000s	1. Seeding grants made possible through increase in Government funding and these used to establish ecumenical chaplaincy coordinating positions in partnership with hospitals	2000
	2. WHO ICD-10AM Pastoral Care Intervention Codes launched in Australia	2001
	3. Pastoral Care Coordinators Network (PCCN) established creating representation from hospitals to liaise with Heads of Churches. PCCN voice expectation of hospital participation in appointments of chaplains to hospitals	2002
	4. Healthcare Chaplaincy Council of Victoria Inc (HCCVI) (formally ICCV) appoint CEO to raise profile of work of chaplaincy and pastoral care across health services	2002
	5. Government funds HCCVI research and report produced recommending model of Pastoral Care Coordinators in every hospital and directly employed by the hospital	2006
	6. First meeting of state chaplaincy bodies in Australia to discuss national direction	2006
	7. Chaplaincy and pastoral care included in the Victorian Department of Health *Policy & Funding Guidelines* for health services	2007
	8. HCCVI publish *Capability Framework for Pastoral Care and Chaplaincy*	2008
	9. HCCVI meet with Department of Human Services (DHS) to discuss recognition of pastoral care as allied health professionals	2008

	10. HCCVI develop *Guidelines for Volunteers* in consultation with PCCN	2009
	11. HCCV publishes *Guidelines for Writing in Patient Notes*	2009
	12. AHWCA votes to wind up and become Spiritual Care Australia – the professional association for chaplains, pastoral and spiritual carers	2009
2010s	1. Interchurch Authority program discontinued in light of: the increasing need for spiritual care to be provided for people of a wide range of spiritual identities and; revision of the Capabilities Framework to include capacity for providers to respond to this reality	2011
	2. HCCVI hosts consultation on a framework proposing full integration of pastoral care in health services. Consultation attended by Government representatives, health service representatives and other key stakeholders	2012
	3. Spiritual Care Australia publish *Standards of Practice*	2013
	4. HCCVI becomes Spiritual Health Victoria (SHV)	2014
	5. Department of Health set new KPIs for SHV to include: credentialling guidelines for faith appointed chaplains, guidelines for best practice, consistent data collection and a focus on patient outcomes	2014
	6. *Spiritual Care Providers (Faith Community Appointed) Credentialling Framework* published by SHV	2015
	7. *Towards Best Practice: Spiritual Care in Victorian Health Services Framework* and *Spiritual Care Minimum Data Set Framework* published by SHV	2016
	8. *Capability Framework for Spiritual Care Practitioners in Health Services* published by SHV	2016
	9. Department of Health and Human Services moves towards recognition of spiritual care as an allied health profession	2016
	10. *National Guidelines for Spiritual Care in Aged Care* published by Meaningful Ageing Australia in partnership with SHV	2017
	11. National Consensus Conference held to agree a nationally consistent approach to spiritual care	2017
	12. ICD-10AM/ACHI/ACS Spiritual Care Intervention Codes revised 10th edition published	2017
	13. Commencement of research partnership with La Trobe University to investigate the contribution of spiritual care to patient outcomes	2018
	14. SHV becomes Spiritual Health Association (SHA)	2019
	15. *Spiritual Care in Medical Records: A Guide to Reporting and Documenting Spiritual Care in Health Services* published by SHA	2019
	16. *Guidelines for Quality Spiritual Care in Health* launched by SHA (revised and published 2020)	2019

Interview data confirmed two key workforce transitions that can be seen in the chronological ordering of events above. The first describes the service received by patients and is a movement from a narrowly focussed to a more broadly available service. This is a transition from chaplaincy to spiritual care. "It's my thoughts about what should have

been happening at the time *[1990s]*, was a move from chaplaincy, which I think is a confused word, but from pastoral care to parishioners, into spiritual care for whoever wants it." (Interview 08).

The second focuses on those providing the care and the locus of accountability, recognising a shift from those seen as external providers to intrinsic members of the health care team. This could be described as a transition from religious representatives, accountable to their religious bodies, to healthcare professionals with direct accountability to the hospital. "I think we have transitioned from a place where spiritual care was seen as an extension of pastoral care, or a place to organize the last rites and funerals, to now being an essential element of the healing and wellness process." (Interview 04)

"So, I think historically we've gone from a sort of individual, probably not so connected spiritual care, to a connected care, more a part of the clinical care team…" (Interview 09).

DISCUSSION

Looking back provides some insight into the complexities of spiritual care provision over the decades. It is important to acknowledge the societal changes that have occurred throughout the period under investigation: greater immigration and changing demographics, increasing secularisation along with increased mistrust of institutions, and the impact of globalisation. All of these have had an influence on the structure and practice of spiritual care, but a thorough exploration of this is outside of the scope of this paper. Whilst acknowledging the broader context within which this discussion takes place, the focus of this paper is to explore what can be learnt from the case study presented.

Table 1 demonstrates that transitions have occurred across the time span covered and yet full integration of spiritual care practitioners as valued members of the multi-disciplinary health care team, envisaged by leaders in the field in the 1970s and 1980s, has yet to be realised. The incremental change illustrated in Table 1 is in keeping with the concept of evolution in the policy process, providing some encouragement that there is slow progress towards acceptance of a professional spiritual care workforce, at least in Victoria. [21] The two identified workforce transitions were reinforced by the interview data, noting changes

over time in understandings of the nature of the service being delivered and of the providers and their accountabilities. The data demonstrate key turning points at each decade, and these can increase our understanding of what is needed for change and become opportunities to take us forward. Turning points in narrative analysis as described by Denzin, are moments of transition, interruption and tension. [15] It is possible to identify in the data a number of influences for these turning points:

1. *Attention to international models and research*: Evidence and engagement with international colleagues has informed understandings of best practice and guided development of key documents. This has been crucial to the identified workforce transitions impacting delivery of service and providers of care.
2. *Cooperation between the churches*: Collaboration by the original cooperating churches laid the foundations for innovation. Their willingness to engage with emerging evidence and with the broader changes in society created the context for new initiatives. This also ensured the increasing diversity of stakeholders' voices gathered 'around the table' to influence and shape progress in the field.
3. *Government support and investment*: From the beginning, the development and growth of spiritual care in the health sector has been dependent on support and investment by Government in research, education, advocacy and service delivery.
4. *Investment from health service management*: Recognition by health service management of the value and contribution of spiritual care to patients' health and wellbeing has enabled the shift towards an integrated workforce.
5. *Leadership and advocacy from the spiritual care peak bodies*: The data illustrates the significant role of leadership and advocacy by the spiritual care peak body in Victoria specifically, whilst recognising the role of other national peak bodies. This work has fostered and enabled the influences listed above and led to growth in the sector.

These influences continue to support progress towards a professional spiritual care model in Victoria, but this has not been the case nationally and the move towards a nationally consistent approach has been slow, even though the contribution of spiritual care to enhanced quality and safety in health care has been established. [22] A national spiritual care peak body needs to identify the

competing interests of stakeholders at a national level as an initial step in the policy process, recognising that progress is more likely if the policy goals are shared at state, territory and federal levels. [23] Ongoing tensions between church employed and health service employed models of spiritual care can become opportunities for further progress if tensions are understood as turning points in the process. In fact, these tensions became even more apparent as the health system coped with the COVID-19 pandemic. COVID-19 has been a major interruption and may provide a significant turning point for spiritual care. International research exploring the impact of the pandemic on spiritual care practice showed that in Australia, the workforce provided through the churches, faith communities and volunteers were stood down. The spiritual care practitioners employed by health services who were identified as being more professional (this was measured by three criteria: higher level of qualification, members of a professional association, and receiving regular professional supervision) were more likely to have contact with COVID patients and seen as essential. [24] In response to COVID-19, decisions were made that highlighted the variations that continue to exist within the spiritual care workforce and reinforced that quality and safety of care is associated with qualified and credentialled spiritual care practitioners. This experience could be a catalyst for the next transition in spiritual care at a national level and the next step in the evolution of spiritual care. Many health services across Australia continue to rely on faith community representatives, church appointed chaplains and volunteers to provide spiritual care. Practices during COVID-19 demonstrated that this is no longer sustainable nor compatible with quality and safety of care, and health service management will need to invest in spiritual care as part of their multi-disciplinary workforce planning. This has implications for the education and training of the required workforce. Continued leadership and advocacy by spiritual care peak bodies is needed to formalise the certification process for qualified and credentialled spiritual care practitioners and to ensure key government and health service personnel across Australia have the evidence and information required to garner their support and investment.

CONCLUSION

This article calls for governments and health service management across Australia to endorse and recognise qualified and credentialled spiritual care practitioners as

health professionals in response to growing evidence. Attention to the historical turning points in the development of spiritual care enables understanding of the influences for change that include: the need for evidence, cooperation amongst stakeholders, investment by government and health service management, and leadership and advocacy from spiritual care peak bodies. The challenge in such a complex and competing health policy environment is to identify a window of opportunity that will once again put this issue on the policy agenda. The interruption of COVID-19 may provide a turning point that creates this window of opportunity for further evolution towards an integrated professional model of spiritual care in Australian health services.

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RESEARCH ARTICLE

FACTORS INFLUENCING JOB SATISFACTION AMONG RECENTLY QUALIFIED RESIDENT DOCTORS: A QUALITATIVE STUDY

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ABSTRACT

INTRODUCTION:

Public health systems throughout the world are constantly being confronted with serious shortages of doctors. The Saudi health system acknowledges the risks involved in its heavy dependence on non-Saudi doctors and has gradually expanded its efforts to nationalize its medical staff by improving the capacity of the medical education system through increasing the number of medical colleges. The objective of this study was to explore the most crucial factors that influence job satisfaction among recently qualified resident doctors in Saudi Arabia.

METHODS:

The study used a qualitative approach, with in-depth interviews that were conducted with recently qualified resident doctors to gather information on the factors that were the most critical in affecting their job satisfaction early in their careers. Twenty-five qualified resident doctors were purposively selected for interviews. The participants were selected from various areas of specialization, such as internal medicine, surgery, pediatrics, obstetrics, gynecology, and emergency medicine.

RESULTS:

This study emphasized the importance of improving the satisfaction levels of recently qualified resident doctors with respect to a range of job-related factors. The following seven themes emerged from the data: education and development, recognition and respect, professionalism, workload, healthcare facilities, patient adherence, and salary.

CONCLUSION:

An increased investment in medical education is recommended to improve educational outcomes. The satisfaction that recently qualified resident doctors have with regard to their salaries should be monitored continuously, and further evidence is needed to determine whether modifications are required. Improving the satisfaction levels of the resident doctors in the seven specific areas of their jobs can result in greater retention.

KEYWORDS

Early career, Job satisfaction, Resident doctors, Retention, Saudi Arabia

INTRODUCTION

Many healthcare systems across the globe are vulnerable due to serious shortages of doctors. Some countries are aware of this issue and try to mitigate its severity by taking measures to increase job satisfaction, and thus ensure retention of medical staff. [1] In 2016, the doctor-population ratio in Saudi Arabia (per 10,000 population) was 23.9, which is comparable to developed countries such as the United States and Canada whose ratios were 25.9 and 26.1, respectively. [2] However, according to the Saudi Arabian Ministry of Health, expatriate doctors comprise about two-thirds of the total number of doctors who work in its facilities. [3] This reliance on non-Saudi nationals poses potential threats to the sustainability of healthcare delivery in the country, as these foreign doctors work on a temporary basis. The Saudi healthcare system acknowledges its lack of doctors and has gradually expanded efforts to nationalize its medical staff. One major step that has been taken to achieve this goal is to improve the capacity of the medical education system by increasing the number of medical colleges. In the past two decades, there has been a substantial increase in the number of medical colleges across the country, of which there are now over 30. This upsurge in medical educational capacity is aimed at securing the future of the health system and meeting the demands of the population. Therefore, although the number of medical college graduates has increased as a result of this expansion, it is important to investigate the outcomes that have accompanied this.

One of the most important reasons for this investigation is to learn about the perspectives that recently qualified resident doctors have regarding their jobs. The expanded system also needs to be able to assess the capacity of its graduates to meet the demands of the health services. Another aspect that needs to be explored is the level of job satisfaction of the doctors early in their careers. It is fundamental to understand whether these doctors are satisfied or not and explore the factors that affect their satisfaction levels. Likewise, it is critical to shed light on their professional experiences and develop strategies to mitigate any barriers that may affect their performance in the workplace. Findings from such research can have positive implications for the overall healthcare system, including improved job satisfaction, staff retention, and quality of care.[4] In terms of job satisfaction in general, a meta-analysis showed a positive relationship between job

satisfaction and the health of employees in various industries and occupations.[5] However, little research has been conducted into recently qualified resident doctors in the Gulf States, an area that relies heavily on expatriate doctors. Although a few studies have focused on the early career stages of doctors, it is imperative to examine previous international studies that have explored factors associated with their job satisfaction. In a review of studies conducted with physicians in the United States, Scheurer et al. found that age, colleague support, income satisfaction, and incentives were positively associated with job satisfaction.[6] Another study in the United States revealed that doctors who continued to practice while being burned out had a higher tendency to commit medical errors and a diminished quality of medical practice and professionalism.[7] Devoe et al. suggested that satisfied doctors were positively associated with high quality of care and patient satisfaction, less self-reported suboptimal patient care practices, and less self-reported likelihood of making errors. On the other hand, dissatisfied doctors were less likely to advise medical students to pursue further studies toward a specialization.[8] From these studies, it is clear that job satisfaction has consequences on the physical and physiological state of doctors, and ultimately, patient outcomes.

Prior research has typically focused on all types of doctors at all career stages rather than specifically focusing on resident doctors in the early stage of their careers. A recent study in Korea suggested that 45% of physicians were dissatisfied with their jobs, and another study conducted by Hess et al. in different non-clinical work settings recommended that career concerns should be explored in relation to each career stage. [9,10] Indeed, it is crucial to meet the expectations and needs of doctors who are in the early stage of their profession, as what they might face at this stage can have an impact on their contribution to healthcare over the long term. In addition, it is necessary to take into account the uniqueness of each health system, including its structures and components. This is especially important in contexts that deviate significantly from Western or Asian societies, such as the Saudi Arabian health structure, with its reliance on expatriate doctors, the expansion of its medical education system, and its recent increase in medical graduates. There remains a need for further research, particularly on resident doctors early in their careers. Therefore, this study aimed to explore the most crucial factors that influence job satisfaction among

recently qualified resident doctors in Saudi Arabia. An in-depth understanding of these factors can be used to develop practical initiatives and policies to retain doctors and, in turn, improve patient care. Findings from this study can also contribute to the literature on doctors' satisfaction with their residencies, and suggested implications can be useful in both Saudi and other Gulf states that share relatively similar economic, cultural, and health system structures.

METHODS

This study employed a qualitative approach. In-depth interviews were conducted with recently qualified resident doctors to gather information on the most crucial factors affecting their job satisfaction. Their personal experiences, opinions about their current workplace roles, and professional aspirations were of interest in this research. The study design was in alignment with the phenomenological research methodology, which explores the who, what, and where of experiences and seeks to obtain insights into a phenomenon that needs to be explored to be understood. [11] This design allowed the respondents to discuss the most crucial factors affecting their job satisfaction in their own words without the constraints of close-ended questions typical of quantitative research. To meet the inclusion criteria, the resident doctors were required to be Saudi nationals with valid medical licenses and one to three years of professional experience at the time of participation. A purposive sample of 25 participants from different departments in three hospitals, including internal medicine, surgery, pediatrics, obstetrics, gynecology, and emergency medicine were included in the study. The sample size was determined when the information obtained from the interviews appeared to have reached saturation, with no new themes emerging.

Prior to the commencement of each interview, the protocol and purpose of the interview were explained to each participant. Each participant was asked to read the participant information sheet and informed that the interview was being voice recorded, participation was voluntary, and they would have the right to withdraw at any time. All participants were happy to proceed in the interview and signed a consent form indicating their willingness to participate. The ethical approval for this study was granted by the Ethics Committee, University of Ha'il, Saudi Arabia (Ethics number H-2019-093). In-depth interviews were conducted with each participant. The

interviews were designed to gather information regarding job satisfaction among recently qualified resident doctors. Initial wide-ranging questions were asked about what attracted them to the profession. An open-ended main question related to the aim of the study asked the recently qualified resident doctors to explain factors influencing their job satisfaction. Follow-up questions were based on their answers to the interview questions and asked about their personal experiences in their current role and their broader experience working in hospitals.

Data were collected over a two-month period between December 2019 and January 2020. All the audio-recorded data obtained from the interviews was transcribed using computer word processing to enable computerized storage and organization of the data. Thematic analysis was performed in this study to identify themes. Thematic analysis is considered well-suited for phenomenological research, wherein it can focus on participants' experiences and sense-making. [12] According to Dapkus et al. thematic analysis has long been used in phenomenological research, as it primarily focuses on participants' perceptions, opinions, and experiences. [13] Braun and Clarke provided a step-by-step framework for leading thematic analysis that was followed in this study. [14] This framework involves six steps: becoming familiar with the data, generating initial codes, looking for themes, reviewing those themes, defining and naming discovered themes, and writing a report. [14] The participants' exact quotations support the interview excerpts as these have provided adequate descriptions and will permit the readers to judge the quality of the data interpretation. The MAXQDA 12 software (Verbi Software, Berlin, Germany) was used for the text coding and storage.

RESULTS

The recently qualified resident doctors addressed a range of factors that influenced their job satisfaction in Saudi Arabia. Seven themes relative to these factors emerged from the 25 interviews: education and development, recognition and respect, professionalism, workload, healthcare facilities, patient adherence, and salary.

Education and development
Education and development were indicated by almost all the participants to critically affect their job satisfaction and growth. The participants stated that most Saudi hospitals lacked specialty programs for residents to join, which they attributed to a lack of consultants to allow hospitals to

open residency programs to prepare new consultants and specialists. The participants also noted that some subspecialties were only available in a few major hospitals in Saudi Arabia, as these hospitals had enough medical consultants to provide such programs. According to the participants, insufficient numbers of consultants and specialists in some hospitals can also affect patient care.

> *It is difficult to join specialty programs in some areas. The only available areas in our hospital are internal medicine, pediatrics, obstetrics, gynecology, and surgery. There are no specialty programs for other areas. This limitation is due to insufficient consultants in other departments that can allow the hospital to offer specialty programs. Some sub-specialties, such as dermatology, plastic surgery, and ophthalmology, are only available in a limited number of hospitals within the kingdom.* (Participant 6, Female)

Residents who were unable to join a specialty residency program in their preferred area claimed that they were being assigned to other areas of very high demand, such as emergency departments. According to the participants, this coverage does not consider the future interests of resident doctors and can generate job dissatisfaction and undermine patient care.

> *I am used to covering in emergency, where there is a shortage of doctors and high demands from patients. I am interested in other areas. I know I was unable to join the residency program, but I want to work in areas that I prefer. They do not take into account my interests. I think this is not ideal for my career development and quality of care.* (Participant 14, Male)

Recognition and respect

recently qualified resident doctors viewed a lack of recognition and respect from their consultants and specialists as a critical factor that influenced their perceptions of their jobs. According to some participants, this lack of recognition and respect even involved being humiliated by some consultants, which, in turn, reduced job satisfaction.

> *When I call other departments for opinions about some cases, they do not recognize us. I remember one day I called the surgery department, and when I introduced myself as a first-year resident in*

> *the residency program… to residents in their third year, the response was: "Can you let someone who is in the third or the fourth year… ask my opinion?"* (Participant 3, Male)

> *Some medical consultants do not respect us. In some situations, medical consultants embarrassed specialist registrars and newly employed physicians. They said things like, "How could you graduate from medical college?" This behavior by some consultants is causing burnout and job dissatisfaction.* (Participant 9, Male)

Some medical consultants and specialists were viewed by some participants as too focused on completing their duties without caring about educating resident doctors. The senior medical staff at some hospitals lack motivation to educate these resident doctors.

> *Some consultants do not care about the career development of resident doctors. They simply want to complete their duties and their rounds. They are not providing sufficient education for us.* (Participant 12, Female)

Professionalism

A lack of professionalism among some employees in the workplace, including those in nursing, pharmacy, administration, and bed management, was seen as a crucial factor that influenced job satisfaction. Examples of unprofessionalism included interference in medical jobs by requesting physicians to combine two patients in the same room, which is medically inappropriate, and embarrassing, unnecessary requests, such as doctors offering ineligible sick leave to their family members.

> *Some workers make awkward requests. Some employees in bed management asked to combine two patients in the same room without understanding their medical conditions. Some ask me to give sick leave to some relatives, which is embarrassing. I will be accountable for that. Also, some doctors in other departments are not fully cooperating with us when we ask for their opinions.* (Participant 1, Male)

Workload

Resident doctors in some areas, especially emergency departments, experience heavy workloads that influence their satisfaction. Participants working in emergency

departments reported handling too many patients during their shifts. Some participants argued that although some cases are not urgent, patients still visit emergency departments due to the limited role of primary healthcare centers. Moreover, some participants noted that doctors in emergency departments have to see all patients and cannot reject any case, even if it is not urgent.

> *Even when patients simply feel cold, I must see them. I cannot refer them back to their primary health centers. I must see them. I think primary healthcare centers should take more responsibility in dealing with this situation.* (Participant 17, Male)

Healthcare facilities

Recently qualified resident doctors argued that the lack of some clinical and non-clinical facilities influenced their job satisfaction. Some participants reported an unsatisfying level of management in maintaining some medical devices and a lack of some medical procedures at their hospitals. In addition, some participants reported a lack of non-clinical facilities related to the work environment, such as limited options for dining and limited convenient places for studying.

> *Some medical procedures are not available at our hospital. We do not have rheumatology or biopsy procedures for discovering the presence, or causes, of a disease.* (Participant 4, Female)

> *The work environment and facilities should be improved. We do not have a room where we can sit and read. There should be a room for us, where we can go to take a break or read when we don't have patients. Also, we only have a small grocery store at our hospital and limited options for dining.* (Participant 10, Female)

Patient adherence

Some participants saw patient adherence as a crucial factor that influenced their job satisfaction. Those participants noted that the lack of adherence of some patients can undermine the quality of the care they receive. According to participants, some patients do not follow medical instructions as they should, and others demand unnecessary medical procedures for their conditions.

> *Some patients do not follow medical instructions. They do not take their medications as requested.*

> *Other patients and relatives want to undergo unnecessary procedures for their conditions. Sometimes they want to get MRIs [magnetic resonance imaging], which the cases do not require. Sometimes, it is difficult to convince these patients.* (Participant 11, Male)

> *Some patients refuse to sign the informed consent for some procedures. I had a patient refuse to sign the informed consent form that is needed for a procedure, such as fluoroscopy.* (Participant 13, Female)

Salary

A final factor that recently qualified resident doctors perceived to influence their job satisfaction was salary. Some participants noted that their salaries were insufficient compared to the amount of time spent studying and preparing. They believed that their jobs were more difficult than other professions.

> *The salary is competitive, but our job is considered one of the hardest jobs. It is more difficult than many professions. It took seven years to graduate from the college of medicine. I think the reward needs some adjustment.* (Participant 16, Male)

DISCUSSION

This study applied a qualitative approach to explore the most crucial factors that impact the job satisfaction of resident doctors in Saudi Arabian government hospitals. The study found that the most crucial factors were education and development, recognition and respect, professionalism, workload, healthcare facilities, patient adherence, and salary. Education and career development were regarded by the majority of recently qualified resident doctors as the most crucial factors influencing their satisfaction. Shanafelt et al. indicated that 45.8% of American doctors were dissatisfied with their professional development opportunities. [15] The target population in Shanafelt et al.'s study was not limited to recently employed doctors but included all types of doctors. In this study, however, recently employed resident doctors reported a lack of specialty programs available for them to join because there are insufficient consultants who can contribute to opening residency programs to promote new consultants and specialists in these areas. Having an insufficient number of consultants and specialists in some hospitals can negatively affect the career growth of

recently qualified doctors. Gruppen et al. found that institutions had a higher influence than specialties on residents' ratings of satisfaction with their learning environment and workload. [16] On the basis of the findings of this study, increased investment in medical education is recommended to improve the educational process and prepare more medical consultants who can meet the needs of resident doctors working in high-need specialties.

The results of this study reveal that it is critical for resident doctors to receive recognition and acknowledgement of the value of their contributions from their consultants. These results are consistent with those of Steinberg et al. who found that encouraging and motivating the values involving merit recognition, employee respect, autonomy, and job security provoke employee satisfaction. [17] Survey results suggests that a minority of healthcare workers and doctors experience workplace bullying or harassment each year, the prevalence of which is high compared to that in other sectors and professions. [18] Eliacin et al. found that hospitals that foster trust, mutual understanding, and shared aims among workers and enable them to perform cooperatively have a positive impact on the job satisfaction of these employees. [19] Enhancing collaboration satisfaction among colleagues requires support and communication from practice leaders, and physicians reported reduced satisfaction when these elements were lacking. [20] In this study, some resident doctors indicated that a lack of professionalism at their workplace is an issue and tends to have a negative impact on their job satisfaction. Such findings are congruent with the results of Fang et al., who revealed that a lack of professionalism influences job satisfaction, workplace autonomy, professional status, relationships, and institutional governance. [21] A professional work environment and enhanced monitoring seem imperative in allowing resident doctors to work within their scope of practice. Health leaders should ensure that their staff follow evidence-based practice to guarantee that unprofessional requests do not interfere with medical jobs. Additionally, policy makers should take measures to enhance professionalism, including motivating and rewarding high performance.

The findings of this study suggest that the status of clinical and non-clinical facilities can impact doctor satisfaction. Some participants argued that healthcare quality can be affected by conditions in clinical facilities, such as the supply and availability of equipment. Some participants reported a lack of rooms to study and inadequate catering and dining facilities in hospitals as factors that affect the job satisfaction of recently qualified resident doctors. These issues experienced by participants reflect the shortcomings in managing some aspects of care in these hospitals. It is not unusual for the lack of supply and unavailability of some resources to become an issue in hospitals in middle- and low-income countries. In China and India, for instance, doctors have low job satisfaction due to medical equipment shortages even though high-quality resources are available. [22-23] This study suggests that the burden of clinical work is a critical problem affecting job satisfaction among employees in emergency departments. According to some participants, primary healthcare centers are not functioning as expected by the Saudi health system. Participants indicated that some patients paid to visit the hospital emergency department for cases that could be managed at primary health centers. In response to this issue, health leaders should review the expected role of primary health centers and monitor their performance to address any issues with the use of resources and ensure the efficient distribution of patients through appropriate health facilities. This study reveals that lack of patient adherence (in the form of disregarding medical instructions and demanding unnecessary procedures) can hinder resident doctors in providing better care and reduce satisfaction levels. Martin et al. discussed the challenges of patient adherence and concluded that no single intervention strategy can improve the adherence of all patients, suggesting that the doctor–patient partnership should remain at the center of all successful attempts to improve patient adherence. [24] Salary also influences job satisfaction among recently qualified resident doctors. This is an expected result because monetary compensation has long been regarded as a major contributor to job satisfaction across all professions and has even been viewed as a basic work motivation need in Maslow's hierarchy of needs. [25] Satisfaction with salary among resident doctors should be monitored continuously, and the gathered evidence should be used to make necessary modifications.

STRENGTHS AND LIMITATIONS OF THE STUDY

This qualitative study has enhanced knowledge regarding factors affecting recently qualified resident doctors. All the issues related to these factors have been discussed in detail. This qualitative study followed the framework used by O'Brien et al. to report qualitative research. [26] However, the main limitation of this qualitative corpus analysis is that the results cannot be generalized to all populations. This limitation is typical for a qualitative

approach, as this approach is often related to a lower sample size and does not make use of the probability sampling technique.

CONCLUSION

This study explored the most crucial factors impacting recently qualified resident doctors' job satisfaction in Saudi Arabian government hospitals. The findings of the study reveal that the most critical factors are education and development, recognition and respect, professionalism, workload, healthcare facilities, patient adherence, and salary. These contributing factors can be used to develop effective strategies for improving the job satisfaction of resident doctors. Increased investment in medical education is needed to improve the educational process and to prepare more qualified medical consultants who can contribute to meeting the demands of the population. The heavy workloads in emergency departments should be further assessed, and those who manage primary healthcare centers should ensure that their expected roles are fulfilled. Professional work environments and enhanced monitoring are imperative in allowing recently qualified resident doctors to work within their scopes of practice. Improving satisfaction with these aspects of resident doctors' jobs can result in increased retention. To enhance the available knowledge, it is recommended that further research be conducted on a larger scale by considering the themes explored in this study.

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REVIEW ARTICLE

SYSTEMATIC LITERATURE REVIEW OF THE EFFECTS OF CLINICAL MENTORING ON NEW GRADUATE REGISTERED NURSES' CLINICAL PERFORMANCE, JOB SATISFACTION AND JOB RETENTION

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ABSTRACT

OBJECTIVE

The purpose of this systematic literature review is to appraise contemporary research literature examining the effects of mentoring on graduate registered nurses' transition to practice objectively and systematically. These areas, specifically examined, are competence, job satisfaction, and retention. Three themes emerged from the research in this area. The themes are informal mentoring effectiveness, the extent of mentoring, and mentoring efficacy.

METHODS

The PRISMA method was implemented. Articles reviewed were written in English and published between December 2015 and December 2020 and obtained from the Griffith University Library electronic catalogue. A quality assessment of each record not excluded in the title and abstract analysis was undertaken using the method described by Kmet.[1] Those with a quality rating of 16 as a minimum are included in this systematic literature review.

RESULTS

Three quantitative, two qualitative and two - method research studies emerged after applying inclusion criteria, selection, and quality assessment. The analysis demonstrated the positive effects of mentoring on all three avenues with one mixed-method study that documented a downward trend in job satisfaction at six months.

CONCLUSIONS

Mentoring is an effective transition to practice strategy for novice nurses. It affects competence, job satisfaction and retention positively. Retention and resignation rates worsen following 12 months of employment. Robust and rigorous studies are essential to justify long-term mentoring programs' cost-effectiveness.

What is known about the topic? Upon joining the nursing workforce, many new graduate nurses require adequate training and experience. A failure in this area increases the risk of "reality shock" and stress which can add to the risk of attrition and turnover. Mentoring is an effective transition to practice strategy for novice nurses; by bridging the gap between theory and practice. Mentoring improves clinical performance, job retention and satisfaction within 12 months.
What does this paper add? New graduate mentoring is a recently-documented method in nursing. Generational mentoring approach acknowledges workplace generational differences and develops future mentors. This also introduced diversified communication channels between mentors and mentees, which facilitates seamless communication. Delineations are evident in the literature. These include distinguishing mentorship from precepting; and turnover from retention. Role demarcations between preceptor, mentor, and facilitator are also noted. Retention rates dwindle at second year of mentoring and then challenges the cost-effectiveness of mentoring after 1 year of implementation.
What are the implications for practitioners? There is research paucity regarding the recommended frequency, structure, duration and content of mentoring programs for new graduate registered nurses (NGRN's). Furthermore, no qualitative research is found to explore the influential factors that contribute to career change or resignation of novice nurses after 12 months of transitioning into practice. Nor is any quantitative research available to measure the effectiveness and practicality of mentoring programs. Empirical evidence would assist nurse managers and nurse mentors to formulate the strategies to facilitate a seamless transition process of NGRN's.

KEYWORDS

nurse mentoring, new graduate registered nurses, clinical competence, job satisfaction, turnover, retention.

INTRODUCTION

Newly qualified nurses enter the workforce sometimes almost bereft of support [2] alongside mounting healthcare demands and patient complexity.[3] This situation creates a dilemma between theoretical expectations and practical realities, [4,5] and may develop into 'reality shock' and 'occupational stress'. [6] These factors lead to increased resignations and turnover [7]; correlating with new graduates' attrition rates of up to 60% during their first year of transition.[8] Because time and resources are invested during the transition phase, graduates' attrition becomes costly and improvident. [2]

Mentoring is an effective strategy that addresses the incongruence between theory and practice. Advocates of mentoring contend that it improves clinical competencies, job satisfaction and retention.[2] There are ongoing deliberations on the return on investment (ROI) of mentoring alongside outcomes in stabilising human resources.[9] To date, the content, structure, frequency, and duration of mentoring programs remain non-standardised;[10] making recommendations and evaluations challenging.

There are various methods and structures deployed in the delivery of mentoring. Firstly, it can be established or developed, with the former based on the theoretical framework and implemented large-scale by more prominent companies.[9] The Versant Nurse Residency Program [9,11] in the United States is an example with the latter established as a less-formal activity within smaller organisations.[6] Mentoring arrangements could either be in dyads, triads, or groups. The mentor-protégé dyad is a symbiotic partnership between experienced and novice nurses,.[6,12] A triad occurs when a peer mentor becomes supplementary support to the new graduate registered nurse (NGRN). [13] Group mentoring is cost-effective and provides frequent mentor interactions. [11]

Patient safety and skill mix trepidations [14] often confront nurse managers and organisational stakeholders, alongside the universal apprehensions of sustaining the nursing workforce's recruitment and retention.[15] With the burgeoning employment of NGRN's into the workforce, implementation of transitional support framework is vital to address potential gaps in patient care delivery and facilitate the seamless transition of new staff. [3,14]

This study aims to explore current data relating to mentoring effects on new graduate registered nurses' proficiencies, contentment, and retention.

BACKGROUND

There is currently an influx of novice nurses and a paucity of seasoned nurses who could potentially mentor them. [5,16]. This situation leads to new nurses feeling overwhelmed and dissuaded; and with the realisation of the contrary roles, 'reality shock' [6] sometimes presents itself. NGRN's experience a transitional period early in their career wherein they undergo role changes from being a student nurse to a registered nurse (RN).[5] This period is critical as it influences their clinical performance and career trajectory). [17-19]

An NGRN is a fully qualified first-year RN who completed at least a three-year degree inclusive of a combination of university theoretical and practical components alongside hospital clinical placements. [20]   The first year of embarking into the workforce is crucial for an NGRN as they often experience the inconsistencies between theoretical ideologies and practical realities. [20] If supported and managed appropriately, NGRN develops job satisfaction and work confidence, [4,5,21] contributing to staff retention. [22] Conversely, mismanagement could lead to 'reality shock', [23] staff burnout and increasing turnovers. [24-25] The transition process is complicated, dynamic, and taxing to NGRN's. [5]

Benner's tenet on novice to expert model has influenced nursing practice since 1982. The model incorporates the Dreyfus Model of Skill Acquisition [26] and outlines how nursing skill acquisition develops over time. [27] Benner defines 'novice nurse' as an individual with no real-life nursing experience; therefore, they cannot exercise 'discretionary judgment', thereby necessitating recurrent

prompting. [16] A novice relies on learned concepts and associated rules such as vital signs and nursing management of vital signs that fall outside of normal ranges, with inexperience to execute 'discretionary judgment' in delivering patient care, [16] associating fundamentalist concepts and practical realities become a challenge. Drusher [28] introduced the theory of transition, encompassing evolutionary periods of 'doing', 'being', and 'knowing', as experienced by NGRN's. These periods are like Kramer's theory of reality shock, as the nurse practitioner ventures from novice to expert, and can take up to 2 years. The novice nurse feels unqualified in performing the nursing role and delivering safe patient care. [29]

Mentoring, defined by Stewart and Krueger, cited in Mills, Francis , [30] is an expert-protégé nurse dyad characterised by reciprocal teaching and learning. [19] Mentoring aims to broaden knowledge base, improve professional practice, foster career progression, and retain staff. It can be a formal framework or an informal relationship; and entails sharing common goals and values between mentor and protégé. [31,32] Mentorship is different from preceptorship characterised by a supervisory, evaluative, and time-bound relationship between a novice and an experienced nurse. [33]

Clinical performance is defined as delivering safe, competent, appropriate, and timely clinical services by a health care provider to a patient with a particular health condition. It aims to accomplish desirable health outcomes and patient satisfaction. [34,35] Clinical performance is the continuous and perceptive application of skills and the subsequent reflection of practices. [36]

Job satisfaction is a sense of enjoyment and fulfilment derived from work, allowing the individual to feel motivated. It can be affected by various components related to tenure, such as leadership, colleagues, workload, and business model. [37,38]

Das and Baruah [22] found that employee retention is a structured approach with policies and procedures intended to create a culture that retains employees by meeting their diverse needs. It is a business strategy used to sustain workforce efficiency and attain organisational goals. [39]

As mentorship transcends the contractual and periodical limitations of preceptorship, [33] investigations of its effects on nurse retention, job satisfaction and competence become worthwhile. Awareness of the needs of progressing NGRNs enables colleagues, nurse managers, and organisations to make informed judgment to bolster protégés and foster positive workplace ethos. [10,40]

RESEARCH QUESTIONS

This study aims to answer the following research questions:

1. What are the effects of clinical mentoring on NGRNs' clinical performance?
2. What are the effects of clinical mentoring on NGRNs' job satisfaction?
3. What are the effects of clinical mentoring on NGRNs' job retention?

SCOPE

Only academic or scholarly English language articles published between 8 December 2015 to 8 December November 2020 that focused on mentoring of NGRN's and its effects on clinical competence, job satisfaction, and/or occupational retention are included. The reviewed literature encompassed nursing journal articles that were either peer-reviewed or refereed. The variety includes original journal articles and research, systematic and literature reviews, and case reports. The current review focuses on various mentoring approaches and structures executed to NGRN's working in direct patient care areas. A preliminary screen applied the selection criteria to cull the number of studies identified. Subsequently, a scoring tool designed by Kmet et al. [1] further scrutinises the quality of the remaining studies (Fig. 1, Fig. 2). Table 1 lists the inclusion and exclusion criteria.

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METHODS

This study utilised a systematic literature review (SLR) as its research method, which encompasses critical perusal, systematic analysis and synthesis of published articles concerning mentoring and its effect on clinical performance, job satisfaction, and retention of NGRN's. It aids in understanding existing theories that serve as implementation bases of an intervention, outlines theoretical criticisms, maps existing evidence related to the

main topic, identify gaps in the literature, and advise future research endeavours.

The authors used the Griffith University electronic library catalogue to search for relevant peer-reviewed, refereed, and scholarly articles. The Griffith University electronic library catalogue incorporates highly ranked, health-related academic databases such as MedLine, Cumulative Index to Nursing and Allied Health Literature, ScienceDirect, PubMed, Cochrane, ProQuest, EBSCOhost, and Scopus. Table 2 reproduces the search strings of keywords and Boolean operators and their results

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement (PRISMA) [41] (Fig.1) was applied, to ensure transparency and comprehensive reporting on evidence-based strategies that can be used to inform future intervention modifications. [42]

Utilising the PRISMA statement, predetermined inclusion and exclusion criteria (Table 1) were used to evaluate the retrieved literature. Initial screening involved examining the title, then abstract and conclusions to establish if the article conformed to the current study's objectives. Articles with title, abstract and conclusions that contained words related to nurse mentorship and its effects on nurse graduates' clinical performance, job satisfaction and retention were included in the current study. These narrowed down the included articles as detailed in Fig. 1.

The remaining evidence was meticulously read and scored according to Standard Quality Assessment Scores (SQAS) [43] shown in Fig. 2 and Fig. 3 for quantitative and qualitative studies, respectively. Mixed method studies, however, have corresponding independently scored quantitative and qualitative sections. For studies to be eligible for SLR inclusion, corresponding Quantitative and Qualitative sections SQAS must be at least 18 and 16, respectively. This step ensures the inclusion of only high-quality literature. Table 4 lists qualified studies with high SQAS.

Table 1. Criteria utilised for inclusion and exclusion of articles in current review

Inclusion criteria	Exclusion criteria
Articles published between 8/12/2015 to 8/12/2020	Grey literature
Nurse mentorship articles that mention its effects on clinical performance, job satisfaction and/or job retention	Nurse preceptorship articles
Nursing discipline	SQAS Qualitative score < 16
Academic or scholarly materials	SQAS Quantitative score < 18
Peer-reviewed or refereed materials	
Systematic reviews, meta-analyses and case reports	
Articles published in English	

Table 2. Search keyword combinations and Boolean operators with corresponding search results (from 8 December 2015 to 8 December 2020)

Search keyword combinations and Boolean operators	Article search results	Article search results (expanded beyond Griffith University website)	Results used in SLR
"nurse mentor*"	270	276	No
("nurse mentor*") AND ("job satisfaction" OR "job retention") AND ("clinical performance")	2	2	No
("nurse mentor*") AND ("job satisfaction" OR "job retention") AND (("clinical performance") OR ("novice nurses") OR ("new graduate*") OR ("new graduate registered nurse*"))	30	30	Yes

FIRGURE1. PREFERRED REPORTING ITEMS FOR SYSTEMATIC REVIEWS AND META-ANALYSES (PRISMA) DIAGRAM
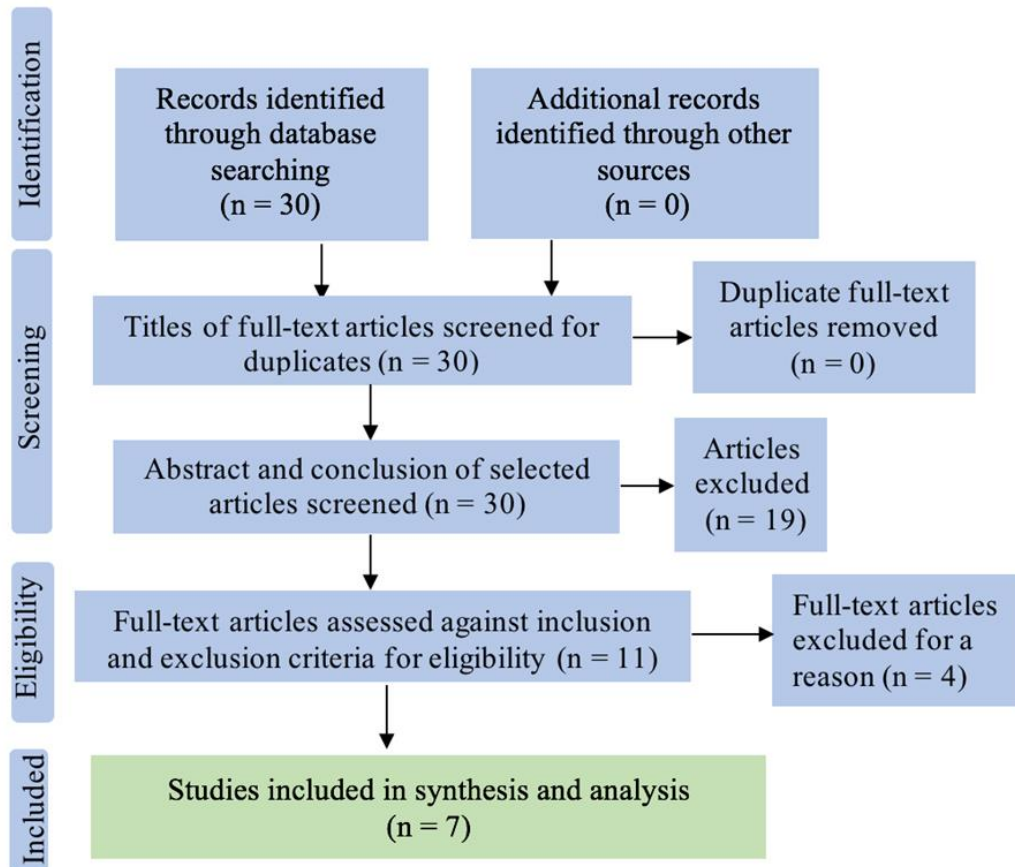

Fig. 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram showing a summary of findings at the outcome level.

FIGURE 2: STANDARD QUALITY ASSESSMENT SCORE (SQAS)

	Criteria	Yes (2)	Partial (1)	No (0)	N/A
1	Question / objective sufficiently described?				
2	Study design evident and appropriate?				
3	Method of subject/ comparison group selection or source of information/ input variables described and appropriate?				
4	Subject (and comparison group, if applicable) characteristics sufficiently described?				
5	If interventional and random allocation was possible, was it described?				
6	If interventional and blinding of investigators was possible, was it reported?				
7	If interventional and blinding of subjects was possible, was it reported?				
8	Outcome and (if applicable) exposure measure(s) well defined and robust to measurement / misclassification bias? Means of assessment reported?				
9	Sample size appropriate?				
10	Analytical methods described/ justified and appropriate?				
11	Some estimate of variance is reported for the main results?				
12	Controlled for confounding?				
13	Results reported in sufficient detail?				
14	Conclusions supported by results?				

Fig. 2 Standard Quality Assessment Score (SQAS). Checklist for assessing the quality of quantitative studies. Source: Kmet, Lee [25]. The summation of individual scores for 'yes', 'partial', and 'no' were attributed to each quantitative study included in this review, as outlined in Table 3. Quantitative SQAS range from 0 to 28, indicating low quality and high quality, respectively.

FIGURE 3: STANDARD QUALITY ASSESSMENT SCORE (SQAS)

	Criteria	Yes (2)	Partial (1)	No (0)
1	Question / objective sufficiently described?			
2	Study design evident and appropriate?			
3	Context for the study clear?			
4	Connection to the theoretical framework/wider body of knowledge?			
5	5. Sampling strategy described, relevant and justified?			
6	Data collection methods clearly described and systematic?			
7	Data analysis clearly described and systematic?			
8	Use of verification procedure(s) to establish credibility?			
9	Conclusions supported by results?			
10	Reflexivity of the account?			

Fig. 3 Standard Quality Assessment Score (SQAS). Checklist for assessing the quality of qualitative studies. Source: Kmet, Lee [25]. The summation of individual scores for 'yes', 'partial', and 'no' were attributed to each quantitative study included in this review, as outlined in Table 3. Qualitative SQAS range from 0 to 20, indicating low quality and high quality, respectively.

LITERATURE REVIEW

All the reviewed publications support the effectiveness of mentoring as a transitional approach for NGRN's. [5,6,9,11,13,19,44] The majority of these studies report positive effects of clinical mentoring on NGRNs' job satisfaction, clinical performance, and retention. An exception to this is the article by Ackerson and Stiles [9] who contend that professional satisfaction plummeted, possibly due to feelings of detachment or lack of feelings of competency halfway and towards the end of a 1-year (NRP) Nurse Residency Program (Table 4). Zhang, Qian [6] encountered a study that did not see any difference in job satisfaction levels between mentoring program participants and non-participants.

Table 3. Articles identified referring to mentorship

Research design	Number	Articles
Quantitative	3	Baumann, Hunsberger, Crea-Arsenio, et al.
		Williams, Scott, Tyndall, et al.
		Zhang, Qian, Wu, et al.,
Qualitative	2	Gellerstedt, Moquist, Roos, et al.
		McInnes, Halcomb, Huckel, et al.
Mixed methods	2	Ackerson and Stiles
		Verret and Lin

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Table 4. Mentoring articles included in review
Studies with Quantitative and Qualitative SQAS of at least 18 and 16, respectively, were included in the study.

Authors	Main findings	Mentoring effects on job satisfaction	Mentoring effects on performance	Mentoring effects on job retention	Quantitative SQAS	Qualitative SQAS
Ackerson and Stiles	Many unprepared novice nurses cannot meet work demands, resulting to stress and turnover. Nurse residency program (NRP) provides mentorship and peer support. NRP effectiveness is dependent on content rather than structure. Retention was unsustained at second year, possibly attributed to mentorship inapplicability to NGRN's. Mitigating strategies include 15-month Wisconsin NRP and optional exploration phase program.	Job satisfaction fell, probably due to disengagement or incompetency at 6 and 12 months of NRP.	Autonomous clinical decision making. Improved stress management and communication skills.	NRP has positive return on investment (ROI) (increases retention rates; reduces turnover, recruitment and replacement fees)	22	19
Baumann, et al.	NGRNs' unreadiness in joining the workforce is a worldwide concern. Consistent and extended Transition programs (TP's) improve care quality. Compared to non-participants, TP participants have higher key dimensions of care delivery scores that improve over time. Mentorship standardisation and best practices remain inconsistent.	TP's bridge the gap between education and practice, which foster job satisfaction. TP's augment job fulfillment. TP participants had increased job satisfaction.	Improves quality of nursing care and key dimensions of care delivery (i.e., decision making, care management, commitment, communication, and system integration).	Increases retention rates; minimises staff turnover.	24	N/A
Gellerstedt, et al.	NGRN transition to independent RN role is stressful. Senior nursing staff turnover has led to NGRN role transition issues and loss of mentorship figures. An advocating trainee program and transformational leadership style aid in NGRN's role transition to RN roles. NGRN's have higher expectations from management during the orientation phase of the transition period. An accessible and versatile manager is needed to support NGRN's during the transition phase. An established agreement between nurse managers and nurse educators regarding NGRN competencies and knowledge base will assist in NGRNs' understanding of their roles	Trainee program and transformational leadership lead to job satisfaction	An introduction during the orientation phase provides avenues for NGRN's to ask questions and improves the delivery of safe patient care. Confidence is gained secondary to NGRN's conversing with superiors NGRN's noted the need to revise tutoring and work introduction in order to address the theory-practice discrepancy	Trainee program and transformational leadership lead to staff retention. NGRN's realise their role in replacing seasoned nurses when they retire Concerns about patient safety are documented to be the reasons for NGRN's resignations during their first year of practice	N/A	17

Table 4. (continued)

Authors	Main findings	Mentoring effects on job satisfaction	Mentoring effects on performance	Mentoring effects on job retention	Quantitative SQAS	Qualitative SQAS
McInnes, et al.	New graduate transition programs in New Zealand and Australia focus on attracting NGRN's into Primary Health Care (PHC). Nurse mentors in general practice (GP) settings are confronted with barriers related to time management and funding. Recruitment-retention strategies are geared more towards nurses working in acute care settings. Lower remuneration rates and negative perceptions regarding nurses' roles in GP work affect job retention rates of PHC nurses. There is ample documentation of transitional changes experienced by NGRN's in acute care settings leading to poor job retention and lower job satisfaction. Studies not seen in PHC.	NG program satisfaction and nurse career progression noted Mentors also learned from mentees	Honed a wider range of clinical skills GP Developed confidence in initiating new programs and fostered work independence	NG program in GP sector can ameliorate nursing workforce shortages. NGRN's who completed the NG program expressed strong desires to remain working in GP settings	N/A	16
Verret and Lin	'Generational mentoring' solidifies relationships, bridges generational gaps, and breeds new mentors. Overall staff responsibility to mentor NGRN's. Managerial support perpetuates mentoring and high practice standards. Delineates roles of preceptor (instructive/evaluative); mentor (supportive); and facilitator (coordinator/mentor-mentee matcher). Traditional mentorship is intensive and exclusive. Contemporary mentorship is supportive, caring, pleasurable and satisfying. Mentor characteristics stated (i.e., confident advisor; participative teacher; development-oriented; aspirational thinker).	Job satisfaction resulting from positive effects of Generational approach to mentoring. Job satisfaction ensues from continuity of mentoring and delivery of high standards of care. Job satisfaction associated with decreased turnover and increased retention.	Nurtures professional growth; promotes high quality nursing practice; increases optimal patient outcomes; decreases stress; facilitates transition to independent roles; empowers communication; develops leadership skills; and improves confidence. Mentorship necessary to cope with health care demands	Stabilises human resource base. Decreases turnover and improves retention rates (as a result of enculturation and job satisfaction).	18	17

Table 4. (continued)

Authors	Main findings	Mentoring effects on job satisfaction	Mentoring effects on performance	Mentoring effects on job retention	Quantitative SQAS	Qualitative SQAS
Williams, et al.,	Precepting and mentoring differentiated. Mentorship is less commonly used in NRP's. Skill development and turnover are collectively measured by perceptions of comfort in assuming nursing roles. Turnover intention is correlated to discomfort in nursing practice. Suggests later (period of) mentorship applicability, after NGRN's gain skill and proficiency.	NRP's and mentoring generally stimulate job satisfaction. Standardised NRP's bring about higher levels of job satisfaction.	Mentoring not related to skill development; Group mentoring is cost-effective in facilitating transition due to minimal monetary and resource demands; and One-to-one mentoring is efficacious yet expensive strategy in promoting stress management, professional development and facilitating practice transition.	Mentoring not established to be associated with turnover; although turnover intention likely higher or definite in group mentees receiving less than four mentor encounters. Despite increasing use of NRP's, turnover rates in the first nursing job are not considerably ameliorated.	21	N/A
Zhang, et al.	Mentoring and precepting separately defined. Mentoring program components, such as practical and psychological support, have affirmative contributions to mentors, mentees, and healthcare organisations. These create a supportive workplace environment. An effective mentoring program encompasses meticulous selection and comprehensive training of mentors; but is not devoid of hurdles (i.e., varying schedules, space and time constraints). Results guide nurse managers in planning, executing, and modifying NGRN mentoring programs.	Job satisfaction reviewed quantitatively and qualitatively by 2 studies each. Overall job satisfaction increased after mentoring, but took 18 months to attain it. One study found that there was no difference in the levels of job satisfaction between mentor and non-mentor groups.	Improves nursing competency. Mentoring programs proven effective in facilitating transition to practice.	Mentoring programs can: 1. Decrease turnover rate; and 2. Increase retention rates.	20	N/A

After mentoring, evidence of clinical performance development includes autonomous clinical decision making; [5,19,13] work independence and confidence in initiating new programs; [19] improved stress management; [9,11,13] better communication skills, [5,9,44] broader clinical skills; [19] and confidence in seeking assistance from colleagues. [13] Nursing skills and leadership traits have improved, [6,13] thereby optimising patient care outcomes,[13] spurring competency, [6,11] confidence [11] and maintaining high-quality practise standards. [13] Job satisfaction has emerged from increased interaction in NRP settings [11] and closing the disparities between education and practice.[44] It ensures the consistent delivery of high standards of care [13] and patient safety.[5] Job satisfaction was also found to ensure from the NGRN trainee program and a transformational leadership approach.[5]

There is a link between retention and turnover. A literature review revealed that retention and turnover are used interchangeably, as terminologies and as measures of mentoring effectiveness. [6] Conversely, Ackerson and Stiles [9] found no literature source that defined both terms.

However, Williams, Scott [11] preferred turnover to retention, asserting that the latter is easily understood. Retention is described as a collective term reflective of influencing factors that encourage or hinder job satisfaction. In terms of measuring parameters over time, turnover rates during the first year is around 20% to 70%, [6] with resignations related to NGRNs' concerns about their ability to maintain patient safety; [5] whilst 17% of NGRN's leave, [44] with attrition or job-change rates surging to 31% at the end of third year. [44]

Verret and Lin [13] determined that retention creates a positive return on investment (ROI). In acute settings, minimal recruitment and replacement expenditures drive ROI, [9] determined by turnover rates. [11] Furthermore, NRP, mentoring partnerships, and transitional practice programs (TPP) decrease turnover rates, [6,11] contribute to job retention [19] and address nursing workforce shortages. [19] Williams, Scott [11] collectively measured the best ROI indicators: skill development and turnover. However, and found that turnover rates in the first nursing jobs do not ameliorate turnover intentions. Williams, Scott [11] and Ackerson and Stiles [9] quantified the incurred

costs per resignation and turnover, amounting to approximately $60,000 and $71,000, respectively. McInnes, Halcomb [19] noted that the gearing of recruitment-retention strategies is more towards nurses working in acute care settings than in primary health care (PHC).

Regarding precepting and mentoring, these roles are delineated by most included literature, [6,11,13] with role clarification of a facilitator, focusing on mentorship coordination and pairing. [13] However, an SLR conducted by Zhang, Qian [6] found that both terms are not clearly defined by most studies previously examined.

After reviewing the literature, different contrasting structures of mentoring emerged such as formal and informal mentoring; [6,9] one-to-one [6,11] and group mentoring; [11] and established and internally developed programs. [9] Formal mentoring has structure, pre-set goals and timeframes, whilst informal mentoring is a mutually agreed mentor-protégé pairing.[6] One-to-one and group mentoring structures are self-explanatory; however, the former is costly, while the latter offers frequent meetings. [11] Established and internally developed mentoring programs are constructed according to a chosen theoretical framework. One is developed locally by smaller businesses, whilst the other is a structured, standardised and evidence-based programme utilised by larger organisations, [11, 45] respectively.

The seven articles reviewed focused on a specific mentoring program. In the United States, NRPs [9,11] and the generational mentorship approach [13] are gaining popularity as forms of established mentorship. At the same time, transitional practice programs (TPP's) are applied in China, [6] Australia and New Zealand,[19] Sweden, [5] and Canada. [44]

The mentoring models also differ, ranging from established programs like Versant NRP University Health System Consortium/American Association of Colleges and Nursing Program, [9,11] and Wisconsin NRP [9] grounded on Benner's novice to expert model [16] and Duchsher's transition theory. [28]

Formal and informal mentoring programs are offered separately in TPP. [6] At the same time, NRP delivers them jointly, with possible views of extending the mentoring relationship to informal, following the formal component. [9] Additionally, extended TPP is made available by the Canadian government of up to 6 years post-graduation of NGRN's who require more transitional nursing role support. [44] Conversely, generational mentoring helps develop future mentors and is enriching to both mentor and mentee, as workplace generational diversity is acknowledged and utilised. [13]

Zhang, Qian et al. [6] suggested Verret and Lin [13] cited mentor characteristics, whilst mentor education qualifications. Only one study mentioned resource materials compiled for mentoring, which is part of the seminal innovative mentor cohort, commenced in winter of 2013. [13] These reflect the early stages of mentorship provision. Job satisfaction of mentees is linked to a transformation leadership approach. [5]

Further exploration of mentor-mentee combinations reveals the practices of one-to-one mentoring, [6,11] a supportive relationship between senior and junior nurses. The novice-peer mentor-veteran mentor triad [13] facilitates symbiotic relationship learning. Here, experienced nurses learn lifework balancing skills from their mentees, while the latter supports honing clinical skills and decision-making.

Reviewing the latest available literature showed how dynamic mentoring approaches have emerged to accommodate changes in the healthcare environment and patient acuity. Firstly, mentoring is now seen as enjoyable; [13] distinctive from traditional mentoring views which portray mentoring as exclusive and intensive. [12] Communication between parties has transcended into text messaging, emailing, calling, updating social media sites, [6] and informal meetings over coffee or meals.[13]

Terminologies have also metamorphosed, paralleling the direction of mentoring. For instance, NGRN's are also referred to as "advanced beginners", reflecting the progression of skill development and knowledge building. [6] "Occupational stress" [6,46] and "reality shock" [6,47] are coined to describe anxious feelings due to overwhelming job demands, and realisation of discrepancies between theory and practice, respectively. [7,6]

There are gaps in the literature that require further exploration. Zhang, Qian [6] proposed mentorship-focused studies to have at least 60 participants to minimise bias and increase generalisability of results. Furthermore, they

suggested determining best practices for mentorship; exploring the qualitative views on the value of mentorship; comparing the feasibility of different mentorship types and alternatives; and determining the frequency of mentor contact to achieve the desired outcomes. [6] Mentors must set minimum educational standards, whilst mentees need their transitional phase needs identified and prioritised, so management and mentors can collaborate on establishing a framework that helps meet these goals. [6] A standardised protocol that indicates timeframes and milestones will be valuable in guiding the progression of availing precepting and mentoring support. A preceptor is applicable during intensive skill development, whilst a mentor is appropriate for broadening career horizons. [11] Lastly, the analysis of obtained information reveals a few flaws in the currently available literature. Firstly, a theoretical framework like Benner's theory [27] may need content realignment to contemporary practice and setting, [9] as it contains outdated information that may be irrelevant to current nursing practice. For example, the description of a novice nurse's tasks is knowing the normal parameters of vital signs to detect problems. [16,27] Today's patients present with complex morbidities that may masquerade clinical signs presentation, deviating from what theory suggests. Healthcare has deviated into a globalised form, facing overwhelming demands whilst delivering preventative and patient-centred care. [48]

The interconnectedness between retention and turnover is not a reciprocal relationship. The same holds with precepting and mentoring. These terms are often transposed in the literature and assume reciprocity and provide no definition. The paucity of evidence-based practices presents to nurse managers and healthcare organisations a challenge and perpetuate the adjustment challenges confronting NGRN's. This situation explains the decreased number of mentoring practices in place [13] and the increasing turnover rates of NGRN's.

DISCUSSION

The literature review demonstrated three recurrent themes emerging from the studies:

1. The value of the informal structure of mentoring programs.
2. The duration of mentoring programs; and
3. The effectiveness of mentoring programs towards participants and organisations.

Contemporary mentoring has assumed a less-formalised structure that requires substantial participant involvement. It incorporates a range of communication pathways ranging from text messaging to informal gatherings. Mentoring facilitates the holistic development of NGRN's whilst assisting them in transitioning into professional practice. A novel mentoring method, called the generational approach, hones mentees and fosters future mentors. [13]

The literature differentiates preceptorship and mentoring. [13] The former could be utilised short-term, during the initial phases of skill honing. Transitioning into the latter happens once the NGRN has established a skill and knowledge base, given the long-term, holistic learning that is broader in scope. This situation parallels the analogy that preceptorship is imperative employment and mentoring develops the NGRN holistically after employment. [11]

The timeframe associated with mentoring is long-term. However, studies did not show a uniform duration of mentoring programs. They vary from 1 to 6 years after graduation, whereas the current studies focus on the first three years of practice [5, 6,9,11,13,19,44].

Mentoring effectiveness is portrayed in two avenues of cost-effectiveness and job satisfaction, derived by the organisation and NGRN's, respectively. Cost-effectiveness or ROI is predominant until the end of the first year of mentorship; [13,46] correlating with plummeting retention rates at year two [9] and rising resignation and career changes at year three. [44] This situation necessitates the formulation of qualitative tools that would assist health managers, and key stakeholders explore the factors that contribute to such changes and generate mitigating strategies that can be effectively implemented towards the end of year one.

Job satisfaction reflects multi-faceted avenues including improved clinical competence [6], high care standards [13], congruence of practice and learning and consistent mentoring [13]. It contributes to job retention and turnover. [6, 9, 11, 13, 44] New studies show trending disconnection and ineptness of NGRN's from 6 months to 1 year of undergoing mentoring, leading to lower job satisfaction. [9] Further exploration of factors causing these deviations is crucial, so mentors can look out for emerging changes and intervene immediately.

RECOMMENDATIONS/GAPS IN THE LITERATURE

This SLR has identified four gaps in the literature to guide future research endeavours that focus on mentoring.

1. The literature on mentorship is seminal and requires quantitative nor qualitative clinical performance indicators that measure NGRN competency before and after mentorship. These will serve as standardised benchmarks for nurse mentors, nurse managers, and healthcare organisations to use when deciding on implementing mentoring programs to NGRN's.

2. There is no standardised structure that guides the best practice in mentoring programs and sparks a debate about program content rather than structure determining its effectiveness. [9] Another study argues that group mentoring, and more frequent meetings enhance the effectiveness of TP's. [11] With the probable inception of indicator tools, [9] benchmarks and timeframes will provide evidence-based guidance regarding the content, duration, frequency, and structure of mentoring programs. [10] Content should reflect the learning needs and milestones of mentees. Exploring content being either standardised for generalised implementation or tailored according to individual learning plans could be beneficial. [10] Refinement of mentor-mentee pairings [13] will predetermine matches based on mutual characteristics and goals, or by the mentee's choice.

3. Contemporary literature examines job satisfaction, retention-turnover, and clinical performance, but there have not been any large-scale studies reported in the literature. There is a need for a more rigorous, formal research into the effectiveness of mentoring programs, including cost-effectiveness.

4. The literature search revealed that there is mentorship-related research paucity in non-acute care settings like PHC. It is recommended that mixed methods research that explores the personal views of NGRNs regarding mentorship in community settings and develops a standardised duration of the mentorship program for PHC NGRNs. Since the pre-existing mentorship strategies to promote job satisfaction, competence, and job retention are dedicated to NGRNs working in acute care. These strategies may be deemed inapplicable to NGRNs in non-acute care settings.

The included studies came from the United States, [9, 11, 13] Canada, [44] Australia and New Zealand, [19] Sweden, [5] and China. [6] Studies from other countries did not meet inclusion criteria, contracting the pertinence of results. The writers recommend that a large-scale quantitative study that will increase the generalisability and applicability of results. A qualitative study can focus on contributing factors to NGRNs' decisions related to their staying or leaving their position after the transitional period.

CONCLUSION

Mentoring is a novel and effective transitional approach for NGRNs compared to precepting contractual and time-bound conditions. Mentorship informality brings about long-term effects that transcend into the quality of professional competence and relationships. In general, clinical mentoring increases the NGRNs' job satisfaction, retention, and clinical performance.

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SOCIOECONOMIC AND POLITICAL DIMENSIONS OF COVID-19 DISPERSION

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ABSTRACT

This study aims to provide an understanding of how certain factors lead to the formation of clusters of areas of COVID-19 dispersion to guide policy decisions and government actions. It utilized an ecological study design that analyzes data at the population or group level. The units of observation are the barangays in Cebu City. These barangays are the nodes in the network and the edge considered is the presence of areas of convergence. In order to identify the nodes for this study, data mining was done to get the number of reported COVID-19 cases in Cebu City from the Cebu City Health Office as of May 23, 2020. Only thirty-nine (39) barangays with COVID-19 cases were included in the study. Results revealed that although public and private transportation is controlled during the implementation of Enhanced Community Quarantine, it is assumed that the spread started prior to the implementation of strict prohibitions which led to the rise of cases later on. Even at the time of the strict community quarantine restrictions, economic activities related to basic necessities were still allowed. For instance, public markets were open with prohibitions related to schedules only. This implies that people are still mobile at certain times despite the presence of restrictions. People still converge in areas where economic activities are present.

KEYWORDS

INTRODUCTION

Infectious diseases present enormous challenges to the public health of the human population. The World Health Organization (WHO) has suggested that the most important measure for controlling infectious disease is a timely response with the implementation of effective interventions. This requires the establishment of the investigation of tempo-spatial disease transmission patterns [1, 2]. Community-based interventions such as school dismissals, event cancellations, social distancing, and creating employee plans to work remotely can help slow the spread of COVID-19. More so, individuals can practice everyday prevention measures like frequent hand washing, staying home when sick, and covering coughs and sneezes [3].

In the early years of scientific medicine, most clinicians and researchers thought only in terms of single causes: specific agents that cause a specific disease. Researchers have shown that the transmission of an infectious disease can be affected by various interactive factors at or across different scales, which makes it very difficult to predict when, where, and how the disease will spread. The natural transmission of an infectious disease depends on the presence of and the interrelationships among three types of epidemiological entities: the disease, the host, and the transmission agent.

Generally speaking, disease transmission is determined by both the transmission properties of each type of entity and the complex ways in which the three types of entities interact with each other [1, 2]. However, current research discoveries highlight the relationships between health and behavioral, psychological, and social variables [4]. Less widely recognized, however, is the association between socioeconomic status and health, or the influence of social networks, current or anticipated employment status, and personal beliefs [5, 6]. These are factors most of the time not considered in disease spread prevention efforts.

Decisions about the implementation of community measures are made by local and state officials, in consultation with other officials as appropriate, and based on the scope of the outbreak and the severity of illness. Implementation will require extensive community engagement, with ongoing and transparent public health communications [3]. WHO was successful in working closely with various stakeholders to promptly generate understanding of the SARS CoV-2, to track the spread and virulence of the virus, and to continuously provide advice to countries and individuals on measures to protect health and prevent the spread of this outbreak. Thus, this study aims to provide an understanding of how certain factors such as policies on the mobility of residents to access goods and services (convergence in public places and transportation) lead to the formation of clusters of areas of COVID-19 dispersion to guide policy decisions and government actions.

THEORETICAL FRAMEWORK

The focus of the study is on the dispersion of the COVID19 cases, specifically looking into the modularity of the COVID19 cases in Cebu City. Modularity refers to the clustering of cases based on the presence of areas of convergence and the availability of the means of transportation from one barangay to another. A barangay is the smallest political unit in the country [7]. The barangays will serve as the nodes and the areas of convergence and means of mobility are considered as the edge. It is assumed that these factors determine the incidence of COVID19 cases.

There is a direct relationship between the areas of convergence and means of mobility and the number of cases in certain barangays. It is further assumed that the weight (extent of) of the interaction has a direct

relationship with the areas of convergence and means of mobility between barangays. To further strengthen the relevance of the analysis of the study, the social, behavioral, and political factors of every barangay are to be considered in the analysis. The social and behavioral factors pertain to congregational behavior and recreation activities [6]. Furthermore, these involve the mobility of people to areas that allows them to access their basic need as permitted by local leaders. These areas are the major sources of economic activities such as markets, malls, and groceries. Political factor refers to the practices within the locale which pertain to a policy implemented related to household monitoring, transfers, and migrant residents in the barangays and the precautionary measures [7]. These involve issuances enforced that regulate the movement of people across barangays. These factors provide the qualitative parameters in the visual analysis of the modules derived in this study.

METHODOLOGY

The study utilized an ecological study design that analyzes data at the population or group level [8]. It is an observational study often used to study rare diseases such as COVID-19 and measure their incidence and prevalence in a particular group of people. In this study, the units of observation are the barangays in Cebu City. These barangays are the nodes in the network and the edge considered is the presence of areas of convergence. In order to identify the nodes for this study, data mining was done to get the number of reported COVID-19 cases in Cebu City from the Cebu City Health Office as of May 23, 2020. Only thirty-nine (39) barangays with COVID-19 cases were included in the study. The connectedness between the nodes was established based on three (3) reference barangays with the highest number of cases. Further, to establish the weights for the edges, an additional attribute was used which is the means of mobility. Codes were utilized for the assigning of weights namely: two (2) if both criteria - area of convergence and means of mobility is present; one (1) if either of the criteria is present; and zero (0) if both are absent. An undirected network perspective was utilized in which the edges indicate a two-way relationship and that each edge can be traversed in both directions. All data gathered were entered in Gephi to come up with a network graph for analysis. Yifan hu layout was utilized to get an overview of the network structure and betweenness centrality was considered to identify influential nodes. Finally, the researchers looked into the

formations of clusters as presented in the network graph and explained the data through the actual observations and reports on the socio-economic and political activities of the barangays involved.

RESULTS

Data taken from the City Health Department posting of Cebu City COVID-19 cases were used to identify the hot zones of the spread of infection and were used as a basis for the identification of nodes. The edges that connect the nodes were dependent on the presence of a common area of convergence. The weights of the edges were determined by an additional attribute variable - the means of transportation. Three barangays were identified as sources and are considered to be hotspots of COVID-19 cases.

FIGURE 1. NETWORK ANALYSIS OF COVID-19 SPREAD IN CEBU CITY
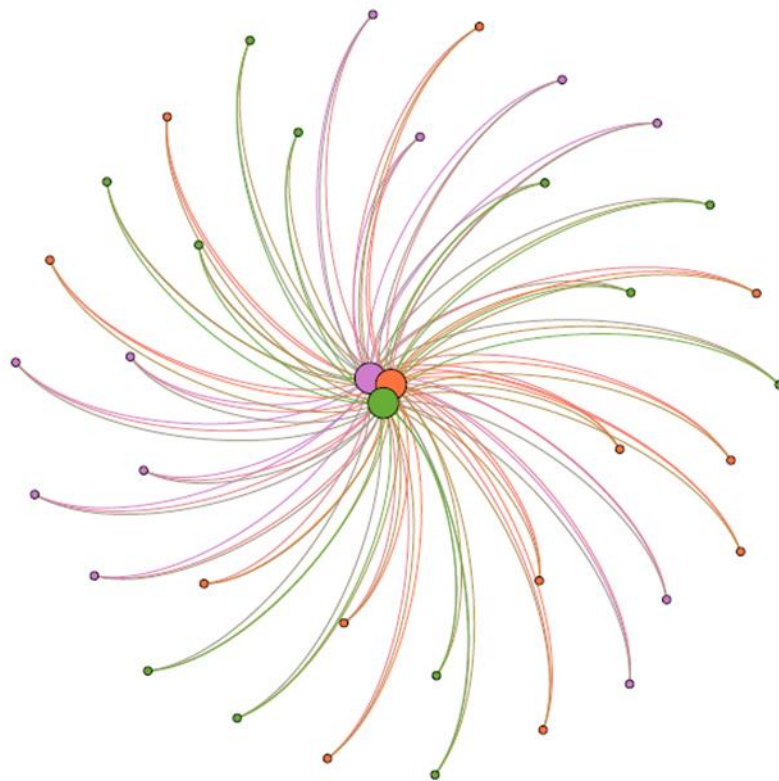
The figure above shows a single main cluster composed of 39 nodes and 108 edges. At the center of the cluster are 3 larger nodes which correspond to barangays Mambaling, Luz, and Labangon respectively. Each of this barangay is connected to the other barangays with COVID-19 cases in varying path lengths and weights as shown by the lines that connect one node to another. The differences in path lengths can be seen by how far a node is from the larger central node. On the other hand, the lines that connect these nodes vary in weight which signifies that one or more barangays are more closely linked to the central node.

There are also three different colors in the figure that represent specific modularity classes. One cluster is in purple color with Barangay Mambaling as the central node. The lines that connect barangay Mambaling to the other nodes are also in the same color. Another cluster is in orange with Barangay Luz as the central node. In the same way, all lines that connect barangay Luz to the other nodes are in a similar hue. Lastly, the green color represents another cluster with Barangay Labangon as the central node and the lines that connect it with the rest of the barangays are of the same color.

Moreover, the figure reveals an overlapping of the three clusters with three nodes having more connections than the rest of the nodes as it appears to be larger in diameter. The smaller nodes are situated around the larger nodes and are connected in lines of varying weights. Also, the three larger nodes are linked to one another.

Despite the source of infection coming from different barangays in the city, the figure reveals a cluster of nodes with connections to the other nodes or barangays. The connections are of varying weights which corresponds to the presence of an area of convergence and means of mobility. COVID-19 infection spreads to other areas since people from different barangays meet at a certain place to satisfy their basic necessities. Further, the pattern of spread may also be attributed to the means of transportation and the areas covered by specific vehicle routes. Cases spread in areas where there are travel routes or are along the routes of transportation towards points of convergence.

Although public and private transportation is controlled during the implementation of Enhanced Community Quarantine, it is assumed that the spread started prior to the implementation of strict prohibitions which led to the rise of cases later on. Even at the time of the strict community quarantine restrictions, economic activities related to basic necessities were still allowed. For instance, public markets were open with prohibitions related to schedules only. This implies that people are still mobile at certain times despite the presence of restrictions. People still converge in areas where economic activities are present.

DISCUSSIONS

With the COVID-19 pandemic still affecting the globe and a considerable number of new cases appearing every day, the choice to move around, dine out, or join other social gatherings is complicated. While some still underestimate the capacity of the virus to hit people plays a part in some of these decisions, even people who acknowledge the danger of contracting the coronavirus keep risking social interactions. The innate characteristic of humans to interact with one another compels people to be social may be to blame. Preventing them to socialize means depriving people of their human nature [8].

During the pandemic, the coronavirus has hinged on the dependence on social interactions to spread the disease. But within that same human drive lies a possible key to making social distancing easier. It is in the nature of humans to develop a penchant for altruism and protecting one another. However, this need to protect one other also includes the responsibility of looking for food for family members which can only be done if work continues and if there are means to move around the city. Thus, forcing people to go out despite the threat of being infected [8].

The increasing spread of the coronavirus across countries has prompted many governments to introduce unprecedented measures to contain the epidemic. These are priority measures that are imposed by a sanitary situation, which leave little room for other options as health should remain the primary concern. These measures have led to many businesses being shut down temporarily, widespread restrictions on travel and mobility, financial market turmoil, an erosion of confidence, and heightened uncertainty [9]. As state and local officials pleaded for residents to stay at home in the midst of the coronavirus pandemic, many included a caveat: people can still enjoy the outdoors, as long as they can maintain a safe social distance, and if going out is for essential activities only [10].

People are supposed to only visit stores selling household essentials in person when they absolutely need to and stay at least 6 feet away from others who are not from your household while shopping and in lines [11]. However, noticeably, people still chose to go to marketplaces that provide affordable products despite the chances of getting infected. This is due to the fact that the pandemic has severely impacted the financial status of the majority of the citizens. Furthermore, the pandemic raised the unemployment rate in the country. Strict quarantine measures have forcefully closed small and big businesses leading to either temporary or permanent loss of jobs. Losing income at this point in time cripples one's purchasing power. This means that people are drawn to areas that offer lower prices for basic commodities. They are inclined to converge in places such as public markets to satisfy their physiological needs. Going to flea markets is not only for cultural reasons, but also to maximize the meager finances left from the savings after not being able to gain income for months.

Another important consideration is mobility and transportation. The role public transportation plays in the spatial transmission of COVID-19 is significant. It was found

out that there is an association between the spread of the infection and the travel of people through the public transportation system [9]. Public transit can put you in close contact with others. However, the majority of the people rely on the public transportation system to move around, especially for work and school. Before strict prohibitions on mobility have been implemented, people move around through public vehicles. supposedly, when going out in public, it is important to stay at least 6 feet away from other people and wear a mask to slow the spread of COVID-19. Before going out, people should know and follow the guidance from local public health authorities in the locality. It is important to consider social distancing options to travel safely when running errands or commuting to and from work, whether walking, bicycling, wheelchair rolling, or using public transit, rideshares, or taxis [11].

The COVID-19 experiences of different local government units have initiated different responses on how to address the spread of infection. This health problem has affected different sectors of governance and created the challenge of how this can be mitigated or controlled. The type and time of response to control the spread of infection are critical points to consider in any area with threats of an epidemic. Common initial responses from local government units would be less significant and most often focused on an immediate resolution once some cases are observed. However, when the unprecedented increase of cases is reported, the political will is challenged and forces leaders to address the concerns. It is only then that the strict quarantine measures were enforced and tracing of cases are implemented. When the onset of a threat is observed immediate quarantine measures were implemented, mobility restrictions would reduce the spread of the virus from one carrier to another. An appropriate tracking system of symptomatic and asymptomatic cases and their contacts will further control the transmission of the infection.

A clear example is reported in Cebu City. The strict implementation of the quarantine pass, suspension of public transportation, curfew and mobility limitations for the young and old population, enforcement of work from home arrangements, among other measures at the height of the rising cases of COVID19 led to a gradual reduction of cases after a few months. These measures demonstrate how control of people's convergence in the same places limits infectious transmission given the spatial picture of how the spread intensified.

CONCLUSION

As the government chooses policies to follow in response to the pandemic, it is imperative to understand precisely how both the pandemic and potential government interventions will impact everyone. Maintaining public and political will for extending social distancing measures and keeping people housed depend on easing financial pressure on people who have been forced to stop working or have otherwise lost income from jobs or businesses. In addressing both the public health crisis and the economic crisis, timely data can help policymakers assess and improve relief efforts so that everyone can afford basic needs until the crisis lifts. To further understand the emergence of cases, it may help to do a network analysis before and after the implementation of measures to suggest that there may be an association between implementation measures and the reduction of cases.

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RESEARCH ARTICLE

COMMUNITY ENGAGEMENT IN THE TELEHEALTH SERVICE FOR AGED PEOPLE WITH DIABETES: COVID-19 RESPONSE IN BANGLADESH

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ABSTRACT

PURPOSE:

The purpose of this study is to present a better understanding of the specialized telehealth service in Bangladesh from the service provider and service recipients by aged people

METHOD:

Both quantitative and qualitative methods were used to collect data from Diabetes Mellitus (DM) patients. Data were collected by online telephone interviewing with an interview schedule. A total of 100 aged people with diabetes were selected purposively for a quantitative interview and 10 In-depth Interviews (IDIs) & Key Informant Interviews (KIIs) were conducted.

RESULT:

The majority of patients aged was between 61 to 68 years with a mean age of 63.6 ± 7.01years. The difference of age of DM patients by sex was found statistically significant ($x2 = 39.49$, df = 31; Cramer's V = .032; P=<.003). The main source of information about digital health was: relatives (55%), neighbors (31%), television (12%), newspaper (10%), social media (9%), and healthcare providers (6%). Strong relationship was found between age of respondents and sources of information ($x2= 77.08$; Cramer's V= .032, df = 13; Sig; P= < .009). About 59% of DM patients were benefited from telehealth services during COVID-19, however; they encountered some difficulties like effective access to digital technology, cost, and diagnosis facilities. About 83% of respondents suggest formalizing community engagement programs to extend the digital health services during a health emergency. The common barriers to the engagement of community people in digital health care are lack of social awareness, lack of peer group support, and gender disparities. Poor counseling, language barrier, bad internet signal, and lack of family members' support were the key barriers during teleconsultation services.

CONCLUSION:

Telehealth has the potential to address critical health issues of aged people and effective community engagement may be the best option to reach older people with diabetes in Bangladesh during any health emergency.

KEYWORDS

Aged care, digital health, community engagement, Bangladesh

INTRODUCTION

The rising burden of chronic disease and the faster-increasing rate of older people is to be considered the greatest challenge to the achievement of quality healthcare services. The increasing trend of older people is to be considered as a game-changer in the healthcare sectors and a key driver to change the demographic features of a country. It is projected that elderly people's growth in Bangladesh to be much faster (219%) compared to some European countries such as Sweden (33%), the UK (45%), or Germany (66%) in the period of 1990-2025. [1] eHealth is now considered an important tool to meet these challenges in developing countries like Bangladesh by engaging the community. For instance, technology in health care, welfare technology, mobile health care, and innovation of health care solutions. [2, 3, 4, 5] Community engagement and digital health have created an opportunity for all the stakeholders as part of the learning process by sharing responsibility and partnership for a transformative and holistic development approach. Community-based health development programs and social mobilization activities such as risk and protective factors, comprehensive and multi-level programs, effective and evidence-based interventions in the community setting are needed to consider designing the community development approach.

In recent times, the Government of Bangladesh (GoB) achieved remarkable progress in the transformation of digital health into COVID-19 response. As a part of digital health services to promote aged people health using telehealth services, the government provides a specialized telehealth service through the Diabetic Association of Bangladesh (BADAS) for aged people with diabetes. It is being evident that diabetes is a significant contributor to deaths and complications among people infected by the nCov-19 in Bangladesh.

Government of Bangladesh has introduced digital health strategy as well as tele-health care service provision for Bangladeshi people in 2019 in pursuing resolution 71.7 of the world health assembly. . Recently government of Bangladesh has introduced tele-healthcare services in the 2 specialized hospitals (Bangabandhu Sheikh Mujib Medical University and National Institute of Cardiovascular Diseases), 3 district hospitals (Shatkhira, Nilphamari and Gopalganj) and 3 sub-district hospitals (Pirgonj, Dakope and Debhata). Around 15 digital healthcare service providers are working in the country wide. This learning process can be useful as an effective tool for determining the future course of action and steps will have intended to support elders in the community to use digital health technologies as easy access and such a process usually strengthens the skills and capacity of the community members. Simultaneously, this process helps both parties (stakeholders and actors) to build confidence through cooperative learning and confidence-building to improve the conditions of target groups and level of knowledge. [7, 8] In this context, we need a comprehensive study of these stakeholders and how they act about each other is warranted, particularly in the context of digital health care services for aged people in Bangladesh. With the recognition that information and communications technologies aim to attain new opportunities and challenges for the achievement of Sustainable Development Goals (SDGs), there is a growing consensus in the global health community that the strategic and innovative use of digital and cutting-edge information and communications technologies will be an essential enabling factor towards other healthcare initiatives such as universal health coverage, health emergencies, and health well-being [9]. Digital health become an essential part of daily health care services and government is planning to amendment the healthcare services and transform it into digital care especially for aged people within on-going healthcare facilities. BADAS ongoing tele-healthcare

services is to consider model initiative to address the diabetes care for aged people in Bangladesh.

The purpose of this study is to present a better understanding of the specialized telehealth service in Bangladesh from the service provider and service recipients by aged people.

METHODS

Mixed methods were used to collect data from DM patients. Data were collected by online telephone interviewing with an interview schedule. A total of 100 aged people with diabetes were selected purposively for Quantitative interviews and 10 IDIs & KIIs were conducted.

SETTING THE SCENARIO:

The Heath system of Bangladesh is working with 600 public hospitals, 16,438 community clinics, and 30,000 satellite clinics to provide healthcare services to around 165 million people. These statistics show that 0.47 doctors per 1,000 populations. [10] Diabetic Association of Bangladesh (BADAS) is a non-profit organization is delivered diabetes care services around half of the people with diabetes in Bangladesh. The organization manages over 100 institutions, covering small to large hospitals and rendering services to primary, secondary, and tertiary care across all disciplines throughout the country. The research was conducted at 4 BADAS hospitals at the district level and data were collected from a patient who attended services and treatment from those hospitals. Diabetic The aged people who attended BADAS hospital for diabetic treatment were interviewed as a key informant for this research. Furthermore, 10 IDIs were also conducted for aged people with DM.

STUDY POPULATION, SAMPLE SIZE AND SAMPLING:

Both quantitative and qualitative data were collected through a sample survey and in-depth interviews, respectively. In sample survey those variables were included which had primarily provided quantitative information, while qualitative data were express feelings, perceptions, and opinions. The patient aged above 65 years were purposively selected to collect information for this study.

The interview schedule was pretested and obtained data were analyzed for determining reliability. Face validity of the questions was determined by research an expert.

Sample size was finalized using a standard formula (Fisher, et al., 1991), which was around 100.

DESIGN AND DEVELOP OF RESEARCH TOOLS:

Both structured and open-ended questions were used in quantitative survey while for in-depth interview data were collected with the help of an interview guide, which included unstructured questions having option to continue to instantly formulate questions for collecting meaningful data. Each in-depth interview has transcribed within 24 hours of interview lest information is lost. In-depth interview respondent's diabetes patients, service providers, and policy makers.

DATA COLLECTION, QUALITY CONTROL, AND DATA MANAGEMENT:

Data (open and close-ended questions) were collected over 1 month (November 1 to November 30, 2020). A total of 100 patients were interviewed using an interview guide. A workshop was conducted with the research assistants to better understanding the study objectives and data collection procedures. The study format and interview schedule were given to diabetologists and public health experts for determining content validity. Their comments were incorporated for updating the research instruments. The filled-in formats and interview schedules were edited immediately after the collection.

DATA ANALYSIS PLAN:

SPSS statistical package was used for analyzing quantitative data. Survey data was coded and entered into the computer for analysis. Univariate and bivariate tables were used for analysis purposes. Data analysis included frequency distribution, cross-tabulation, co-relation, and association and, statistically significant tests between variables ($X2$, p-value, and CI). The qualitative data were analyzed manually using the content analysis technique. Categorization was done according to themes and sub-themes.

ETHICAL CONSIDERATION:

Verbal consent was obtained from each participant after explaining the purpose and nature of the research. Participation in the study was voluntary and participants were informed of their right to quit/refuse their participation at any stage of the study if they do not want to participate. Moreover, the confidentiality of the information was assured by using an anonymous consent form.

RESULTS

SOCIO-DEMOGRAPHIC INFORMATION OF DM PATIENTS:

The study revealed that a large number (73%) of diabetes patients aged between 61 to 68 years with a mean age of 63.6 ± 7.01years, ranging from 55 to 84 years old, which means a large number of diabetes patients were elderly and few were very aged. A total of 40 males and 60 females' diabetes patients were included in this study. The difference of age of DM patients by sex was found statistically significant at .003 level (x^2 = 39.49, df = 31; Cramer's V = .032). The studied most of the DM patients were Muslim (91.8) whereas 8.2% were Hindu. The majority (75%) of the DM patient family size was 4-5 and level of education was up to primary (33%), High school (30.60%), SSC (10%), HSC (4.9%), Graduate (2.75%), Postgraduate (.5%) and Illiterate (20.5%) respectively. About 42.5% of the DM patients' occupation was housewife, 22.2% were service holder, 10.3% were businessman, 8.8% were retired person, 5.5% were old/aged and 4.3% were a farmer and 2.5% were day labor. About 88.5% DM patients were married, 7% were the widow and remaining .5% was divorced. On average DM patients came hospital from a 42 KM distance to receive treatment and services.

TABLE 1: PERCENTAGE DISTRIBUTION OF AGE OF THE RESPONDENTS BY GENDER

AGE CATEGORIES	MALE N= 40	FEMALE N= 60	TOTAL N= 100
	Percentage	Percentage	Percentage
55-60 years	8.5%	30%	20%
61-65 years	40%	47%	44%
66-70 years	24%	14%	19%
71-80years	20%	6%	13%
81-85 years	7.5%	3%	4%
Total	100.0	100.0	100.0
Mean	63.01	63.96	63.52
Median	66.90	67.70	67.80
St. deviation	7.11	7.16	7.14
x^2= 39.49; Cramer's V= .031, df = 9; Sig; P= < .003			

COMMUNITY ENGAGEMENT AND AGED PEOPLE PERCEPTION OF DIGITAL HEALTH SERVICES:

About 66% of the respondents were informed about telehealth services and about 58% of the elderly people have received some sort of telehealth services during COVID-19. About 55% of aged people heard about digital health from their relatives whereas 31% were informed about digital health care services from their neighbors. People also heard from mass media like television (12%), newspaper (10%), Facebook (9%) whereas 6% were informed by formal healthcare providers. A strong relationship is found between the age of respondents and sources of information. The formal sources of information obtained by respondents progressively increase with the increase of their age (x^2= 77.08; Cramer's V= .032, df = 13; Sig; P= < .009). Possible reasons could be that relatively older people chose to stay at home due to COVID-19 and were more likely to watch TV, follow radio programs and read the newspaper to get updates on the COVID-19 pandemic while passing time at home. The interesting feature is that about 78% of aged people welcome digital health services like telehealth services of BADAS and among them 59% had experienced receiving telehealth service during COVID and lockdown situations. The vast majority (83%) suggested formalizing community engagement programs to extend the digital health services during a health emergency. About 27% of aged people had faced various difficulties in receiving treatment during lockdown using digital health platforms. The major difficulties were access to digital technology (42%), diagnosis of diseases (36%), and buying of prescribed medicine (22%) due to financial crisis. BADAS established its digital care center in 2018 aimed to access health care for aged people. The big concern is that about 56% of users

are not happy with their services and suggested more community engagement for the effective utilization of digital health services. Recommendations were sought from the respondents for the improvement of services of digital health. In response to this, some suggestions were put forward by the respondent. The highest percentage of respondents suggested making more facilitating digital care (56%), followed by providing better diagnosis facilities (43%), effective advocating for people with diabetes (38%), promoting community awareness (32%), and strong community engagement especially community leaders (29%). About 36% of participants believe that the recent COVID-19 shows high demand for community engagement. Participants were informed about digital health care for aged people from different sources such as Physician (46%); Television (21%), and Neighbors (45%). Our data show that a large proportion (56%) of respondents were not happy with the existing quality of services. The aged people think that telehealth services support them to prevent any sort of direct physical contact (49%), provide continuous care to the older community (46%), and reduce morbidity and mortality in COVID-19 (44%). The important issue is that a large number of respondents (58%) are informed about government digital services. Common barriers to engagement of community people in digital health care for aged people such as lack of social awareness (55%), lack of peer group support (44%), and gender disparities (32%) are notable. In general, a health educator or counselor provides counseling on DM complications, the importance of regular follow-up and visits of referring places, how to control sugar levels, how to maintain a healthy lifestyle, and advice for the next appointment. Respondents were informed about diabetes treatment from doctors (73%), quacks (12%), rural physicians (52%), and allied health personnel (48%). A digital platform like social media also plays a vital role to create strong community engagement and help to improve their health-seeking behavior at the individual and community level. Majority of the respondents opined that development of infrastructure, connectivity, quality of digital healthcare, and validation of digital health care maybe crucial steps to engage the community.

FINDINGS FROM QUALITATIVE INTERVIEWS:

In order to understand aged people expectation and service providers' views in response to digital healthcare we tried to comprehend common persons' and occupational groups' perception of tele-healthcare for aged diabetes patients. We conducted in depth interview. Some participants believe that most of the aged people

have rejected digital healthcare because they prefer going to specialists or qualified physicians physically for treatment. From our KIIs and IDIs data, we found that most of the respondent's mention barriers to receive digital healthcare. The majority of the participant's mention health education barriers like poor counseling, poor time allocation, language barriers (sometimes they couldn't understand the medical terminology using by a physician or allied health personnel), and lack of support from family members during telehealth conversations. Participants also mention financial barriers that negatively affect telehealth services and treatment (internet or mobile charge). Some aged people said that they do not even have money for a daily living how could even be possible to continue such long time-costly treatment over a telephone call. The participants hold the view that for lack of financial constraints they are not able to buy smart phone and unable to get digital healthcare.

Aged DM patients mentioned that community people have a lack of awareness such as an ignorant attitude to telehealth services, and in some cases, patients have less attention to the health counseling. Patient guardian has very low interest on telehealth services because they think that 'there are many gossiping but no-talk about diabetes. Poor communication between patients and service providers is the key barrier to provide telehealth care. Respondent suggests to effective awareness program about telehealth services, meaningful community engagement, cheap internet service, easy apps facility, and improve language barriers to deliver the counseling to aged people.

Perceptions were also measured through informal discussion and few structured questions. Most of the people perceive that digital platform is not good for quality healthcare especially for aged diabetes people. Majority of participates still believe in herbal treatment for their diabetes but they opined that modern treatment of diabetes is needed and service facilities should be made available. They have suggested arranging a one-day training session for aged people at community level on how to use digital platform to get easy treatment in the older age.

DISCUSSION

The primary goal of the study was to understand the service recipients' opinions about digital health and the

importance of community engagement service of BADAS for aged people during COVID-19. Health emergencies like COVID-19 push aged people to manage home quarantine and receive the tele-healthcare services provided by BADAS in a community setting. Government Digital Health Atlas (DHA) and BADAS digital health care is an initiative for aged people is parallel activities to reach aged people in Bangladesh. BADAS started its telehealth care for aged people in 2018 aimed at helping the aged people to reduce the suffering and make the services available. BADAS as a non-profit organization is trying to minimize the gap of its program and to make it user-friendly to aged people. Evidence shows that majority of the aged people is missing out on community engagement for digital health care initiative. Digital health care and community engagement is a new era for aged people of Bangladesh and COVID-19 is the best time to provide such services to people with diabetes. From our data, we found that the mean age of respondents was 63.6 ± 7.01years and the majority of the respondents were female. The age of aged people with diabetes by sex was found statistically significant. Possible reasons could be that relatively older people chose to stay at home due to COVID-19 and were more likely to watch TV, follow radio programs and read the newspaper to get updates on the COVID-19 pandemic. Aged diabetes patients on average travel 42 kilometers to get physical services from the diabetes hospitals. The majority of the aged people like to welcome digital health care services and 59% of aged people was benefited from BADAS telehealth services during COVID-19 and lockdown. Our study finding was similar to Nazim et al., (2020) [10] and they found that 52% of aged people were benefited from telehealth services during COVID-19. Recent studies show that digital health that connects diabetes patients with healthcare providers was level 2 using the video mode. [11] This facility is absent in the context of Bangladeshi digital healthcare. The majority of the aged diabetes patient who is living in the rural remote areas do not have such smart phone facility to conduct consultation with physician y using the video mode. On the other hand, most of advance level (3B) users using the CGM devices which provide active monitoring diagnosis and treatment based on the timely clinical judgement. [12]

Aged people with diabetes had faced some difficulties during telehealth services such as access to digital technology, cost, and diagnosis facilities. Our study findings were familiar with the findings of Tan et al., (2020) [13] and they reveal that aged people face barriers to the adoption of telehealth services such as cost, access, trust of technology, privacy concern, and user interface during COVID-19. Community engagement approach and tele-healthcare for aged people with diabetes are innovative healthcare services to remote underprivileged people in Bangladesh. Our data shows that community engagement is poor in Bangladesh and the vast majority (83%) suggested formalizing community engagement programs to extend the digital health services during any health emergency. Community engagement is an effective tool to provide quality services to the service recipients and about 56% were not happy with present telehealth services. The use of CGM with synchronized data sharing makes diabetes educators and clinicians easy to make decisions and fix the patient's problem during the pandemic. This wearable equipment classified at level 3B because it could empower patients and families. The patients and family can do active monitoring, recording the glycemic status day by day, transmit the data to the healthcare, and do early specific diagnosis by reminder feature of hypoglycemia and hyperglycemia alarm. [14] The common barriers are to engage community people in digital health care for the aged people are poor social awareness, the low interest of peer group support, and gender disparities. Poor counseling, language barrier, bad internet signal, and lack of family members' support are key barriers to deliver teleconsultation services. Qualitative findings also show poor counseling, insufficient allocation of time, language barriers, and family members' ignorant attitudes are the key barriers to receive quality service from tele-healthcare. Furthermore, the financial barrier is the key issue for aged people with diabetes, and in some cases, participants have less interest to attend telehealth services due to the high cost of the internet. Respondents suggest promoting the quality counseling session, continuing effective community awareness programs, meaningful community engagement activities, and enable access to tele-healthcare are the key factors to improve the tele-healthcare for aged in Bangladesh.

CONCLUSION

Aged people with diabetes are struggled to receive quality diabetes healthcare through a digital platform in Bangladesh. BADAS initiative opens a new window of opportunity for aged people to receive diabetes healthcare by staying at home. Telehealth services during any health emergency play a vital role to address the critical health issues of unprivileged aged people living in rural areas. Digital health strategy and proactive

community engagement may support aged diabetes people health care access during self-confinement.

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DIALYSIS ADEQUACY AMONG HAEMODIALYSIS PATIENTS IN EASTERN MEDITERRANEAN REGION: A SYSTEMATIC REVIEW AND META-ANALYSIS

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ABSTRACT

INTRODUCTION:

Dialysis adequacy is one of the most important indicators for measuring the quality of care provided in hemodialysis (HD) wards. Despite individual studies, there is still no comprehensive study about dialysis adequacy in the Eastern Mediterranean Region (EMRO). This study was conducted to evaluate the dialysis adequacy in HD patients in the EMRO.

METHODS:

In the present systematic review and meta-analysis international (EMBASE, Scopus, PubMed, Web of Science) and national (SID, MAGIRAN) databases were searched for related articles using keywords "dialysis adequacy" and "EMRO" from 1 January 2000 to April 30, 2020. The quality of studies was studied using Hoy et al instrument.

RESULTS:

Out of 966 retrieved studies, 63 studies conducted on 15462 HD patients were included. The pooled mean of KT/V and URR were 1.24 (95% CI: 1.19, 1.30) and 63.03% (95% CI: 61.31, 64.75), respectively. The pooled prevalence of Kt/V>1.2 and URR>65.0% were 42.73% (95% CI: 31.58, 53.88) and 42.52% (95% CI: 25.3, 59.7), respectively.

CONCLUSION:

The results of the present study indicate the poor dialysis adequacy in the EMRO region and the need to improve the physical infrastructure, workforce, and pieces of equipment in hemodialysis wards.

KEYWORDS

Dialysis adequacy; Renal Failure; Eastern Mediterranean Region; Systematic review.
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INTRODUCTION

Today, end-stage renal disease (ESRD) is a major public health challenge worldwide. According to the latest results of the global burden disease study (GBD) in 2020, about 697 million people worldwide suffer from chronic kidney disease (CKD), which shows that the global prevalence of CKD is 13.4% [1]. Also, at the end of 2017, more than 1.2 million people lost their lives due to CKD [2]. More than 89% of ESRD patients use hemodialysis [3].

Hemodialysis in the long term causes negative effects on the psychological (fatigue, depression) [4,5] and physical dimensions (itching, musculoskeletal pain) [6,7]. It also causes a negative effect on the quality of care indicators in hemodialysis wards including anemia, nutritional disorders, and dialysis adequacy [8,9]. Achieving optimal dialysis adequacy is the main goal of the care provided [10].

Dialysis adequacy is used as a global standard to evaluate the performance of the dialysis machine and more generally as an indicator to evaluate the performance of the dialysis center and the rate of receiving appropriate health services [11]. Despite the importance of regular measurement of dialysis adequacy, the results of studies show that in developing countries, only one-third of patients undergo dialysis adequacy regularly [12].

Evidence for the Eastern Mediterranean shows that most countries do not have a dialysis registry [13]. Also, more than 34% of HD patients do not receive a target KT/V greater than 1.2 [13]. Individual studies also show that most patients have lower than standard dialysis adequacy. There is limited information on the adequacy of dialysis in the EMRO region. The studies performed are mostly individual. Determining the exact level of dialysis adequacy can help policymakers to determine the distance from global standards and plan to reduce this gap. Therefore, this study was performed to evaluate the dialysis adequacy in patients undergoing hemodialysis in the EMRO.

METHODS

1. ELIGIBILITY CRITERIA

This systematic review and meta-analysis was conducted based on Cochran's book and reported using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement [14]. The protocol has been registered in PROSPERO (CRD42017057507). Studies performed on HD patients were included. Narrative Reviews, letters to the editor, qualitative studies, and published in none-English language were excluded. Dialysis adequacy was measured using KT / V and URR indices. According to the National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI), dialysis adequacy was considered as kt / v> 1.2 or URR above 65% [15].

2. SEARCH STRATEGY

In the present study, international (EMBASE, Scopus, PubMed, Web of Science) and national (SID, MAGIRAN) databases were searched from 1 January 2000 to April 30 2020 in the peer-reviewed journals. The search strategy was developed with the help of a librarian with experience in systematic review studies. The search strategy developed for the PubMed database for searching other databases was modified and used. Boolean operators (AND, OR, and NOT), Mesh related keywords, truncation "*" and related text words were used for search in title and abstract using the following keywords: "Dialysis adequacy" AND "EMRO region countries". Supplementary Table 1. EMRO countries were defined based on the WHO category.

3. SELECTION OF STUDIES AND DATA EXTRACTION

Based on the study protocol, the two researchers separately reviewed the titles. The consensus method was used for solving controversies among two researchers. At first, duplicate studies were eliminated, then the remaining studies were evaluated concerning the overall purpose of the study. Then, based on the eligibility criteria the title and abstract of the articles were reviewed. In the last stage, the Full Text of the remaining articles was evaluated and the final articles were selected. In cases where the necessary information was not available in the studies, the authors of the studies were contacted. The extracted information was entered into Excel. The items extracted were: Author, Year of publication, Country, sampling method, method of dialysis adequacy measurement (kt/v, URR), Design, number of participants, Age (mean+SD), gender (male /female), Risk of bias, main outcomes (Kt/V mean, % and number of patients with kt/v> 1.2, mean of URR, and % and number of patients with URR>65%, Dialysis Session Length(DSL)(min), Intradialytic Weight Loss (kg) and risk of bias.

4. QUALITY ASSESSMENT AND DATA ANALYSIS

Assess the methodological quality and risk of bias of each included observational study were evaluated by using the

Hoy et al tool. This 10-items tool evaluated the quality of studies in two dimensions including external validity Internal validity Risk of bias was evaluated by two researchers independently, Disagreements were resolved through the consensus method. All the eligible studies were included in the synthesis after a systematic review. Data were combined with the forest plot. The overall dialysis adequacy was evaluated by a random-effects model. The heterogeneity of the preliminary studies was evaluated with I2 tests. Sub-group analysis was conducted to determine heterogeneity based on the study gender and age. Meta-analysis was performed using STATA 14 (StataCorp, Texas, USA) statistical software.

RESULTS

1. STUDY SELECTION

A total of 966 articles from initial searches have been retrieved in national and international databases. Out of 801 none-duplicated articles in the title and abstract screening process, 609 studies were excluded. Out of 87 studies, 63 had eligibility criteria. Out of 24 excluded studies, eight studies were narrative reviews, one study was a letter to the editor, five studies had not full text, four studies were qualitative, and six studies had not English abstract (Figure 1).

FIGURE 1: STUDY SELECTION PROCESS

Figure 1: Study selection process
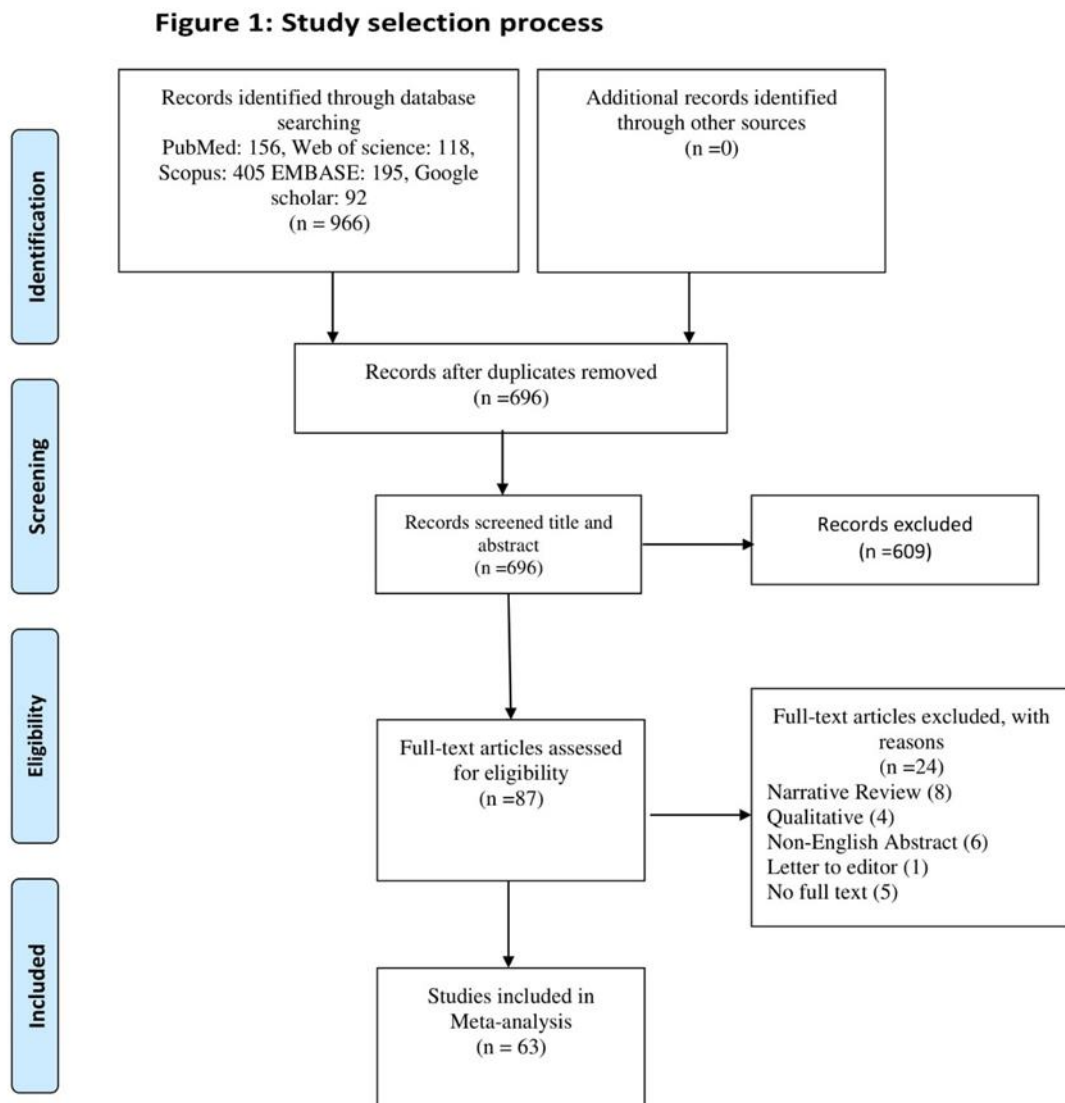
2. STUDY CHARACTERISTICS

63 studies performed on 15462 HD patients entered the final stage. The highest number of studies was conducted in Iran (n = 35), Egypt, and Saudi Arabia (n = 9). In most studies (n = 55) the convenience sampling method was used to select the samples. Most studies were cross-sectional (n = 65) and had low bias risk (n = 63). Most participants were female and had a mean age of 49.2 ± 15.7 (age range: 39-61.7 years). (Table 1)

3. DIALYSIS ADEQUACY

Of the total included study, quantify hemodialysis and peritoneal dialysis treatment adequacy assessed by Kt/V in 46 studies, with 13744 participants. In these studies, the mean of Kt/V was between 0.68 and 2.19. Based on the results of the random effect method, the pooled mean of Kt/V was 1.24 (95% CI: 1.19, 1.30; I2=99.3%) (Figure 2).

The Kt/VOCM (Kt by OCM (Online Clearance Monitor) and V by Watson) were reported in three studies. In this study Kt/VOCM mean±SD was 0.93±0.32 [16], 1.02±0.15 [17] and 1.45±0.23 [18] and pooled mean was 1.13 (95% CI: 0.82, 1.45; I2=97.9%).

The urea reduction ratio (URR) as the fractional reduction of urea during dialysis, assessed and reported in 22 studies, with 7096 participants. In these studies, the mean of URR was between 54.4% and 81.3%. Based on the results of the random effect method, the pooled mean of URR was 63.03% (95% CI: 61.31, 64.75; I2=100%) (Figure 3).

The prevalence of Kt/V>1.2 as dialysis adequacy was reported in 30 studies. The dialysis adequacy based on this index was high heterogeneity and was between 4.86% to 97.95% in the included study. Based on the results of the random effect method, the pooled prevalence of Kt/V>1.2 was 42.73% (95% CI: 31.58, 53.88; I2=99.3%) (Figure 4).

The prevalence of URR>65.0% as dialysis adequacy was reported in 12 studies. The dialysis adequacy based on this index was high heterogeneity and was between 10.0% to 93.84% in the included study. Based on the results of the random effect method, the pooled prevalence of URR>65.0% was 42.52% (95% CI: 25.3, 59.7; I2=99.3%) (Figure 5)

FIGURE 2. THE FOREST PLOT AND POOLED MEAN KT/V AS A MARKER OF DIALYSIS ADEQUACY

Author	Year	Country	ES (95% CI)	% Weight
Aatif, T.	2014	Morocco	1.82 (1.72, 1.92)	2.13
Abdelsalam, M.	2019	Egypt	1.35 (1.31, 1.39)	2.28
Abdelwhab, S.	2010	Egypt	1.29 (1.25, 1.33)	2.27
Adas, H.	2014	Palestine	1.06 (1.05, 1.07)	2.31
Aghsaiefard, Z.	2018	Iran	1.23 (1.20, 1.26)	2.29
Ahmadi, F.	2017	Iran	1.30 (1.17, 1.43)	2.00
Al Eissa, M.	2010	Saudi Arabia	1.30 (1.26, 1.34)	2.27
Al Saran, K.	2009	Saudi Arabia	1.37 (1.33, 1.41)	2.27
Al Saran, K.	2011	Saudi Arabia	1.45 (1.42, 1.48)	2.29
Al-Saran, K.A.	2009	Saudi Arabia	1.40 (1.38, 1.42)	2.30
Al-Saran, K.A.	2010	Saudi Arabia	1.19 (1.09, 1.29)	2.11
AlYousef, A.	2016	Kuwait	1.35 (1.28, 1.42)	2.22
AlYousef, A.	2016	Qatar	1.51 (1.45, 1.57)	2.23
AlYousef, A.	2016	Saudi Arabia	1.29 (1.26, 1.32)	2.28
AlYousef, A.	2016	UAE	1.50 (1.46, 1.54)	2.28
Amini, M.	2011	Iran	1.20 (1.19, 1.21)	2.31
Assal, H.S.	2006	Egypt	1.38 (1.19, 1.57)	1.75
Azar, A.T.	2007	Egypt	0.99 (0.95, 1.03)	2.28
Balouchi, A.	2018	Iran	1.09 (1.06, 1.12)	2.29
Dahbour, S.S.	2009	Jordan	2.13 (2.03, 2.23)	2.13
El Sayed, S.	2009	Saudi Arabia	1.40 (1.38, 1.42)	2.30
Esmaeilivand, M.	2015	Iran	1.24 (1.19, 1.29)	2.25
Farhadi, M.	2015	Iran	1.08 (0.99, 1.17)	2.16
Ghorbane M., Z.	2016	Iran	1.35 (1.24, 1.46)	2.09
Haghighi, M.J.	2018	Iran	0.83 (0.74, 0.93)	2.15
Hejaili, F.	2009	Saudi Arabia	1.60 (1.50, 1.70)	2.13
Hejaili, F.	2017	Saudi Arabia	2.19 (1.50, 2.88)	0.44
Hemayati, R.	2015	Iran	1.30 (1.20, 1.40)	2.12
Hussain, A.	2015	Pakistan	1.49 (1.42, 1.56)	2.21
Hojjat, M.	2009	Iran	0.96 (0.90, 1.02)	2.23
Ibrahim, S.	2006	Egypt	1.13 (1.07, 1.19)	2.24
Jalalzadeh, M.	2015	Iran	1.21 (1.18, 1.24)	2.29
Kadiri Mel, M.	2011	Morroco	1.14 (1.06, 1.22)	2.18
Kaviannezhad, R.	2016	Iran	1.10 (1.09, 1.11)	2.31
Mahdavi-Mazdeh, M.	2007	Iran	0.97 (0.96, 0.98)	2.31
Malekmakan, L.	2010	Iran	0.97 (0.94, 1.00)	2.29
Malekmakan, L.	2011	Iran	0.90 (0.83, 0.97)	2.22
Maoujoud, O.	2012	Morroco	1.22 (1.10, 1.34)	2.04
Mohamed, E.I.	2008	Egypt	1.21 (1.19, 1.23)	2.30
Moslem, A.R.	2008	Iran	1.39 (1.26, 1.52)	2.00
Mozaffari, N.	2004	Iran	0.68 (0.59, 0.77)	2.15
Nemati, E.	2017	Iran	0.92 (0.90, 0.94)	2.30
Nikparvar, M.	2015	Iran	0.92 (0.86, 0.98)	2.24
Oshvandi, K.H.	2012	Iran	1.27 (1.18, 1.36)	2.16
Ossareh, S.	2016	Iran	1.30 (1.28, 1.32)	2.30
Pourfarziani, V.	2008	Iran	1.17 (1.14, 1.20)	2.29
Overall (I-squared = 99.3%, p = 0.000)			1.24 (1.19, 1.30)	100.00

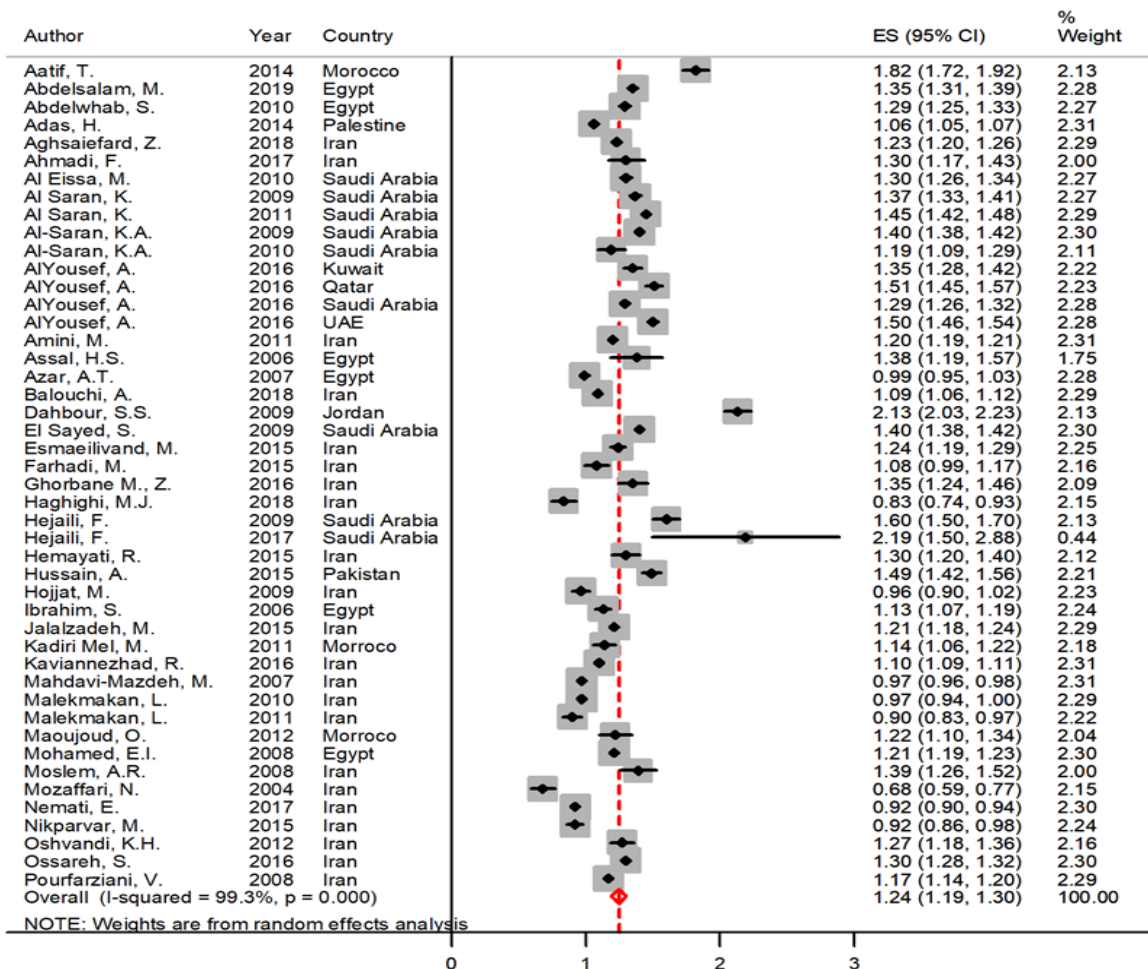NOTE: Weights are from random effects analysis

FIGURE 3. THE FOREST PLOT AND POOLED MEAN UREA REDUCTION RATIO (URR) AS A MARKER OF DIALYSIS ADEQUACY

Author	Year	Country	ES (95% CI)	% Weight
Abbas, H.N.	2009	Pakistan	69.00 (67.98, 70.02)	4.78
Adas, H.	2014	Palestine	54.40 (49.67, 59.13)	3.55
Afshar, R.	2007	Iran	55.30 (53.42, 57.18)	4.60
Al Saran, K.	2011	Saudi Arabia	70.45 (69.56, 71.34)	4.80
Amini, M.	2011	Iran	61.00 (60.63, 61.37)	4.86
Azar, A.T.	2007	Egypt	58.77 (57.35, 60.19)	4.71
Bradran, A.	2006	Iran	58.50 (55.56, 61.44)	4.26
Dahbour, S.S.	2009	Jordan	81.30 (79.75, 82.85)	4.68
Esmaeilivand, M.	2015	Iran	58.46 (55.26, 61.66)	4.16
Farhadi, M.	2015	Iran	58.36 (55.57, 61.15)	4.31
Ghorbane M., Z.	2016	Iran	66.15 (63.61, 68.69)	4.40
Hamid, A.	2019	Pakistan	72.80 (70.65, 74.95)	4.52
Hojjat, M.	2009	Iran	61.00 (58.29, 63.71)	4.34
Ibrahim, S.	2010	Egypt	63.50 (61.79, 65.21)	4.64
Ibrahim, S.	2006	Egypt	60.62 (58.09, 63.15)	4.40
Ibrahim, S.	2008	Egypt	66.72 (65.28, 68.16)	4.71
Ibrahim, S.	2015	Egypt	61.40 (59.62, 63.18)	4.62
Kaviannezhad, R.	2016	Iran	61.00 (60.96, 61.04)	4.87
Nasri, H.	2007	Iran	58.70 (55.97, 61.43)	4.33
Nemati, E.	2017	Iran	58.00 (57.97, 58.03)	4.87
Oshvandi, K.H.	2012	Iran	65.00 (64.97, 65.03)	4.87
Pourfarziani, V.	2008	Iran	62.60 (61.24, 63.96)	4.72
Overall (I-squared = 100.0%, p = 0.000)			63.03 (61.32, 64.75)	100.00

NOTE: Weights are from random effects analysis

(Axis: 0 50 70 90)

FIGURE 4. THE FOREST PLOT AND POOLED PREVALENCE OF KT/V>1.2 AS DIALYSIS ADEQUACY

Author	Year	Country	ES (95% CI)	% Weight
Adas, H.	2014	Palestine	0.3906 (0.2806, 0.5131)	3.29
Al Saran, K.	2009	Saudi Arabia	0.1765 (0.0619, 0.4103)	3.14
Al Saran, K.	2011	Saudi Arabia	0.9795 (0.9413, 0.9930)	3.42
Al-Jahdali, H.H.	2015	Iran	0.8191 (0.7579, 0.8676)	3.39
AlYousef, A.	2016	Kuwait	0.6810 (0.5916, 0.7589)	3.36
AlYousef, A.	2016	Qatar	0.8621 (0.7507, 0.9284)	3.35
AlYousef, A.	2016	Saudi Arabia	0.6181 (0.5707, 0.6634)	3.40
AlYousef, A.	2016	UAE	0.6199 (0.5544, 0.6813)	3.38
Amini, M.	2011	Iran	0.4328 (0.4175, 0.4482)	3.42
Ashrafi, Z.	2014	Iran	0.7222 (0.6095, 0.8124)	3.33
Balouchi, A.	2018	Iran	0.0486 (0.0237, 0.0969)	3.41
Bashardoust, B.	2007	Iran	0.5667 (0.3920, 0.7262)	3.15
Beladi Mousavi, S.	2012	Iran	0.1296 (0.0642, 0.2442)	3.35
Farhadi, M.	2015	Iran	0.2955 (0.1816, 0.4422)	3.26
Ghorbane M., Z.	2016	Iran	0.5914 (0.4898, 0.6857)	3.33
Hashemi, M.	2014	Iran	0.2826 (0.1732, 0.4255)	3.27
Hojjat, M.	2009	Iran	0.1471 (0.0819, 0.2500)	3.36
Kaviannezhad, R.	2016	Iran	0.2000 (0.1050, 0.3476)	3.28
Lesan Pezeshki, M.	2001	Iran	0.1892 (0.0948, 0.3420)	3.28
Malekmakan, L.	2010	Iran	0.3212 (0.2860, 0.3586)	3.41
Malekmakan, L.	2011	Iran	0.1507 (0.0863, 0.2500)	3.36
Maoujoud, O.	2012	Morroco	0.5833 (0.4428, 0.7115)	3.25
Mogharab, M.	2010	Iran	0.1000 (0.0435, 0.2136)	3.36
Moslem, A.R.	2008	Iran	0.7000 (0.5212, 0.8334)	3.19
Mozaffari, N.	2004	Iran	0.1000 (0.0493, 0.1923)	3.38
Nadi, E.	2003	Iran	0.6100 (0.5120, 0.6998)	3.34
Nemati, E.	2017	Iran	0.1563 (0.1373, 0.1773)	3.42
Nikparvar, M.	2015	Iran	0.2754 (0.1839, 0.3905)	3.32
Ossareh, S.	2016	Iran	0.6821 (0.6424, 0.7194)	3.41
Pakpour, A.H.	2010	Iran	0.3760 (0.3183, 0.4375)	3.39
Overall (I^2 = 99.3348%, p = 0.0000)			0.4273 (0.3158, 0.5388)	100.00

(Axis: 0 .25 .5 .75 1)

FIGURE 5. THE FOREST PLOT AND POOLED PREVALENCE OF URR>65% AS DIALYSIS ADEQUACY

The dialysis session length (DSL) and prescribed blood flow rate (ml/min) were reported in eight studies. The mean of this DSL time was between 202.0 to 245.2 min and pooled mean of this time (min) was 226.0 (95% CI: 218.8, 233.2; I2=97.0%). Also, the mean prescribed blood flow rate was between 242.9 to 310.0 ml/min and pooled mean of that was 277.9 (95% CI:260.2, 295.7; I2=99.0%) (Table 2).

4.META-REGRESSION

The results of univariate meta-regression analyses of Kt/V and URR showed a year of publication, mean age of participants, and gender (male-to-female ratio) variables not significantly contributed to the heterogeneity of Kt/V and URR mean score (P>0.05). Although, the mean age of participants for Kt/V>1.2 showed a marginally significant heterogeneity (Coef. =1.8, p=0.076), which explained 8.6% of the between-study variation. Also, gender (male-to-female ratio) for prevalence of URR>65% showed a significant heterogeneity (Coef. =-42.0, p=0.010), that explained 50.4% of between-study variation (Figure 6).

TABLE 2: META-ANALYSIS OF DIALYSIS SESSION LENGTH (MIN) AND PRESCRIBED BLOOD FLOW RATE (ML/MIN)

The first author (Year)	Country	Mean (95% CI)	
		Dialysis Session Length (min)	Prescribed Blood Flow Rate (ml/min)
Aatif, T. (2014)	Morocco	245.2 (241.1, 249.2)	291.1 (286.8, 295.4)
Adas, H. (2014)	Palestine	238.4 (235.3, 241.4)	
AlYousef, A. (2016)	Kuwait	219.0 (209.2, 228.8)	288.0 (275.3, 300.7)
AlYousef, A. (2016)	Qatar	230.0 (219.4, 240.6)	290.0 (272.2, 307.8)
AlYousef, A. (2016)	Saudi Arabia	202.0 (196.4, 207.6)	310.0 (295.2, 324.7)
AlYousef, A. (2016)	UAE	226.0 (220.5, 231.5)	284.0 (271.1, 296.9)
Amini, M. (2011)	Iran	229.2 (228.5, 229.9)	242.9 (241.7, 244.1)
Azar, A.T. (2007)	Egypt	216.6 (212.7, 220.5)	
Kaviannezhad, R.	Iran		245.4 (242.2, 248.6)
Overall pooled effect size (mean)		226.0 (218.8, 233.2)	277.9 (260.2, 295.7)

CI: Confidence interval

FIGURE 6. META-REGRESSION OF PUBLICATION YEAR, AGE, AND SEX RATIO (MALE-TO-FEMALE) FOR KT/V AND URR
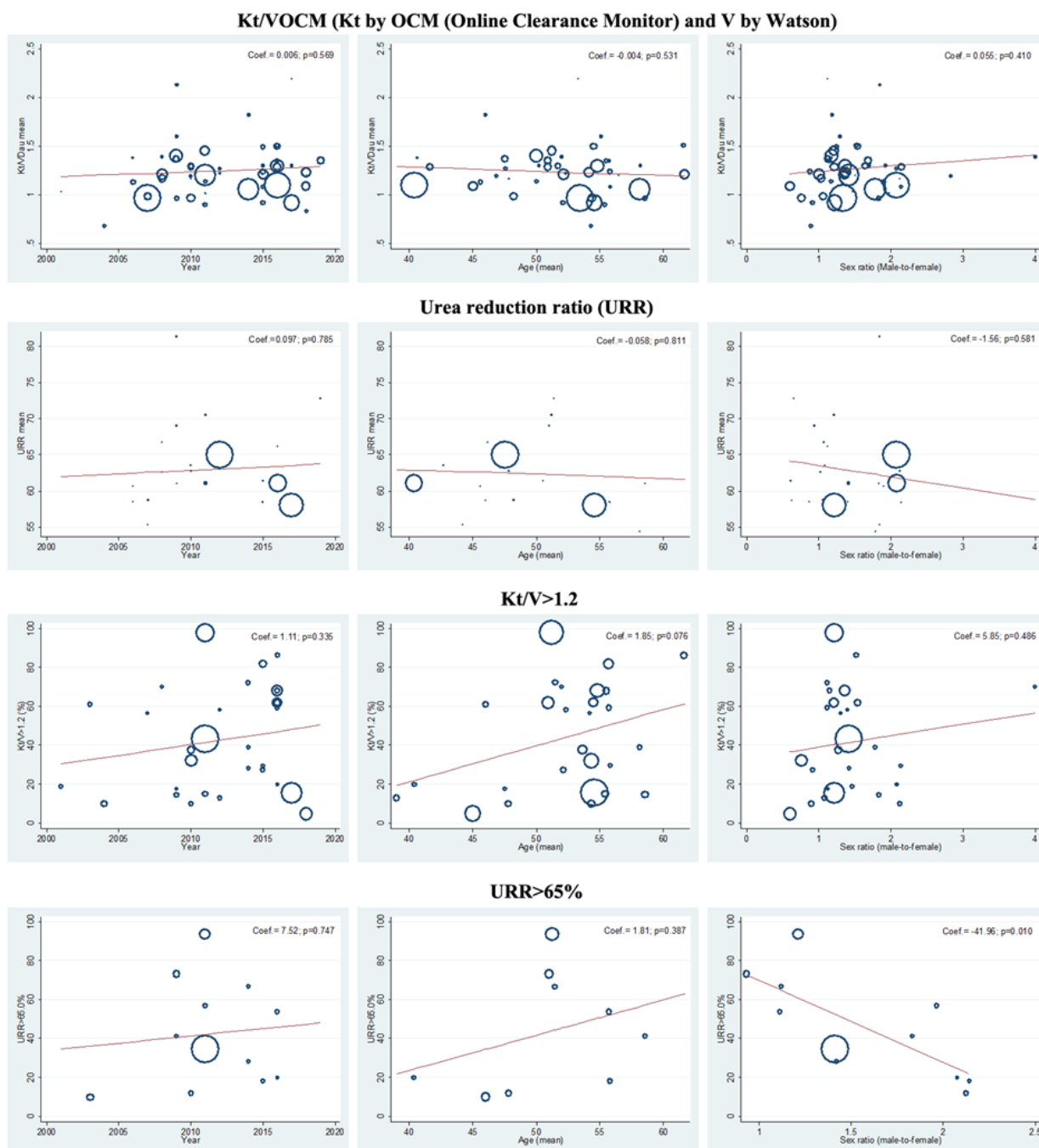
DISCUSSION

Providing high-quality care is the most important goal of hemodialysis. This systematic review and meta-analysis study was performed to evaluate the dialysis adequacy in hemodialysis patients in the EMRO. 63 studies performed on 15462 people entered the final stage. The results of the meta-analysis showed that the mean Kt/V in patients undergoing hemodialysis in the EMRO is 1.24, which is in line with international standards. But compared to Turkey (1.61), North America (1.56, Europe (1.57) was at a lower level,

which could be due to the different methods of dialysis adequacy measurement, the number of dialysis sessions in different countries [19]. The mean of dialysis adequacy based on URR was 63.3%, which is less than the standard level of 65%. Studies have shown that lower URR is associated with mortality and long-term hospitalization [20,21]. Also, the results of this study showed that more than 42% of patients in the Middle East region have a Kt/V >1.2, but in the previous meta-analysis study in Iran, only 28.8% of patients had a KT/V >1.2, which was lower than the present

study [22] which can be due to methodological differences (number of studies entered, diversity of countries under study and method of measuring dialysis adequacy) in the two studies, as well as changes in the number of services provided to patients during this period. Individuals in Australia have shown that all patients have a KT/V of 1.3 and higher, which shows better results than the present study. This difference could be due to differences in the type of study, differences in sample size, and better services provided in the centers [23]. The different cut-off points used to determine optimal dialysis adequacy in different countries can be an important factor influencing dialysis adequacy, so that in older guides, especially in developing countries, especially in the EMRO, KT/V>1.2 defined as optimal dialysis adequacy but in developed countries KT / V >1.4 to 1.7 are considered as adequate dialysis adequacy [24,25].

The different cut-off points used may be due to differences in the facilities available in dialysis wards in different countries, the number of patients undergoing dialysis, as well as the annual evaluations of dialysis quality in countries. Also, the mean dialysis session length in the present study was 226 minutes. Which was better than North America (223) and worse compared to Turkey (240), Europe (244), and Japan (239) [19]. This could be due to the smaller number of centers and Dialysis beds were available for patients, the number of patients was high and there was a shortage of medical personnel in Middle Eastern countries and the prescribed blood flow rate was 277.9. Which was less than Europe (326), North America (396), and Turkey (349), which could be due to differences in filters used in different dialysis departments and dialysis machines [19]. The mean age of participants in the present study was 49.2 years. However, in previous individual studies in other parts of the world, it was 60.7 and 61.5, which is higher than the present study and indicates the onset of dialysis at a younger age in the Eastern Mediterranean, which may be due to the diagnosis of chronic kidney disease in the late stages [26,27].

Although dialysis adequacy is generally higher than 1.2, due to many differences in social, economic, and health literacy levels of patients in most countries, there is a need to improve infrastructure, increase dialysis centers to better organize the dialysis of patients.

LIMITATIONS :

The most important limitations of the present study were: the most of included studies were cross-sectional so when interpreting the results, specific methodological limitations of this type of study should be considered. Many studies did not provide complete information that contacted the authors. Another limitation was the language of the studies, which included only studies with English abstracts. Another limitation was the high heterogeneity between the studies, which was reduced by categorical analysis

STRENGTHS:

Despite the above limitations, according to the best knowledge of the researchers, this study is the first systematic review study in this field in the region. Also, all indicators related to dialysis adequacy reported in the initial studies were included.

CONCLUSION

This systematic review and meta-analysis study showed that more than half of hemodialysis patients in the EMRO region do not have adequate dialysis adequacy, so it is necessary to review the treatment policies of dialysis centers in different countries, improve the number and quality of equipment in hemodialysis wards. Increasing the knowledge of health workers about the importance and measurement of dialysis adequacy is also essential. The results of the present study can help increase policymakers' awareness of the current state of dialysis adequacy in various countries in the EMRO. Since most studies were single-center, data sharing in the form of a regional registry could provide a better picture of the dialysis adequacy situation in the EMRO.

DISCLOSURE OF POTENTIAL CONFLICTS OF INTEREST

All authors read and approved the final manuscript. All authors of this article have no competing interests to declare.

ETHICS AND DISSEMINATION

Since the data presented here come from published literature and are not associated with patient privacy, ethical approval is not required.

RESEARCH INVOLVING HUMAN PARTICIPANTS AND/OR ANIMALS

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not

contain any studies with human participants or animals performed by any of the authors.

INFORMED CONSENT

N/A

FUNDING

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TABLE 1: SUMMARY OF INCLUDED STUDIES

Author	Year	Country	sampling method	Method to determine the Dialysis adequacy	Design	Participants 1.number of patients 2.age 3.gender(male /female)	Risk of bias	KT/V	Other factors 1.Dialysis Session Length (DSL) (min) (mean) 2. Interdialytic Weight Loss kg m 3.Prescribed Blood Flow Rate n (ml/min)
Aatif, T. [18]	2014	Morocco	convenience	KT/V-URR	Cross-Sectional	1.35 2.46 3.19/16	Moderate	1.82	1.245.17 2.NR 3.291.08
Abbas, H. N. [28]	2009	Pakistan	convenience	URR	Cross-Sectional	1.201 2.51 3.97/104	Moderate		-
Abdelsalam, M. [29]	2019	Egypt	convenience	KT/V	Cross-Sectional	1.193 2.50.9 3.121/72	low	1.35	-
Abdelwhab, S. [30]	2010	Egypt	convenience	KT/V	Cross-Sectional	1.88 2.41.59 3.60/28	low	1.29	-
Adas, H. [31]	2014	Palestine	census	KT/V-URR	Cross-Sectional	1.64 2.58.13 3.41/23	low	1.06	1.238.36 2.NR 3.NR
Afshar, R. [32]	2007	Iran	convenience	URR	Cross-Sectional	1.54 2.44.2 3.35/19	low		-
Aghsaiefard, Z. [33]	2018	Iran	convenience	KT/V	Cross-Sectional	1.176 2.54.14 3.102/74	low	1.23	-
Ahmadi, F. [34]	2017	Iran	convenience	KT/V	RCT	1.54 2.58.2 3.34/20	low	1.3	-

Akhmouch, I. [16]	2011	Morocco	convenience	KT/V	Cross-Sectional	1.47 2.53.4 3.28/19	low		
Al Eissa, M. [35]	2010	Saudi Arabia	convenience	KT/V	Cross-Sectional	1.322 2.51.7 3.200/122	low	1.3	-
Al Saran, K. [17]	2009	Saudi Arabia	convenience	KT/V	Cross-Sectional	1.17 2.47.52 3.9/8	low	1.37	-
Al Saran, K. [36]	2011	Saudi Arabia	census	KT/V-URR	Cross-Sectional	1.146 2.51.21 3.80/66	low	1.45	-
Al-Jahdali, H. H. [37]	2010	Saudi Arabia	census	KT/V	Cross-Sectional	1.188 2.55.7 3.NR	Moderate	-	-
Al-Saedy, A. J.[38]	2011	Iraq	census	KT/V-URR	Cross-Sectional	1.86 2.NR 3.57/29	low	1.02	-
Al-Saran, K. A. [39]	2009	Saudi Arabia	census	KT/V	Cross-Sectional	1.200 2.50 3.108/92	low	1.4	-
Al-Saran, K. A. [40]	2010	Saudi Arabia	census	KT/V	Cross-Sectional	1.23 2.46.83 3.17/6	low	1.19	-
AlYousef, A. [41]	2016	Kuwait	Random	KT/V	Cross-Sectional	1.116 2.55.5 3.62/54	low	1.35	1.219 2.3.24 3.288
AlYousef, A.[41]	2016	Qatar	Random	KT/V	Cross-Sectional	1.58 2.61.6 3.35/23	low	1.51	1.230 2.3.10 3.290
AlYousef, A. [41]	2016	Saudi Arabia	Random	KT/V	Cross-Sectional	1.419 2.50.9 3.230/189	low	1.29	1.202 2.3.54 3.310

AlYousef, A.[41]	2016	UAE	Random	KT/V	Cross-Sectional	1.221 2.54.5 3.134/87	low	1.50	1.226 3.3.32 3.284
Amini, M. [42]	2011	Iran	Random	KT/V-URR	Cross-Sectional	1.4004 2.NR 3.2345/1659	low	1.2	1.229.2 2.NR 3.242.9
Ashrafi, Z [43]	2014	Iran	convenience	KT/V-URR	Cross-Sectional	1.72 2.51.47 3.38/34	low		-
Assal, H. S. [44]	2006	Egypt	convenience	KT/V	Cross-Sectional	1.61 2.40.6 3.33/28	low	1.38	-
Azar, A. T. [45]	2007	Egypt	convenience	KT/V-URR	experimental study	1.134 2.48.21 3.69/65	low	0.99	1.216.6 2.2.048 3.500
Balouchi, A. [46]	2018	Iran	convenience	KT/V	Cross-Sectional	1.144 2.45 3.54/90	low	1.09	-
Bashardoust, Bahman [47]	2007	Iran	convenience	KT/V	Cross-Sectional	1.30 2.54.2 3.17/13	low		-
Beladi Mousavi, Seifollah [48]	2012	Iran	convenience	KT/V-URR	Cross-Sectional	1.54 2.39 3.28/26	low		-
Bradran, A [49]	2006	Iran	convenience	URR	Cross-Sectional	1.36 2.NR 3.21/15	low		-
Dahbour, S. S. [50]	2009	Jordan	convenience	KT/V-URR	Cross-Sectional	1.54 2.NR 3.35/19	low	2.13	-
El Sayed, S. [51]	2009	Saudi Arabia	convenience	KT/V	Cross-Sectional	1.200 2.50 3.108/92	low	1.4	-

Esmaeilivand, M. [52]	2015	Iran	convenience	KT/V-URR	Cross-Sectional	1.152 2.55.77 3.71/81	low	1.24	-
Farhadi,M [53]	2015	Iran	convenience	KT/V-URR	Cross-Sectional	1.44 2.55.80 3.30/14	low	1.08	-
Ghorbane Moghaddam, Zinab [54]	2016	Iran	convenience	KT/V-URR	Cross-Sectional	1.93 2.55.70 3.49/44	low	1.35	-
Haghighi, M. J. [55]	2018	Iran	convenience	KT/V	Cross-Sectional	1.22 2.NR 3.NR	low	0.834	-
Hamid, A. [56]	2019	Pakistan	convenience	URR	Cross-Sectional	1.33 2.51.36 3.13/20	low		-
Hashemi, M [57]	2014	Iran	convenience	KT/V	Cross-Sectional	1.46 2.NR 3.27/19	low		-
Hejaili, F. [58]	2009	Saudi Arabia	convenience	KT/V	Cross-Sectional	1.55 2.55.1 3.31/24	low	1.6	-
Hejaili, F. [59]	2017	Saudi Arabia	convenience	KT/V	Cross-Sectional	1.250 2.53.27 3.132/118	low	2.19	-
Hemayati, R. [60]	2015	Iran	census	KT/V	Cross-Sectional	1.38 2.50.2 3.25/13	low	1.30	-
Hussain, A. [61]	2015	Pakistan	convenience	KT/V	Cross-Sectional	1.90 2.NR 3.50/40	low	1.49	-
Hojjat M [62]	2009	Iran	census	KT/V	Cross-Sectional	1.68 2.58.55 3.44/24	low	0.963	-

Ibrahim, S. [63]	2010	Egypt	convenience	URR	Cross-Sectional	1.100 2.42.67 3.52/48	low		-
Ibrahim, S. [64]	2006	Egypt	convenience	KT/V-URR	Cross-Sectional	1.29 2.45.58 3.19/10	low	1.13	-
Ibrahim, S. [65]	2008	Egypt	convenience	URR	Cross-Sectional	1.60 2.46.13 3.31/29	low		-
Ibrahim, S [66]	2015	Egypt	convenience	URR	Cross-Sectional	1.100 2.50.51 3.38/62	low		-
Jalalzadeh, M [67]	2015	Iran	convenience	KT/V	Cross-Sectional	1.300 2.61.7 3.173/127	low	1.21	-
Kadiri Mel, M. [68]	2011	Morroco	convenience	KT/V	Cross-Sectional	1.37 2.50 3.20/17	low	1.14	-
Kaviannezhad, Rasool [69]	2016	Iran	convenience	KT/V-URR	Cross-Sectional	1.40 2.40.37 3.287/13	low	1.10	-
Lesan Pezeshki, mahboub [70]	2001	Iran	convenience	KT/V	Cross-Sectional	1.37 2.NR 3.22/15	low	1.04	-
Mahdavi-Mazdeh, M. [71]	2007	Iran	convenience	KT/V	Cross-Sectional	1.2630 2.53.4 3.1505/1125	low	0.97	-
Malekmakan, L. [72]	2010	Iran	convenience	KT/V	Cross-Sectional	1.632 2.54.36 3.272/360	low	0.97	-
Malekmakan, L.[73]	2011	Iran	convenience	KT/V	Cross-Sectional	1.73 2.55.4 3.73/0	low	0.9	-

Maoujoud, O. [74]	2012	Morroco	convenience	KT/V	Cross-Sectional	1.48 2.52.3 3.28/20	low	1.22	-
Minoo, F. [75]	2018	Iran	convenience	KT/V	Cross-Sectional	1.135 2.56.45 3.81/54	low	1.2	-
Mogharab, M [76]	2010	Iran	convenience	KT/V-URR	Cross-Sectional	1.50 2.47.80 3.34/16	low	1.17	-
Mohamed, E. I. [77]	2008	Egypt	convenience	KT/V	Cross-Sectional	1.40 2.52.11 3.20/20	low	1.21	-
Moslem, AR. [78]	2008	Iran	convenience	KT/V	Cross-Sectional	1.30 2.52 3.24/6	low	1.39	-
Mozaffari, Naser [79]	2004	Iran	convenience	KT/V	Cross-Sectional	1.70 2.54.3 3.33/37	low	0.68	-
Nadi, Ebrahim [80]	2003	Iran	convenience	KT/V	Cross-Sectional	1.100 2.46 3.NR	low		-
Nasri, H. [81]	2007	Iran	convenience	URR	Cross-Sectional	1.39 2.46 3.15/24	low		-
Nemati, E. [82]	2017	Iran	convenience	KT/V	Cross-Sectional	1.1267 2.54.56 3.695/572	low	0.92	-
Nikparvar, M. [83]	2015	Iran	convenience	KT/V	Cross-Sectional	1.69 2.52.1 3.33/36	low	0.92	-
Oshvandi, KH [84]	2012	Iran	census	KT/V-URR	Cross-Sectional	1.40 2.47.56 3.27/13	low	1.27	-

Ossareh, S. [85]	2016	Iran	census	KT/V	Cross-Sectional	1.560 2.54.8 3.323/237	low	1.3	-
Pakpour, A. H. [86]	2010	Iran	convenience	KT/V	Cross-Sectional	1.250 2.52.63 3.140/110	low		-
Pourfarziani, V. [87]	2008	Iran	convenience	KT/V-URR	Cross-Sectional	1.338 2.NR 3.171/167	low	1.17	-

RELATIONSHIP BETWEEN SLEEP, DIGITAL USAGE AND EMOTIONAL STATES IN THAI OCCUPATIONAL THERAPY STUDENTS

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ABSTRACT

INTRODUCTION:

Occupational imbalance of overloaded online education and sleep deprivation has been complained by Thai occupational therapy students (OTS) during the worldwide pandemic of coronavirus disease 2019 (COVID-19) e.g., feeling asleep in the classroom, inactive engagement in problem-based learning.

METHODS:

This cross-sectional study aims to survey the OTS (n = 52 out of 128) regarding many standardized tools: smartphone addiction, internet addiction, sleep quality, sleep hygiene, and emotional states. Data analysis includes Pearson's and Spearman's rank-order correlations, Chi-square tests, and calculation of point prevalence rates.

RESULTS:

A strong correlation of smartphone and internet addiction was found (r = 0.703, p < 0.001). Moderate correlations were addressed including sleep quality and smartphone addiction (r = 0.566), sleep quality and stress (r = 0.574), sleep quality depression (r = 0.554), and anxiety and smartphone addiction (r = 0.512). This study has reported point prevalence rates, such as 23.44% poor sleep quality, 17.96% smartphone addiction, and 7.81% anxiety.

CONCLUSION:

The unwell sleep OTS are gaining comorbidities of smartphone and internet addiction and negative emotional states than those well sleep OTS. A restoration of occupational balance will be required for those poor sleep quality and anxiety.

KEYWORDS

Sleep quality, Smartphone addiction, Emotional states, Cognitive overload, Occupational Therapy

INTRODUCTION

Digital usage is studied for everyone in the 21st century; the numbers of smartphone users were reported at 5.22 billion people worldwide as well as 4.66 billion for internet users. [1] There were 90.66 million and 48.59 million Thais for smartphone and internet users, respectively. [1] International university students (n = 470) could not break a routine pattern of unhealthy lifestyle which was smartphone addiction or using the smartphone/tablet longer period of time than intended. They gained excessive use of the smartphone/tablet in classes, even controlled by their observed peers, resulting in poor academic performance over 2 years. [2] There were many smartphones and internet addiction studies in Thai university students [3-5]. Thai pharmacy students (N = 484) were surveyed and 39.1% out of 391 students were smartphone addiction. They preferred looking down at their smartphone/tablet screens rather than face-to-face communication which becomes negative emotional states of depression (p < 0.001) and stress (p < 0.002). [3] Thai Thammasat University students (n = 460) were smartphone addiction around 109 males and 156 females. When compared to those students with no smartphone addiction, both genders with addictive smartphone scored higher depression and stress (p < 0.001). [4] Moreover, 45.8% out of 800 Thai university students at Chiang Mai who had engaged internet addiction; excessive levels of smartphone or tablet use including internet activities. They would be significantly scored low psychological well-being such as social relationship and meaningful life (p < 0.001). [5]

Thai occupational therapy students (OTS) have complained during the worldwide pandemic of coronavirus disease 2019 (COVID-19) e.g., sleep fragmentation, worrying about overloaded assignments in a long period of online learning. To extend a new normal life the smartphone and internet users have developed a multipurpose of occupational participation, which is defined as individual characteristics related meaningful involvement in the environment of social and educational activities including sleep quality and hygiene. [6] As seen those smartphone and internet addiction studied in Thai university student, however, no study was conducted in Thai Occupational Therapy Students (OTS) who would be trained for helping their clients with occupational participation after impairments of physical and mental health. Previously, there was significant correlation

between quality of sleep and stress; internet addiction and stress in the Indian OTS study (n = 110). [7] Consequently, this OTS study suggests a prevention of smartphone and internet addiction is needed for enhancing occupational balance which is defined as individual experience of having right time use and amount of productive, leisure, and sleep activities. [8-9] Similarly, the Korean OTS study (n = 120) showed smartphone and internet addiction related negative relationships with interpersonal relationships, problem-solving skills, self-efficacy, participation in classes, and self-control learning. [10] The Spanish OTS study (n = 192) resulted a self-control on their internet use only 3.2% of samples and a moderate occupational imbalance (averaged 38.7 out of 65) meaning stress related too little spending on productive activities and too much internet activities without social engagement. [11]

As seen those OTS studies were discussed in non-Thai cultural contexts and a number of lifestyle modification has been suggested [12-15], this study was firstly interested in finding a relationship between smartphone and internet addiction, sleep quality, sleep hygiene, and emotional states in the OTS at Mahidol University, Thailand. The utilization and generalization of the findings are a psychoeducation of sleep and emotional states for the Thai OTS including individualized consultation for occupational balance without smartphone and internet addiction.

METHODS

PARTICIPANTS AND PROCEDURE

This study was a cross-sectional descriptive study. Parcipants were Occupational Therapy Students (OTS) studying in the 1st to the 4th year at Mahidol University. From all partcipants (N = 128) who have enrolled in the an academic year of 2020, a stratified sampling was used prior to filling out the questionnaires. All interested participants on voluntary basis were briefed about the study procedure including informed consent within an anonymous online health survey. The results derived from this study will be confidentially kept; de-identified and coded process will be unbiasedly conducted without any relevent academic performance. Ethical endorsement was obtained under The Centre of Ethical Reinforcement for Human Research of the Mahidol University (MU-CIRB 2020/177.1607)

SAMPLE SIZE AND SUBJECT SELECTION

The sample size was calculated for 38.40, with the largest sample size required 40 students. [16] In order to minimize the risk of miscalculation, a replacement participant could be accepted in the event of a participant's withdrawal. Inclusion criteria for subject selection included no history of psychiatric disorders and the daily use of smartphone as well as internet connection. Different age ranges between 18 and 23 years were excluded. All participants had the human rights for unwilling to participate, and request to be a withdrawal criterion halfway through the online survey.

INSTRUMENTS FOR DATA COLLECTION

The online survey consisted of five sections of the following standardized instruments: Smartphone Addiction Scale: Thai Short Version (SAS-SV-TH), Internet Addiction Test: Thai version (IAT: Thai version), Thai version of the Pittsburgh Sleep Quality Index (T-PSQI), Sleep Hygiene Index: Thai version (SHI: Thai version), and Depression Anxiety Stress Scales: Thai version (DASS-21: Thai version). Demographic information was also collected including age, gender, educational attainment, cumulative grade point average, and residential contexts.

The SAS-SV-TH [17] has been used to assess smartphone addiction behavior; a cut-off score above or equal to 31 and 33 for males and females, respectively. The SAS-SV-TH was composed of 10 items with scores ranging from 10 to 60; choices ranging from 1 (strongly disagree) to 6 (strongly agreed) for each question. The SAS-SV-TH had internal consistency of 0.94 for the total scale and validity with satisfactory at aged 18 to 23. [17]

The IAT: Thai version [18] has been extenively tested for its psychometric properties; with 20 items to be rated ranging from 1(rarely) to 5(always). Total scores grater than 30 were considered internet addiction. Cronbach's alpha of 0.89 was previously tested at aged 18-25. [18]

The T-PSQI [19] has been used to assess an overall sleep quality over one-month; consisted of 19 self-rated items. Each item was scored between 0 (no difficulty) to 3 (severe difficulty). The overall score of less than or equal to 5 indicated good sleep quality. The T-PSQI has a sensitivity of 89.6, a specificity of 86.5, and Conbach's alpha coefficient of 0.73. [19]

The SHI: Thai version [20] had Cronbach's alpha of 0.74 in a total of 14 questions for sleep hygiene behaviors; score ranged "5" indicates most practiced while "1" indicates least practiced. A low level of the practice of sleep hygiene behaviors scored 1.00-2.33, a moderate level scored 2.34-3.66, and a high level scored 3.67-5.00. [21]

The DASS-21: Thai version was consisted of 21 questions of emotional states with the Cronbach's alpha coefficient for depression of 0.82, anxiety of 0.78, and stress of 0.69. [22] The scoring criterion for each item was between 0-3. For depression there were 5 levels of judging a trend as normal (0-4), mild (5-6), moderate (7-10), severe (11-13) and extremely severe (14 or above). For anxiety there were normal (0-3), mild (4-5), moderate (6-7), severe (8-9) and extremely severe (10 or above). For stress there were normal (0-7), mild (8-9), moderate (10-12), severe (13-16) and extremely severe (17 or above). [22]

STATISTICAL ANALYSIS

All obtained data were analyzed using the IBM Statistical Package for the Social Sciences (IBM SPSS) version 23. [23] Descriptive statistics, point prevalences, Chi-square test, Pearson's and Spearman's rank-order correlation coefficients were calculated. Correlational interpretation related normality of data was used for both Pearson's and Spearman's including 0.30-0.50 (weak), 0.50-0.70 (moderate), 0.70-0.90 (strong), and 0.90-1.00 (very strong). [24]

RESULTS

PARTICIPANT CHARACTERISTICS

Fifty-two of OTS were recruited in this study (see Table 1). There was a higher proportion of females (82.70%; n = 43) than males (17.30%; n = 9). Mean ± standard deviation of age was 20.04 ± 1.19 years.

SLEEP QUALITY AND HYGIENE

The T-PSQI averaged 6.10 ± 2.23 with its point prevalence rate of poor sleep quality 23.44% (n = 30). A moderate level practice of sleep hygiene behaviors has shown to be 3.51 ± 0.35 with its point prevalence rate of 32.81% (n = 42). However, there was no significant correlation between sleep quality and sleep hygiene (r = -0.260, p = 0.063).

TABLE 1: DEMOGRAPHIC INFORMATION AND INDEPENDENT VARIABLES OF PARTICIPANTS (N = 52)

DEMOGRAPHIC PROPERTIES	N (%)	MEAN ± SD
Gender		
Male	9 (17.30)	
Female	43 (82.70)	
Age (years)		20.04 ± 1.19
Education		
OTS 1st year	13 (25.00)	
OTS 2nd year	15 (28.80)	
OTS 3rd year	13 (25.00)	
OTS 4th year	11 (21.20)	
Cumulative overall grade point average (GPAX)		
GPAX = 2.51 - 3.00	7 (13.50)	
GPAX = 3.01 - 3.50	18 (34.60)	
GPAX = 3.51 - 4.00	27 (51.90)	
Residential contexts		
Dormitory	27 (51.90)	
Home with parents	22 (42.30)	
Home with relatives	3 (5.80)	
SAS-SV-TH		30.87 ± 9.51
IAT: Thai version		32.42 ± 15.26
T-PSQI		6.10 ± 2.23
SHI: Thai version		3.51 ± 0.35
DASS-21: Thai version		
Depression		2.25 ± 1.45
Anxiety		2.15 ± 1.51
Stress		1.64 ± 1.10

SAS-SV-TH, Smartphone Addiction Scale: Thai Short Version; IAT: Thai version: Internet Addiction Test: Thai version; T-PSQI: Thai version of the Pittsburgh Sleep Quality Index; SHI: Thai version: Sleep Hygiene Index: Thai version; DASS-21: Thai version: Depression Anxiety Stress Scales: Thai version.

SMARTPHONE AND INTERNET ADDICTION

From a population size was 128 OTS, there were existing cases of smartphone and internet addiction (n = 23 and 27). A point prevalence rate was calculated by (23/128) x 100 = 17.96% and (27/128) x 100 = 21.09% of smartphone and internet addiction, respectively. The SAS-SV-TH scored 30.87 ± 9.51 as well as the IAT Thai version scored 32.42 ± 15.26. Both smartphone and internet addiction were strongly correlated (r = 0.703, p < 0.001) as shown in Table 2.

EMOTIONAL STATES

This study considered a cut-off scoring below 5, 4, and 8 for normal levels of depression, anxiety, and stress, respectively. [22] A self-reported set of three emotional states included depression of 2.25 ± 1.45, anxiety of 2.15 ± 1.51, and stress of 1.64 ± 1.10. Their point prevalence rates showed 4.69% for mild depression (n = 6), 7.81% for mild anxiety (n = 10), and 3.13% for mild to moderate stress (n = 4). Both depression and stress were strongly correlated (r = 0.702, p < 0.001) as shown in Table 2.

TABLE 2: PEARSON'S (R) AND SPEARMAN'S (Rs) CORRELATION BETWEEN SMARTPHONE & INTERNET ADDICTION, SLEEP QUALITY, AND EMOTIONAL STATES

MATCHED PARAMETERS	T-PSQI	SAS-SV-TH	IAT: Thai version	DASS-21: Thai version Depression	DASS-21: Thai version Anxiety	DASS-21: Thai version Stress
T-PSQI r p n	-	0.566 0.000 52	0.416 0.002 52	0.554 0.000 52	0.360 0.009 52	0.574 0.000 52
SAS-SV-TH r p n	0.566 0.000 52	-	0.703 0.000 52	0.335 0.015 52	0.512 0.000 52	0.411 0.002 52
IAT: Thai version r p n	0.416 0.002 52	0.703 0.000 52	-	0.425 0.002 52	0.400 0.003 52	0.445 0.001 52
Depression r_s p n	0.554 0.000 52	0.335 0.015 52	0.425 0.002 52	-	0.438 0.001 52	0.702 0.000 52
Anxiety r_s p n	0.360 0.009 52	0.512 0.000 52	0.400 0.003 52	0.438 0.001 52	-	0.459 0.001 52
Stress r_s p n	0.574 0.000 52	0.411 0.002 52	0.445 0.001 52	0.702 0.000 52	0.459 0.001 52	-

CORRELATION OF SMARTPHONE & INTERNET ADDICTION, SLEEP QUALITY, AND EMOTIONAL STATES

The results in Table 2 showed a moderate positive correlation between sleep quality and smartphone addiction ($r = 0.566$, $p < 0.001$). A weak positive correlation was found between sleep quality and internet addiction ($r = 0.416$, $p < 0.05$). Significant correlations of smartphone addiction and emotional states were found at depression ($r_s = 0.335$, $p < 0.05$); anxiety ($r_s = 0.512$, $p < 0.001$) and stress ($r_s = 0.411$, $p < 0.001$). Moreover, internet addiction and emotional states were also found at depression ($r_s = 0.425$, $p < 0.001$); anxiety ($r_s = 0.400$, $p < 0.001$) and stress ($r_s = 0.445$, $p < 0.001$). Significantly, a chi-square test found differences at 95% confidence interval; the unwell group ($n = 30$) seemed to get more problematic counts or comorbidities than the well sleep group ($n = 22$) as seen in Figure 1.

FIGURE 1: COMPARISON OF PROBLEMATIC COUNTS IN UNWELL AND WEEL SLEEP GROUPS VIA THE PSQI

Numbers of Occupational Therapy Students, Mahidol University
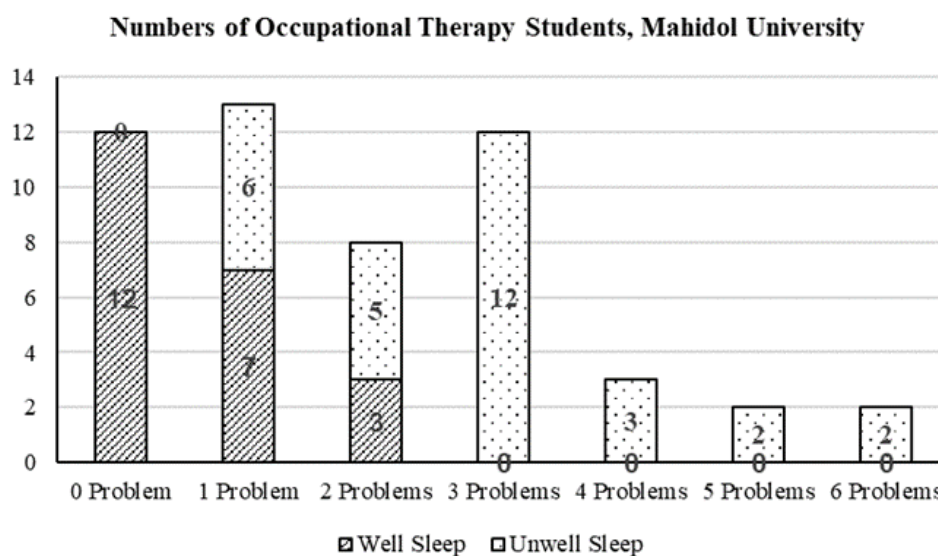
DISCUSSION

This correlational study cannot predict cause and effect, but the results assess independent variabiles equally including smartphone/internet addiction variables, sleep variables, and negative emotional states in Thai OTS with a total of 52 out of 128 participants. The point prevalence rates are also contributed to be a further implementation as early psychoeducation for a quality of sleep associated emotional states in order to improve occupational balance with less smartphone and internet addiction. Interestingly, three major findings are discussed in congruence with the previous studies.

Firstly, the mean $\pm$ SD scores of self-report smartphone (30.87 ± 9.51) and internet (32.42 ± 15.26) addiction, indicate some OTS are behaving with smartphone and internet addiction. Especially for individual calculation of scores, the OTS have been accounted 44.23% of samples for smartphone addiction and 51.92% of samples for internet addiction. Thai pharmacy students [3] have gained smartphone addiction (39.10% of samples) less than Thai OTS whereas Thammasart University students [4] have gained smartphone addiction (57.61% of samples) more than Thai OTS. Whereas Thai university students at Chiang Mai [5] have gained internet addiction (45.8% of sampls) less than Thai OTS, not being a severe trend as the Spainish OTS ($n = 189$, 96.8% of samples). [11] Additionally, Indian OTS have gained internet addiction more than Thai OTS ($n = 63$, 57.27% of samples) [7] so that normal internet users are found in Thai OTS ($n = 25$, 48.08% of samples) more than Indian OTS ($n = 47$, 42.72% of samples. [7] Thai OTS might use internet for online studying, working on class's materials, and searching for contents related with assignments.

Secondly, Thai OTS (57.69% of samples) have poor sleep quality which is agreed with the previous result of India OTS study (74.55% of samples). [7] Although most Thai OTS

reveals a moderate level of sleep hygiene behaviors (n = 42) and a high level is slightly found (n=10), but there was no significant difference between the smartphone/internet addiction and the sleep hygiene. In addition, the unwell sleep of OTS (n = 30) gain mental health comorbidities of smartphone and internet addiction than the well sleep of OTS (n = 22). A moderate correlation was found in between sleep quality and smartphone addiction (r = 0.566, p < 0.001) whereas a weak correlation was found in between sleep quality and internet addiction (r = 0.412, p < 0.05). Surprisingly, Thai university students were focused on smartphone or internet addiction in relation with depression and stress, rather than sleep quality. This study highlights that Thai OTS have gained internet addition with a negative consequence of sleep quality while both smartphone and internet addiction were strongly correlated (r = 0.703, p < 0.001). In contrast to the India OTS study, internet addiction was not correlated with sleep quality (r = 0.180, p = 0.061). [7] It might be that the Indian students get benefits from using the internet e.g., education, communication and entertainment to relieve stress which was slightly correlated with sleep quality (r = 0.285, p = 0.003). [7] Since the data collection was made at the duration of pandemic in Thailand, Thai OTS might use smartphone with internet connection to their families as well as in peer-group assignment at nighttime.

Thirdly, Thai OTS have scored with low point prevalence rates for mild depression (n = 6), mild anxiety (n = 10), and mild to moderate stress (n = 4). In depth of individual scoring Thai OTS have accounted to be anxious alone (n = 7), anxious stress (n = 1), depressive stress (n = 1), depressive anxious stress (n = 2), and depression alone (n = 3). All three emotional states measured by the DASS-21: Thai version have been significantly correlated (r = 0.438 to 0.702, p $\leq$ 0.001), but those have not been correlated with sleep hygiene (r = -0.258 to 0.047, p > 0.05). Nevertheless, India OTS resulted a weak correlation between internet addiction and stress (r = 0.380, p < 0.001) similar to Thai OTS (r = 0.445, p $\leq$ 0.001). Depression and stress were strongly correlated with sleep quality (r = 0.554 and 0.574, p < 0.001 respectively). Depression and stress were also significantly correlated with smartphone and internet addiction (r = 0.335 to 0.445, p > 0.05). Similar to Thai Pharmacy students and Thammasart University students with smartphone/tablet addiction, numbers of depression and stress were significantly counted more than those without smartphone/tablet addiction (p < 0.05). [3-4] However, Thai

OTS might use smartphone to relieve anxiety because their anxiety scores was moderately correlated with smartphone addiction (r = 0.512, p < 0.001).

Implication for the further research of occupational participation suggests that time-use diary mixed in-depth interview can be used in order to determine whether Thai OTS are able to manage occupational balance or not. The OTS may be trained to prioritize doing self-care activities as the most importance as well as spending time with family and friends. [12] Using the Pomodoro techniques of 5-min breakout in every 25-min working is recommended. [13] As seen the OTS are easily distracted by digital stimuli [14], so that their emotional inhibition may not be created in the classrooms. Creative environment and meaningful activities may improve their concentration adapted to achieve the educational plan of digital usage. [15]

CONCLUSION

The main purpose of this study is achieved finding moderate correlations: smartphone addiction and anxiety, smartphone addiction and sleep quality, sleep quality and depression, and sleep quality and stress. Both smartphone and internet addiction are strongly correlated, and then both stress and depression are strongly correlated. This study raises awareness and engagement for a reduction of cognitive overload during the day, a prevention of smartphone/internet addiction, and a promotion of sleep quality related emotional states management in Thai OTS.

DECLARATION OF CONFLICT OF INTEREST
The authors decalre no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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RESEARCH ARTICLE

COVID-19 LOCKDOWN LANDSLIDES: THE NEGATIVE IMPACT OF SUBSEQUENT LOCKDOWNS ON LONELINESS, WELLBEING, AND MENTAL HEALTH OF AUSTRALIANS

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ABSTRACT

OBJECTIVE

We previously reported on loneliness, depression, anxiety and stress of Australians living alone during the first COVID-19-related government enforced lockdown in Australia. At this time, those living alone were experiencing relatively low levels of emotional distress. Since then, one state, Victoria, underwent a second extended lockdown period and until now, it was unclear what impact this sequential lockdown might have had on the mental health and wellbeing of Victorian citizens. The current study aimed to add to the emerging literature on the lockdown experience in Australia by directly comparing the levels of anxiety, depression, stress, loneliness, and wellbeing between Victorians in the second extended lockdown and Australians in the first lockdown.

DESIGN

Data from our original study of 384 Australians was compared with cross-sectional surveys of 340 Victorians during the second lockdown period.

SETTING

An online survey was administered with people residing in Victoria self-selecting to complete the study.

OUTCOME MEASURES

Participants were asked to complete the Depression, Anxiety and Stress Scale (DASS-21), WHO-5 Wellbeing Scale, and the University of California Los Angeles (UCLA) Loneliness Scale. They were also invited to offer their insights into how the second extended lockdown experience had differed from the first.

RESULTS

Independent samples t-tests revealed that Australians were significantly more depressed, anxious, stressed, and lonely, and experienced reduced psychological wellbeing in the second lockdown compared to the first however overall, the levels indicated mild psychological distress. Qualitative insights revealed impact on mental health and a feeling of increased restrictions during lockdown two.

CONCLUSIONS

Participants demonstrated adaptation to the lockdowns, providing support for the measures the Australian government have adopted to physically protect Australians from COVID-19. Management of the negative psychological impact through attention to wellbeing practices is however recommended in light of the increase in mental health concerns and likely further lockdown periods.

KEYWORDS: COVID-19, psychological wellbeing, loneliness, lockdown.

INTRODUCTION

In addition to the physical and economic impact of the novel SARS-CoV-2 Coronavirus pandemic, emerging evidence speaks of immense psychological impacts on communities. Government protective measures such as lockdown and physical distancing, while vital to stemming transmission of COVID-19, have been associated with rises in depression, anxiety, and other negative psychological consequences. The current study seeks to add to our understanding of the impact repeated lockdowns have had on psychological wellbeing and mental health in Australia.

In Australia, the sequalae of COVID-19 has been relatively minor in comparison to other countries, with less than 30,000 total cases and fewer than 1000 COVID deaths recorded. [1] This is likely due to the stringent measures taken by the Australian state governments to keep the Australian public physically safe from the virus. Widespread and extended lockdown procedures to reduce the spread of disease have been implemented by the Australian government twice; the first a Stage 3 lockdown across Australia beginning 23rd March and easing from 11th May 2020, and the second in Victoria (Stage 4 in Metropolitan Melbourne and Stage 3 in regional areas) beginning August 2nd (metro) and August 5th (regional) and easing from September 14th, 2020. Evidence of the negative impact of lockdown measures on psychological wellbeing has been reported in early severely affected countries like China [2-3] and Italy [4], however a less clear picture emerges of the impact of lockdown in countries which have comparatively lower infection rates and deaths due to COVID-19. An April survey of 1491 adults in Australia conducted by Stanton and colleagues [5] indicated 26.5% of participants reported moderate to extremely severe levels of depressive symptoms, 13.5% moderate to extremely severe levels of anxiety, and 18.1% moderate to extremely severe levels of stress, as measured by the Depression Anxiety and Stress Scale [DASS-21; 6]. Similar impact was reported in a survey of 5070 Australians conducted by Newby et al. [7] during the peak of the April lockdown, which found 55% of respondents felt their mental

health had worsened a little, and 23% a lot. Other studies however have reported less impact; for example, a survey of 1599 Australians conducted by Rogers and Cruickshank

(2020 unpublished pre-print) during the first lockdown in April was suggestive of 'somewhat' rather than 'a lot' of deterioration to mental health, and many reported 'no change' (40-50%) or even 'improvement' (6-17%). Similarly, findings of our study during the first lockdown revealed that, on average, the mental health of those living alone were experiencing relatively low levels of emotional distress. [8]

In light of the mixed evidence, lack of studies on repeated lockdowns, and likely continuation of COVID-19 snap lockdowns, additional clarity as to the impact sequential lockdowns might have on the mental health and wellbeing of Australians would be of potential benefit for those tasked with management of staff. Therefore, the current study aimed to add to the emerging literature on the lockdown experience in Australia by directly comparing the levels of anxiety, depression, stress, loneliness, and wellbeing, between Victorians who experienced a second extended lockdown, and Australians in the first lockdown. It was hypothesised that in lockdown two comparative to lockdown one; (i) levels of anxiety, depression, and stress symptoms would be higher, (ii) loneliness would be higher, and (iii) overall psychological wellbeing would be lower. The research also aimed to identify how the second lockdown might be experientially different to the first, by adopting a mixed methodology design.

METHOD

PARTICIPANTS

A total of 384 participants from Australia completed the online survey administered during the first lockdown (54 men, 328 women, 1 non-binary gender, 1 unspecified), Mage = 51 years, SDage = 15 years, age range 23 to 89 years). Participants were required to be adults (18+), Australian residents / citizens, and live alone. Most participants (81%) had a postgraduate or undergraduate university qualification. Data relating to where in Australia the participants resided was not collected.

The second study sampled 340 participants from the state of Victoria, Australia, who completed one of two online surveys administered during the second lockdown (30 men, 307 women, 3 non-binary gender), Mage = 47 years, SDage = 15 years, age range 20 to 87 years). To participate in one of the surveys the requirements were the same as those for the first lockdown survey; to be adults (18+) Australian

residents / citizens and live alone (n = 280). The other survey did not require participants to be living alone and was open to all Australian adults. Data relating to where in Australia the participants resided was collected and data from those in Victoria were included in this study. Most of these participants (73%) had a postgraduate or undergraduate university qualification and resided in Metropolitan Melbourne (83%) while the remainder resided in regional Victoria (17%).

Only a small proportion of participants in both samples knew someone diagnosed with COVID-19 (n = 10 in lockdown one and n = 25 in lockdown two), with one participant diagnosed themselves in lockdown two sample. Approximately one third of participants sampled during the second lockdown had received a test for COVID-19 that had come back negative. Data relating to negative tests was not collected at the time of the first lockdown.

MEASURES

Data for the current study was drawn from three separate surveys, each of which are part of larger projects, one of which has been published. [8] In all surveys, participants responded to a series of questions regarding their COVID-19 experience. An opportunity was also provided for participants completing surveys in the second lockdown to respond to an open-ended question about how their experience of the second lockdown was different to their first.

The World Health Organization Well-Being Index [WHO-5; 9] is among the most widely used questionnaires assessing subjective psychological well-being. It is a short questionnaire consisting of 5 questions measured on a 6-point Likert scale, which tap into current subjective well-being of the respondents. These five questions assess positive mood (good spirits, relaxation), vitality (being active and waking up fresh and rested), and general interest (being interested in things) over the two weeks prior to completion. The WHO-5 has been applied successfully across a wide range of study fields and has been validated in a number of studies with regard to both clinical and psychometric validity [see review 10]. In the current study the scale demonstrated excellent overall reliability from all three surveys (a = .88 - .92).

The DASS-21 [6] is a 21-item questionnaire rated on a 4-point Likert scale never, sometimes, often, and always. It was chosen as a widely accepted and psychometrically sound measure of mood which emphasises mood state over clinical diagnosis. As expected from previous research [e.g., 11] all subscales demonstrated excellent overall reliability (a = .90 - .92 for Depression; a = .80 - .87 for Anxiety; a = .87 - .91 for Stress).

The 3-item University of California, Los Angeles (UCLA) Loneliness Scale [12] is a short version of the longer questionnaire developed by Russell et al. [13] Participants rated how often they felt they lacked companionship, were left out, or felt isolated during the respective lockdown periods, on a 4-point Likert scale never, rarely, sometimes, and often. Reliability coefficients were a = .87 and a = .84 in the first and second lockdown respectively.

As per the Office of National Statistics [14] recommendations, a direct, 1-item measure of loneliness was also used whereby participants were asked to rate how often they had felt lonely during the lockdown, which was again rated on the same 4-point Likert scale as the UCLA Loneliness Scale. There was good convergent validity demonstrated between this direct measure and the UCLA Loneliness scale at both timepoints, with correlations of r = .82 and r = .78, respectively.

DESIGN AND PROCEDURE

A summary of our sampling and analytical procedures can be seen in Figure 1. The study utilised a cross-sectional non-experimental survey design and was completed online by clicking on a secure link to a Qualtrics platform hosting the surveys. Ethics was approved for all three studies by the Monash University Human Research Ethics Committee. Promotion of the study occurred via social media and personal networks, with no payment or incentive offered for participation. Participants self-selected into the first lockdown survey between May 5th and 13th 2020 (COVID-19 stage 3 lock-down period in all states of Australia). Individual states commenced their own easing of restrictions from May 11th, 2020, however following a rise of COVID-19 cases in Metropolitan Melbourne and Mitchell Shire, these parts of Victoria re-entered stage 3 lockdown. On August 2nd a State of Disaster was declared and Metropolitan Melbourne entered a stage 4 lockdown. Three days later August 5th, regional Victoria (including Mitchell Shire) re-entered stage 3 lockdown. On September 14, a staged process for Victoria to come out of lockdown commenced. Participants self-selected into the second lockdown surveys between August 8th and 13th September 2020 (while Regional Victoria was under a COVID-19 stage 3 lock-down while Metropolitan

Melbourne was under a COVID-19 stage 4 lockdown). During the lockdowns the only valid reasons to be out of one's house was i) shopping for food, ii) accessing medical services or providing care, iii) exercise, and iv) going to work as an "essential worker". Additional restrictions for stage four included a curfew whereby residents could not leave their house between the hours of 8pm – 5am, only one hour of exercise was permitted per day, and residents could only move about within a 5km radius, unless they had a permit. Mask wearing outside the house also became mandatory.

DATA ANALYSIS

Data was exported from Qualtrics to Statistical Package for Social Sciences (SPSS). Before the datasets were collated missing values analyses were conducted on each individual dataset and all missing datapoints were found to be missing completely at random. One missing datapoint for the anxiety subscale from the first lockdown, one missing datapoint for the stress subscale from the second lockdown, and two missing datapoints on the direct loneliness measure from the first lockdown were left as missing. A series of independent t-tests were conducted to compare wellbeing, depression, anxiety, and stress scores between the two lockdown periods.

RESULTS

QUANTITATIVE ANALYSES

Depression, anxiety, stress, and wellbeing data from both lockdown two surveys were combined and to ensure there were no differences between these two sets of data independent samples t-tests were run to compare means on all dependent variables. Histograms and Q-Q Plots indicated some minor deviation from normal distribution where scores were weighted towards a positive skew (i.e., higher scores) for the subscales of Depression, Anxiety and Stress in both samples, which is to be expected in non-clinical samples. Extreme outliers were checked using z scores ≥ ± 3.29 and three found on the anxiety subscale, one from one dataset and two from the other. To ensure these data points was not exerting undue influence on the model, their Cook distances were checked and found to be <1, ranging between 0.02 and 0.14. As they were deemed not to be exerting undue influence on the model, they were left unchanged. Levene's test of equality of variances indicated variances were similar for all subscale variables across the two datasets (p > .05). Independent samples t-tests revealed no differences between the two datasets (p < .05) on any of the subscales and so the data was pooled together for subsequent analyses. Loneliness data was only collected in one of the lockdown two studies and so no comparisons were required.

Descriptive analysis of the key variables is presented in Table 1. Scores on the DASS-21 were doubled to allow for normative comparison; mean scores indicated that in the week prior to survey, participants in lockdown two were experiencing greater distress than in lockdown one with depression scores progressing from mild to mild-moderate levels, anxiety progressing from normal to normal-mild levels, and stress increasing but remaining in the normal range. It is important to note that the DASS scores should be regarded as providing an individual's score on an underlying dimension therefore these cut-offs are provided purely for comparative purposes. [11] Scores on the WHO-5 wellbeing scale were multiplied by 4 for interpretation as a percentage. At lockdown one participants reported an average level of wellbeing, however during lockdown two this had decreased to below average levels. Similarly, loneliness levels also increased from lockdown one to lockdown two, using both the 3-item and the direct measure.

TABLE 1: MEANS, STANDARD DEVIATIONS, AND RANGES FOR STUDY VARIABLES, BY LOCKDOWN

	Lockdown 1				Lockdown 2			
	Range	M	SD	N	Range	M	SD	N
Wellbeing	4-100	54.6	22.4	384	0-100	44.8	22.9	340
Depression	0-42	10.6	8.7	384	0-42	13.7	10.2	340
Anxiety	0-36	5.4	6.0	383	0-38	7.4	7.6	340
Stress	0-42	10.7	8.0	384	0-42	13.6	9.3	339
Loneliness (3)	3-12	8.2	2.6	384	3-12	9.1	2.5	282
Loneliness (1)	1-4	2.7	1.0	382	1-4	3.0	1.0	282

To compare mean scores on wellbeing, depression, anxiety, stress, and loneliness between lockdown one and lockdown two a series of independent t-tests were run. Once again histograms and Q-Q Plots indicated some minor deviation from normal distribution where scores are weighted towards higher scores for the wellbeing scale, however only for the lockdown one group. The distribution was more evenly spread at lockdown two. For the depression, anxiety and stress scales, scores were weighted towards lower scores in both lockdown groups. For loneliness, scores were weighted towards higher scores in lockdown two and a more even distribution in lockdown one. Extreme outliers were again checked using z scores ≥ ± 3.29 and three high scorers were found in the first lockdown for depression, eight high scorers were found in the first lockdown and three in the second lockdown for anxiety, and three high scorers were found in the first

lockdown for stress. To ensure these data points were not exerting undue influence on the models, their Cook distances were checked and found to be <1, ranging between 0.01 and 0.03. As they were deemed not to be exerting undue influence on the models, they were left unchanged. Levene's test of equality of variances indicated variances were significantly different (p < .05) for the depression, anxiety and stress subscales across the two lockdowns and so results are reported for variances not assumed.

Independent samples t-tests revealed significant differences between the two lockdowns on wellbeing, depression, anxiety, and stress, with wellbeing significantly decreasing and depression, anxiety, and stress significantly increasing (refer to Table 2).

TABLE 2: RESULTS OF COMPARISONS OF WELLBEING, DEPRESSION, ANXIETY, AND STRESS ACROSS THE TWO LOCKDOWNS

Variables	Mean Difference	95% CI of the difference		SE difference	t	df	Cohen d
Wellbeing	-9.79	-13.10	-6.48	1.69	5.81*	722.00	0.43
Depression	3.10	1.71,	4.49	0.71	4.38†*	669.37	0.33
Anxiety	2.01	1.01,	3.02	0.51	3.93†*	646.61	0.29
Stress	2.90	1.62,	4.18	0.65	4.46†*	672.26	0.33
Loneliness (3 items)	0.89	0.49,	1.29	0.20	4.40*	664.00	0.34
Loneliness (1 item)	0.32	0.17,	0.47	0.08	4.13*	662.00	0.32

* $p < .001$, † equal variances not assumed

QUALITATIVE ANALYSES

To better capture the personal experiences of participants in the second lockdown the two authors of this paper independently identified themes on the first 10 cases, and through discussion created mutually agreed upon theme names and definitions that were used to independently code the next block of 10 cases. Then, their coding was compared, and theme names and definitions refined where necessary. This process continued until an

acceptable inter-rater reliability (r > .80) was reached. Once achieved the first author completed the coding and then the second author reviewed it and any discrepancies were resolved through discussion. Blank responses (n = 108) and responses that did not adequately address the question (n = 17) were not included in the sample size calculation for this analysis. Themes endorsed by 5% or more of participants are presented in Table 3. Percentages were rounded to the nearest whole number.

TABLE 3: COMMON THEMES RELATING TO PEOPLES EXPERIENCES OF A SECOND LOCKDOWN

Theme	Definition	Examples	Frequency (%) (N = 215)
More restricted / isolating	Additional restrictions in second lockdown have resulted in feelings of being more restricted and / or isolated.	It is worse than the first time, I am isolating primarily at my home where I live alone. I am feeling very lonely and imprisoned as I cannot see any of my family. I also am scared of travelling to see my partner, so am only seeing them once a week.	85 (40%)
Impact mental health	Exacerbation of existing mental health concerns or indicators of development of anxiety / depression.	Much harder, with a more ambiguous endpoint. I have suffered low mood and anxiety this lockdown.	50 (23%)
No / minimal difference	Little or no difference perceived comparative to first lockdown.	No different I've virtually stayed isolated when I'm not working since the beginning.	40 (19%)
Practical changes	Changes related to everyday life.	More time working from home. Less going out to do basic shopping and when I do go out it's only with 2km of where I live.	20 (9%)
Iso fatigue	Impact of ongoing COVID-19 isolation.	It's been harder in terms of feeling like it's never ending and not being sure when life will ever get back to 'normal'.	12 (6%)
Positives arisen	Practical or emotional benefits experienced.	I am on disability pension and have mental health issues which make going out stressful. Not having to make excuses to stay in has been restful. Also being able to participate in events online - church, gaming, therapy sessions - generally gives me all the human contact that I want.	10 (5%)

Note. Frequencies were calculated by summing the number of participants who endorsed a theme. Individual participants were only able to endorse a theme once but could endorse more than one theme.

DISCUSSION AND CONCLUSION

This study aimed to articulate some of the indirect effects of the COVID-19 pandemic by exploring the impact of a second lockdown on the mental health and wellbeing of Australians. Findings indicated that although Australians reported normal levels of anxiety and stress and mild symptoms of depression during the first lockdown, those sampled during the second lockdown (which impacted only citizens in the state of Victoria) reported more concerns; with levels of depression, anxiety and stress all rising. These findings are consistent with an increase in loneliness and a decrease in wellbeing also reported between the two timepoints.

The qualitative analysis supported these findings, with almost a quarter of the sample (23%) reporting negative impact on their mental health. Indicators of depressed mood such as "difficult to be motivated", "emotionally exhausting" and "much more depressing" were offered. Symptoms of anxiety were also described such as "more unsettled", "more worried about the future" and "bad insomnia and frequent wakings". One participant described what could be considered a complex trauma response: "I panicked, then felt fear for my life in the first lockdown. I felt over it, numb, couldn't care less, don't know how to feel, it is what it is, in the second lockdown." Some participants reported positive changes because of the second lockdown (5%), however these tended to be more practical nature (e.g., working from home) rather than personal growth experienced in relation to the negative impact of the lockdown. Consistent with the relatively low levels of anxiety reported, post-traumatic growth is an unlikely outcome [see meta-analysis, 15], however this may be an important consideration for future research especially in more vulnerable populations.

In line with the increase loneliness scores, a sense of being more restricted and isolated was expressed by 40% of participants who responded to the open-ended questions. However, the theme of iso-fatigue was only minimally endorsed (6%), suggesting that the sense of being more restricted and isolated may have arisen in part from the actual limitations imposed in the second lockdown (e.g., 5km movement rule and curfew) rather than a perception that the second lockdown was more restrictive and isolating than the first.

It was highlighted that although the quantitative analysis indicated a decline in mood and wellbeing between lockdown one and two, 19% of the sample reported they felt no or minimal difference between the first and second lockdown. This finding is open to interpretation, but it may be due in part to a continuation of restrictive behaviour from the first lockdown as a self-imposed safety mechanism, therefore the second lockdown did not require substantial emotional or practical changes. As such, future research may like to explore the role of perceived control over external and internal states, and how this impacts subjective wellbeing. Overall, however, it would appear that there was an adaptation to the second lockdown given the normal-mild range of psychological distress and qualitative explanations.

These findings add to our emerging understanding of the impact of COVID-19 lockdowns on the mental health of Australians, which is of importance for management of staff in the public and health sectors as continuing lockdowns are likely to occur until widespread vaccination is in place. There are however a number of limitations associated with the current study which impact conclusions which can be drawn from the findings, such as the cross-sectional nature of the analyses and convenience sample which relied on people who had access to online social media forums. Further, the majority of the sample (82%) were people who lived alone, so may not be reflective of all Victorian's experience. Moreover, while data from lockdown one included participants from all over Australia, data from lockdown two was restricted to participants from only one state, hence, it is possible that Victorian's have reduced indicators of mental health compared to the rest of the country, for reasons unrelated to COVID-19. This is however unlikely given that reports show Victorians to have comparable levels of depression, anxiety and stress as other states, with citizens of the state of Tasmania demonstrating the highest rates of depression and anxiety and citizens of the state of Queensland demonstrating the highest stress levels.

While some of the negative effects associated with repeated lockdowns are likely to dissipate as virus-related restrictions ease, increasing psychological distress may have more lasting impact, and further develop into mental health concerns. [17] The current study indicates a slight rise in concerns, suggesting that attention to staff wellbeing would be a valuable complement to current workplace

safety systems especially in light of likely future lockdowns taking place. Workplace culture and recognition of COVID impact will be key in this regard, with managers tasked with creating a positive mental health environment which promotes ongoing self-care and destigmatises help-seeking. High-frequency pulse surveys which measure well-being could be used to share evidence on what works to improve psychological wellbeing as circumstances of the COVID-19 pandemic change. The findings also highlight the importance of exploring innovative ways to maintain connection and support during periods of lockdown and beyond. It is clear that attention to wellbeing as an integral component in Australia's recovery plan is needed for a sustainable and healthy future.

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VIRTUAL FRACTURE CLINIC: A PANDEMIC-READY TOOL FOR IMPROVING THE EFFICIENCY OF FRACTURE CLINIC

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ABSTRACT

BACKGROUND:

The traditional model of care of the Orthopaedic Fracture Clinic (OFC) is labour intensive, expensive, has poor satisfaction rates, and often has minimal impact on management and outcomes of patients with minor injuries. Our aim was to implement a Virtual Fracture Clinic (VFC) for the management of minor injuries that is safe, reduces OFC clinic workload and reduces the OFC failure to attend (FTA) rate.

METHODS:

This study was a retrospective longitudinal audit of OFC workload before (January 2012 -February 2017) and after (March 2017 – December 2019) implementation of the VFC. It was performed in an urban district general hospital in South East Queensland, Australia. The primary outcome measures included attendances per timepoint (month).

RESULTS:

Overall, we observed a significant reduction in total number of patients from 1,055 (IQR 104.5) to 831 (IQR: 103) per month coming through the OFC following the introduction of the VFC (F = 21.9; df=1; p <0.0001). The failure to attend rate was reduced by 44% from 271 (IQR: 127.3) to 151 (IQR: 72.8) (F=4.0; df=1; p = 0.047).

CONCLUSION:

The VFC implementation was successful in improving efficiency and reducing the current OFC workload, as well as reducing FTA rate. Reduction in clinic workload allows more time to be spent with complex patients, prevents clinic backlogs and overbooking, and crowding of waiting rooms. In the midst of a global pandemic that is spread by close contact, virtual clinics seem the way of the future to treat patients whilst minimising risk of COVID-19 spread.

KEYWORDS

Virtual fracture clinic, acute trauma, fracture clinic, orthopaedic outpatient

INTRODUCTION

In an era where hospitals are striving for healthcare-delivery efficiency and cost-effectiveness, many medical and surgical specialties are seeking ways to streamline the outpatient clinic experience both for patients and clinicians. This is particularly true in Orthopaedics, where the classic model of Orthopaedic Fracture Clinic is labour-intensive for both clinical and administrative staff, and patients often experience extensive wait times due to overbooking. Overbooking stems from a combination of factors: increasing demand for services supplied by a limited capacity clinic, as well as clinic booking templates that often do not reflect the true clinic capacity (a product of clinician time and rooms available).[1] The common practice of 'overbooking' clinics is used to compensate for the proportion of patients who will fail to attend (FTA) their appointment. [1] It leads to more crowded waiting rooms and longer waiting times at the clinic. Overbooking in the OFC also stems from a large proportion of ED referrals, which creates a substantial burden on the clinic.

Currently, Queensland public hospitals undertake on average 105,624 orthopaedic outpatient appointments each year (the highest of all specialist outpatient services). Increasing population and life expectancy, coupled with an increasing burden of disease and disability, is resulting in increased demand for specialist orthopaedic services. Demand is expected to outweigh capacity and, in an ever increasing fiscally challenged environment, health services and clinicians need to ensure optimal use of resources to meet the needs of all Queenslanders. [2]

In 2016, our OFC saw 17,195 patients, of which 5,466 (31.8%) were new referrals from ED. (3) In a regular clinic there are expected to be 50 patients per day. With the overload there are an additional 16 patients per day. The clinic is

staffed by junior doctors consisting of residents, training and non-training registrars, with backup advice from a consultant in a parallel clinic. The patient load is 25 per four hours, and with the additional patients this becomes 33 per four-hour clinic. This results in clinics frequently running over time and reduced consultation time for each patient as staff attempt to keep running to schedule. A study looking at factors influencing patient satisfaction with orthopaedic outpatient clinic identified key environmental factors resulting in dissatisfaction as increase clinic wait time, and reduced or insufficient contact time with the clinician. [4] Thus, an alternative and innovative model of care for reduced face-to-face attendances, particularly during the COVID pandemic, is required to provide sustainable, patient focused and quality outcome driven services for the orthopaedic outpatient department.

The traditional patient population attending the OFC includes patients with acute fractures, but also includes all musculoskeletal injuries requiring outpatient follow up (Figure 1). Fracture-related appointments are expected to be scheduled within 1-2 weeks of the acute injury to ensure timely intervention in those patients with complications such as malpositioned or unstable fractures. Unfortunately, for many patients without these complex fracture issues, the review occurs in the acute period whilst the patient still has substantial pain and immobility, resulting in less than adequate assessment upon initial review. The patient is subsequently brought back for review once the acute symptoms have settled to allow for thorough assessment, and then repeatedly reviewed over the following weeks to observe fracture healing. Multiple review appointments for a single patient increases the demand on the capacity of the OFC. Increasing demand for appointments has been observed with simple, stable, self-limiting musculoskeletal injuries where initial management in the ED could be followed by referral to allied health professionals or the GP for management rather than increasing the workload of the OFC. [3, 5-8]

FIGURE 1: TRADITIONAL ORTHOPAEDIC FRACTURE CLINIC MODEL
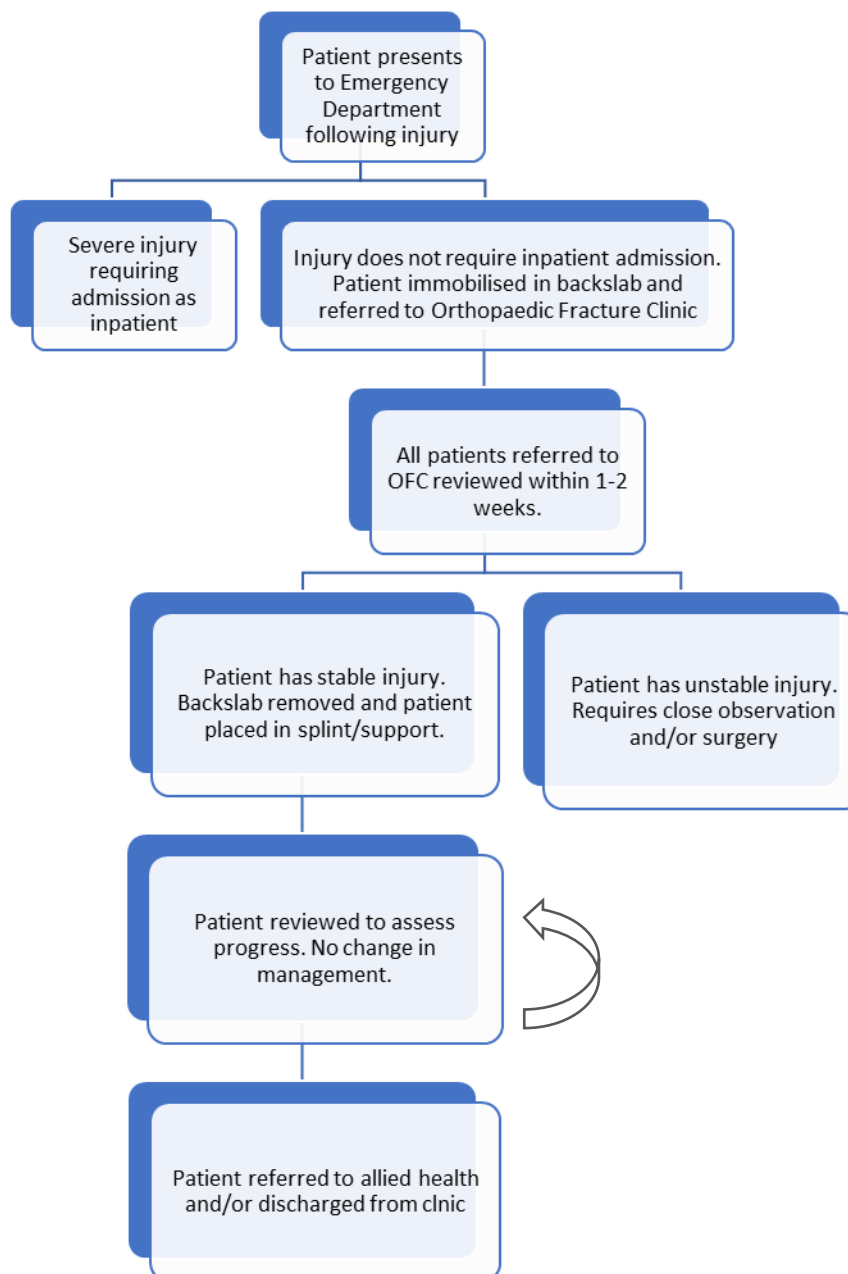
Early review of patients with acute fractures is also directed by the traditional model of care where the majority of fractures are immobilised in a Plaster of Paris (POP) backslab. Patients are asked to attend clinic during the acute injury period to assess the integrity and adequacy of the POP that has been applied, or to remove the POP in instances where it has been applied injudiciously to injuries that could be managed in other ways. Unfortunately, immobilisation can lead to stiffness and reduced function, which can be a cause for concern for patients and inexperienced junior clinicians, and subsequently results in patients being asked to return to OFC for review to re-evaluate their movement after a period of time.

The creation of a Virtual Fracture Clinic Model of Care at the Glasgow Royal Infirmary [9] sought to solve the problems posed by the traditional OFC model and the concept is being adopted in Orthopaedic units internationally. [6-8, 10] In the Glasgow model, patients seen in the ED with fractures not requiring admission are given education on their specific injury and referred to VFC. At the VFC the case notes and radiographs are reviewed by an orthopaedic consultant and a telephone consultation with the patient follows to discuss the management strategy. There are three outcomes from the VFC: referral back to the GP or to a physiotherapist, a face-to-face review in the OFC, or a review in a sub-specialty orthopaedic clinic. A growing body of literature highlights the role advanced physiotherapists can play in supporting

Orthopaedics, through either completion of the VFC review under supervision or management of patients (both face-to-face and virtually) diverted by the VFC doctor. [11, 12]

In an audit of Logan Hospital OFC in 2016 2,216 patients attended the clinic over a four-week period. Of these, 1,041 (47%) had simple injuries that did not receive any additional intervention by the orthopaedic team beyond what was received in the ED and were observed over a 6-8 week period. Logan Hospital sought to implement a virtual fracture Model of Care based on the outcomes at the Glasgow Royal Infirmary. The goal was to reduce OFC workload, reduce waiting times for OFC appointments, allow greater consultation time for review of patients with more complex injuries, and minimise outpatient clinic appointment costs to our healthcare facility. Additionally, it was anticipated that patients diverted from OFC to allied health would demonstrate clinically and statistically significant improvements in their QuickDASH scores and high satisfaction with the VFC process. The QuickDASH is a responsive and validated outcome measure in Orthopaedic upper limb trauma, however has not been evaluated specifically in relation to VFC conditions. [13]

METHODS

Study design: This study was a retrospective longitudinal audit of fracture clinic workload before and after implementation of the VFC. It was performed in an urban district general hospital in South East Queensland, Australia. Ethical approval was sought and granted by Metro South HREC. After discussion with a statistician, it was decided that best reflection of VFC influence would be demonstrated by comparing five-year data from the traditional clinic vs three-year data for VFC. By doing this we hoped to eliminate any outliers or seasonal variation and get a true reflection of the OFC workload prior to VFC implementation. Inclusion criteria were all patients referred to the Logan Hospital orthopaedic acute trauma outpatient service from January 2012 to December 2019 (a total of 96 months). The VFC was implemented in March 2017. Units of measurement included attendances per timepoint (month). Overall, 96 timepoints were analysed; data was missing for the first 62 timepoints for VFC.

Data Collection: Data was obtained via the hospital electronic computer systems (Appointment Scheduling Information System and Elective Management System) and the outpatient appointment booking systems by the Metro South Outpatient Department Data Manager. Data was collated into a Microsoft Excel (2019) spreadsheet and the following variables were recorded: clinic referred to (OFC/VFC), patient appointment status (new patient/review patient), whether a patient failed to attend their appointment (FTA), and whether a patient was discharged following their OPD appointment. Data was also collected regarding the number of orthopaedic outpatients reviewed in clinic by the plaster technicians. Patients attending Advanced Practice Hand Therapy after VFC review in lieu of attending OFC had additional data related to initial and discharge QuickDASH scores and satisfaction scores recorded into a Microsoft Excel (2019) spreadsheet. The satisfaction survey consisted of four questions, relating to the patient's satisfaction with: waiting times, seeing advanced practice allied health in place of attending fracture clinic, the knowledge of the therapist providing treatment and the treatment provided. Patients could choose one of five responses ranging from very dissatisfied, dissatisfied, neutral, satisfied or very satisfied.

Primary outcome measures included the total number of patients seen in the OFC, the number of new and review patients seen in the OFC, the number of FTAs, and the number of patients discharged from OFC per month. Secondary outcome was the volume of work performed by the plaster technicians each month.

VFC described injuries were defined in partnership by the orthopaedic department and the ED and incorporated into the Care Pathway (Table 1). The care pathway included specific advice relating to plaster cast immobilisation; POP immobilisation was to be avoided and removable splints used instead. All patients were given a verbal explanation of their injury by the treating ED medical officer and an information leaflet relating to their injury, created by the orthopaedic department. Leaflets used simple language to describe the injury, the natural history of the injury and expected recovery timeframes. Patients were discharged home with a letter and leaflet for their GP. The ED medical officer completed an electronic intrahospital patient referral to VFC triggering a virtual appointment booking for the patient.

TABLE 1: VFC APPROVED INJURIES AND MANAGEMENT PATHWAYS

INJURY	MANAGEMENT	DISCHARGE DESTINATION
Paediatric buckle fracture of distal radius and/or ulna (<12 years old)	Wrist splint	General Practitioner
Paediatric clavicle fracture (<12 years old)	Collar & Cuff	General Practitioner
Acromioclavicular joint sprain (Rookwood class 1 & 2)	Collar & Cuff	General Practitioner
Proximal humerus fracture in elderly patient (>80) with severe dementia	Collar & Cuff	General Practitioner
Ankle sprain	Ankle brace or moonboot	Acute (<3 weeks) – General Practitioner Chronic (>3weeks) – Physiotherapy
Malleolar flake avulsion fracture	Ankle brace or moonboot	General Practitioner
5th metatarsal base fracture or other distal metatarsal fracture	Hard-sole walking shoe or moonboot	General Practitioner
Toe fractures	Buddy strap + heel walker shoe	General Practitioner
5th metacarpal fracture	Buddy strap + soft bandage wrap	Hand Therapy
Finger distal phalanx tuft fracture or undisplaced phalangeal fractures	Protective splint (i.e. Zimmer splint or Mallet splint)	Hand Therapy
Mallet finger (joint not subluxed and <30% of articular surface involved)	Mallet splint	Hand Therapy
Finger volar plate avulsion injury	Buddy strapping	Hand Therapy
Undisplaced radial head/neck fracture (Mason 1 or 2)	Broad arm sling	Hand Therapy

VFC is held five-days per week and is conducted by one orthopaedic registrar and overseen by a single consultant orthopaedic surgeon. Digital radiographs and patient case notes are reviewed, and an appropriate management plan is determined based on the nature of the injury. Management pathways include:

1. Discharge to care of GP

2. Discharge to an appropriate Allied Health department (Advanced Practice Hand Clinic (APHC) or Physiotherapy), or

3. Referral to OFC for in-person assessment (Figure 2).

APHC is led by an Advanced Physiotherapist with experience and appropriate credentialling to independently manage patients with Orthopaedic conditions. Use of this skillset and framework to its full potential affords the VFC process the ability to divert a

larger subset of trauma within the recognised pathway conditions. An Orthopaedic registrar is available via an on-call phone for real time second opinions on imaging, and there are four appointment spaces per week in a consultant Orthopaedic surgeon clinic reserved for hand therapy to escalate cases of concern.

Referrals deemed not appropriate for VFC (i.e. injury not defined by VFC pathway, incorrectly diagnosed injury, or immobilisation with POP requiring plaster technician or medical offer for removal) are referred to OFC. A letter is sent to both the patient and the GP to advise them of the outcome of their VFC appointment.

FIGURE 2: LOGAN HOSPITAL VIRTUAL FRACTURE CLINIC MODEL OF CARE
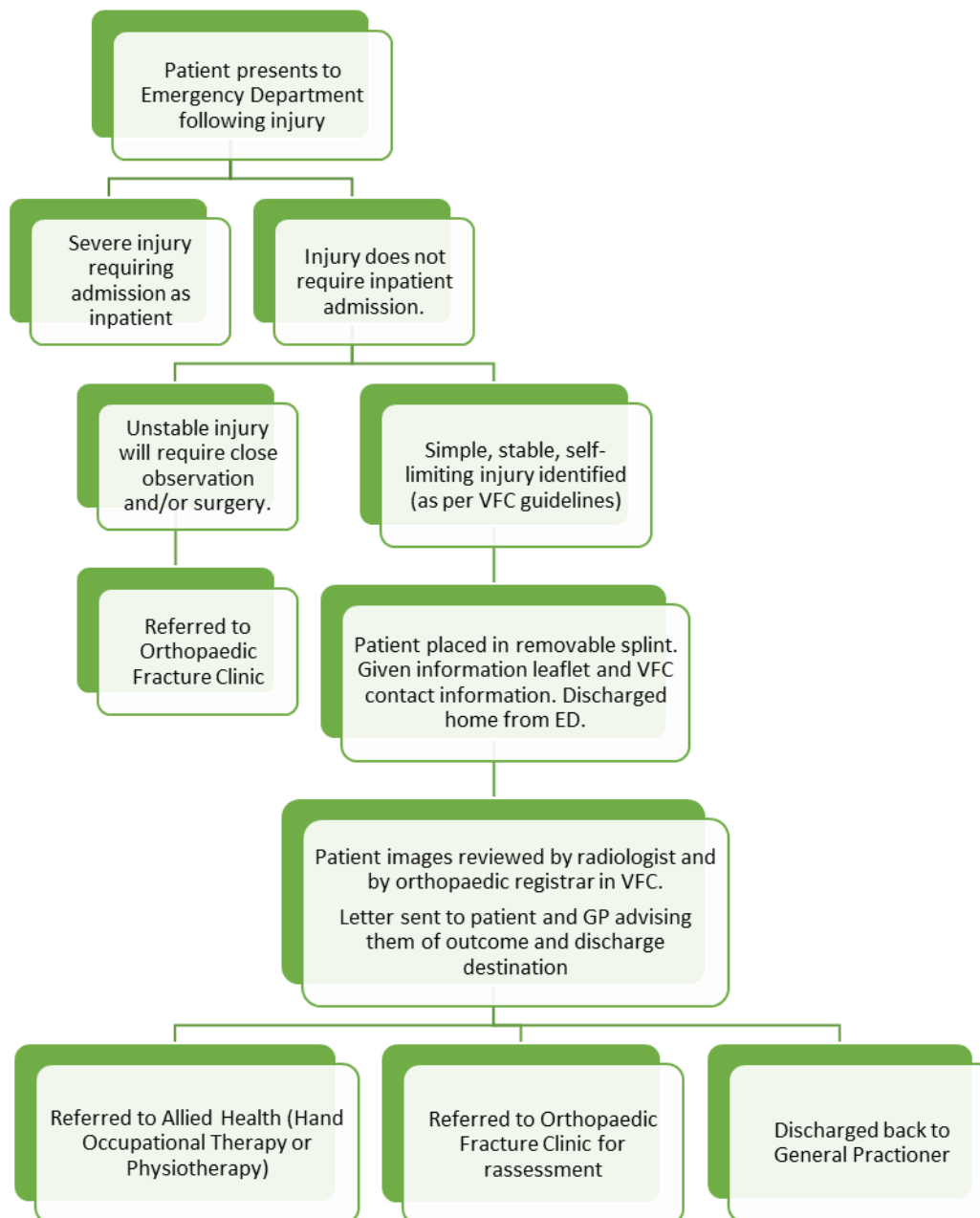
STATISTICAL METHODS

This analysis took the form of a retrospective interrupted time series (ITS). ITS is a useful tool for evaluating the effectiveness of healthcare interventions. Data is collected at time-points both before and after an intervention, to determine whether observed changes in outcome are explained by secular trends in the data, or are likely attributable to the intervention itself. [14] ITS compares the means before and after in a robust way, that takes into account correlations between time points and allows for

controlling of confounders such as seasonality using a ANCOVA Lagged Dependent Variable model. [15]

The analyses were performed using the R software version 4.0.2 (2020-06-22) and developed in RStudio 1.4.1103. [16, 17] The R packages used were 'its.analysis' written by Patrick English and 'segmented' written by Vito M.R. Muggeo of which the 'its.analysis' package results are reported here for brevity. [18-20] For the variables of interest that were normally distributed for both clinic regimens, the mean and standard deviation was reported, otherwise the median and inter-quartile range was reported. The reported standard deviation for the OFC plaster technician appointments is an estimate only after correction for a missing value. This was an exploratory study, and no adjustments were made to the reported p-values to take into account multiple hypothesis testing.

RESULTS

A total of 96,741 patients were reviewed in the outpatient fracture clinics over the study period; 91,108 in OFC and 5,633 in VFC. The mean number of monthly OFC patients seen before and after implementation of the virtual clinic is shown (Figure 3). Overall, we observed a significant reduction in total number of patients (from 1,055 (IQR 104.5) to 831 (IQR: 103) per month) coming through the OFC following the introduction of the VFC (F = 21.9; df=1; p <0.0001).

FIGURE 3: TIME SERIES CURVES OF TOTAL OFC PATIENTS SEEN PRE- AND POST- VFC IMPLEMENTATION
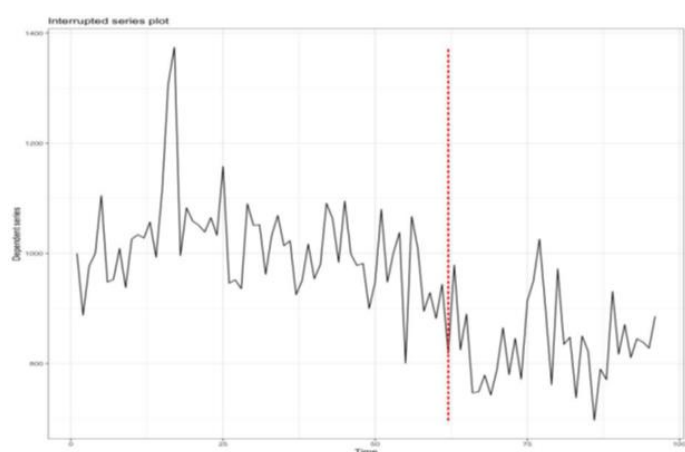
There was an 11% reduction in new patient referrals to OFC (407 (SD: 57.7) to 361 (SD: 48.4) (F=6.3; df=1; p = 0.014)) and 20% reduction in review patients returning to

OFC (610 (SD: 96.6) to 484 (SD: 57.1) (F = 4.8; df=1; p = 0.032)) (Figures 4 and 5).

FIGURES 4 AND 5: TIME SERIES CURVES OF NEW PATIENTS SEEN IN OFC AND REVIEW PATIENTS SEEN IN OFC
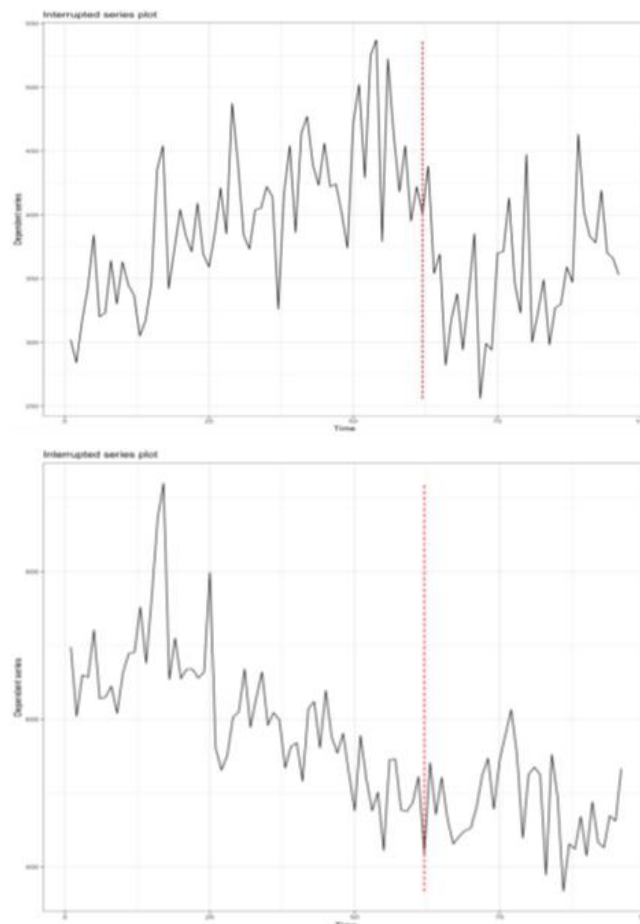
The FTA rate was reduced by 44% from 271 (IQR: 127.3) to 151 (IQR: 72.8) (F=4.0; df=1; p = 0.047) (Figure 6). A sub-analysis was performed to determine the reduction in FTA rate in new OFC referrals versus review patients. There was no significant change in new patient failure to attend (from 113 (SD: 45.3) to 82 (SD: 33.3) (F=2.1; df=1; p = 0.151), in comparison to the larger significant reduction in OFC review patient FTA rates (from 169 (IQR: 49.2) to 86 (34) (F=7.2; df=1; p = 0.009). This result correlates with our expectations about the VFC implementation; that the new patients attending OFC would have more severe injuries requiring orthopaedic consultation and are thus less likely to FTA. We hypothesised that the patients likely to FTA OFC pre-VRC implementation had either simple injuries not requiring intervention (new patients) or were reviewed at least once and then FTA as their condition improved (review patients). Implementation of the VFC will redirect both these patient populations to the virtual clinic.

FIGURE 6: TIME SERIES CURES OF FTA IN ORTHOPAEDIC FRACTURE CLINIC

FIGURE 7: TIME SERIES CURVES OF TOTAL NUMBER OF PATIENTS DISCHARGED FROM OFC
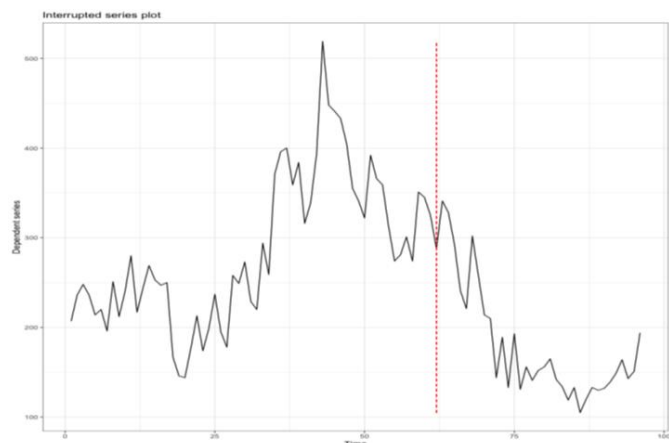
No significant change was noted in discharge rates from the OFC from 477 (IQR: 390) to 272 (IQR: 69.3) (p = 0.124) (Figure 7). A trend towards a significant change in median new patient discharges (176 (IQR: 168.5) to 91 (IQR: 39.8) (p = 0.076)) was observed, and no significant changes in mean for review patients discharged from OFC (282 (IQR: 190) to 181 (IQR: 40.8) (p = 0.236). This result is as expected, as the VFC was hypothesised to reduce the number of inappropriate OFC patient referrals; thus, the patients seen in OFC after VFC-implementation appropriately require face-to-face consultation with orthopaedic staff, and are not anticipated to be discharged at a significant rate from OFC.

There was a significant change in plaster technician appointments after the VFC introduction from 482 (SD: 50) to 374 (SD: 50.4) (p < 0.0001).

Of the patients referred to APHC following VFC review, 206 patients (July 2017 – February 2019) had complete data for the QuickDASH outcome. Average initial QuickDASH score was 64.3% whilst average discharge score was 11.3% resulting in a QuickDASH score improvement of 53%. Satisfaction scores were collated between May 2017 to July 2019 with three hundred and thirty-six the lowest, and three hundred and fifty-two the highest number of responses to questions 1 to 4. Percentage of respondents indicating satisfied or very satisfied was ninety six percent to question 1, and ninety nine percent to question 2, 3 and 4 (Table 2).

TABLE 2: APHC SATISFACTION SCORES

Patient Satisfaction Survey	Very Dissatisfied	Dissatisfied	Neither	Satisfied	Very Satisfied
1. How satisfied were you with the waiting time to receive your initial appointment in the Advanced Practice Hand Clinic?	1	6	5	82	258
2. How satisfied were you to see an Advanced Practice Therapist rather than a doctor at your initial appointment?	1	1	2	70	264
3. How satisfied were you with the level of knowledge of the Advanced Hand Therapist who did your initial assessment?	2		1	41	296
4. How satisfied are you with the treatment you received?	2	1	2	33	298
Total	**6**	**8**	**10**	**226**	**1116**

DISCUSSION

Value-based health care focuses on how to ensure sustainability of the system to meet the challenges of an aging population with increasing demand on the system, whilst recognising that a focus on efficiency alone is insufficient. The change in emphasis from volume to value challenges the system to better understand the patient experience, critically review how and where care is delivered, and reduce unwarranted clinical variation. [21] This virtual Model of Care has demonstrated its benefit during a global pandemic by reducing face-to-face consultations, as well as supporting the quadruple aim of value-based care through providing patients improved access to health services, better health outcomes, a satisfactory experience of their healthcare, as well as ensuring the health professionals involved are experiencing satisfaction in delivering such care and health system resources are better utilised. [22]

Jenkins et al. [9] described the potential advantages of a VFC as multifactorial; with benefits in the ED, Orthopaedic Departments and Allied Health, the potential to improve patient satisfaction, and potential healthcare cost savings. Although several countries have reported developing VFCs, the Logan Hospital VFC was one of the first virtual clinics to be implemented in Australia and has the largest cohort of data from our region. This study demonstrates the effectiveness of the clinic model of care in the Australian public health care system.

Implementation of a VFC model has shown value by reducing the number of face-to-face consultations in the OFC by 21%, as well as allowing more efficient use of medical staff resources. [23, 24] This allows a single staff member to assess the VFC referrals, in significantly less time than would be required to review all the patients face-to-face. This also reduces the time-pressure on doctors in the OFC, allowing for additional time to be spent appropriately with patients presenting with complex injuries requiring further work-up and management. These benefits have already been demonstrated at other sites by Legg et al. [6], McKirdy & Imbuldeniya [25], Murray et al. [26] and O'Reilly et al. [8] Logan Hospital recorded an 11% reduction in new OFC referrals, in addition to a 20% reduction in the number of review appointments and a 44% reduction in FTAs. This has resulted in a decrease in the administrative burden following up such patients and consequently less overbooking of the OFC. This markedly improves overall efficiency and reduces waiting times for OFC patients. Additionally, and fortuitously, our audit has new relevance in that VFC can also assist with decreasing the in-person footprint in hospital clinics during pandemics such as COVID-19.

A number of previous studies have investigated the implementation of the VFC model with promising results relating to safety and efficiency. Holgate and colleagues [27] showed the VFC to significantly reduce the wait time for a face-to-face consultation within the OFC as well as being compliant with British Orthopaedic Association Standards for Trauma (BOAST 7 guidelines), thus demonstrating the safety of VFC. Cavka et al. [11] recorded a significant improvement in patient wait times for first contact with the orthopaedic team with the introduction of VFC, from a median of seven days to two. They also reported a reduced rate of unplanned ED re-attendances and reduction in the average number of outpatient clinical attendances per referral. Finger et al [28] demonstrated no significant difference in upper extremity disability, return to work, or satisfaction in patients assessed and provided with conservative treatment by a hand surgeon, then given optional or scheduled follow-up, for simple upper extremity fractures. Brogan et al. [29] described excellent outcomes of fifth metatarsal fractures and supports the use of a VFC model to provide standardised, high-quality, and cost-effective care. Furthermore, Gilbert et al. [23] demonstrated how quickly and successfully virtual clinics could be set up in the face of a global pandemic. The Logan Hospital results concurred with the findings of the previous authors that this is a safe, efficient way to satisfactorily manage self-limiting injuries to improve overall clinical efficiency.

Vardy et al. [5] have demonstrated that instigation of a standardised pathway of care for predetermined minor injuries not requiring admission, from diagnosis through to management and subsequent follow-up, will facilitate more timely injury management in the ED. The Logan Hospital care pathway reduced the use of plaster cast immobilisation in favour of removable generic splinting devices. These are more time efficient and requires less specific skills to apply than plaster/fibreglass cast, further reducing time to discharge from the ED. Implementation of these pathways and splinting also reduces the number of patients returning to the ED for plaster care issues or for follow-up after failing to attend a planned OFC appointment. [5, 11] Following implementation of the VFC model at Logan Hospital there were 22% less plaster

technician appointments within the OFC, presenting a significant cost saving in consumables as well as decreasing time pressures upon the plaster technicians.

Implementation of a VFC model has significant cost saving potential for healthcare providers and may allow redistribution of funds to other services. [30] Whilst we anticipate significant savings for the hospital with the implementation of the VFC, a formal cost analysis was not conducted. A full health econometric analysis would also consider the costs of medical staff (doctors, nurses, radiographers, allied health practitioners and plaster technicians), consumables (removable splints, POP, cast fiberglass), and the cost savings encountered by reducing patient time spent the in ED.

Jayaram et al. [31] demonstrated high rates of patient satisfaction (87% satisfied) with Mason 1 and 2 radial head fractures managed in a VFC model. Our paper demonstrates that patients diverted to APHC from VFC show clinically and statistically significant improvements in QuickDASH scores. Furthermore, levels of satisfaction from the patients were very high with 99% of consumers being satisfied with diversion from OFC to APHC, the knowledge of the therapist and the treatment received. Although Jayaram et al. [31] reported 87% satisfaction, this was only with radial head fractures, and assessed satisfaction with the leaflet provided. To our knowledge this is the first paper reporting consumer satisfaction with the change in model of care, reporting satisfaction with not seeing an Orthopaedic doctor and reporting outcomes across multiple upper limb conditions.

The obvious area for concern with a VFC is the potential to miss a serious injury. Whilst VFC clinics have demonstrated that management of predefined injuries is safe [7, 8, 27, 29, 32-34], additional steps were introduced at Logan Hospital to ensure patients were not harmed or treatment compromised, as this was the first clinic of its kind to be introduced to the region. Three additional steps were introduced at Logan Hospital. First was introduction of a VFC Hotline for patients and GPs with queries to directly communicate with an orthopaedic registrar. The second step relates to staffing of the VFC, as the clinic is run by junior orthopaedic registrars. To address this, the VFC is performed alongside a senior orthopaedic consultant clinic each morning, so the junior staff have a readily available avenue for support from senior staff. The third step was to introduce allied health as a VFC discharge location to ensure follow up of all discharged patients. This was a

modification to the VFC at Glasgow Royal Infirmary [9]; we discharge a large percentage of VFC patients to allied health as we feel this not only improves their rehab and recovery but is an additional step to prevent patients from "falling through the cracks" in the community should a serious injury be missed initially. This was necessitated due to the difference in primary care access in the United Kingdom compared to Australia. Patients are registered with a single GP in the UK thus enabling an easily identifiable follow up safety net. In Australia, patients may not be registered with a GP or may be registered at multiple sites, making primary care follow up less reliable.

CONCLUSION

Overall, the implementation of a VFC at our hospital was successful in improving efficiency and reducing the current OFC workload, as well as having a positive effect on the FTA rate. Diversion to APHC resulted in clinically and statistically significant improvements in outcomes measures, satisfied consumers, and reduction in clinic load and plaster technician workload allowed additional time to be spent with complex patients, prevented clinic backlogs and overbooking with associated crowding of waiting rooms. We have also demonstrated that the Glasgow Hospital VFC model can be successfully modified to suit different hospital regions and patient demographics.

We anticipate this service will continue to improve and will reduce the workload of both the OFC and the ED for the management of minor injuries. In an era dealing with a global pandemic that is spread via person-to-person direct contact, the virtues of a virtual clinic are exponential. This model of care has been adopted permanently in our hospital. We are optimistic that VFC models are a socially distanced, pandemic-proof clinical care model that will be the way of the future for Australian orthopaedic departments.

DISCLOSURE STATEMENT
The authors declare that they have no relevant or material financial interested that relate to the research described in this paper and have nothing to disclose.

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RESEARCH ARTICLE

AN EXPLORATION OF JOB STRESS AMONG HEALTH CARE WORK FORCE

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ABSTRACT

OBJECTIVES:

The aim of this study is unique and will be useful in elucidating the level and sources of job stress among nurses working in government and private sector health institutions in the Kurdistan Region. This research could be useful in developing future nursing and healthcare manpower planning policies. In this research work, the objective is to evaluate the job stress among hospital nurses in the Kurdistan region. The research part basically explains about work-related stress and how it is harmful to the health of the employees.

METHODS:

With the help of questionnaires, the authors collected primary data from the nurses working in 34 public and 56 private hospitals all over the Kurdistan region. To collect the data author used a simple random sampling method. The proposed study is descriptive in nature and authors collected data from 252 staff nurses working in the Kurdistan region. To do the analysis author used statistical tools like descriptive statistics, mean, cluster, chi-square, and correspondence analysis. To analyses, the data author used statistical software package SPSS 28.

RESULTS:

The results reveals that the ranking of four job stress domains like job factor, organizational factors, interpersonal relations factors and environmental factors. In that the interpersonal relations factors are ranked number one and the second rank is organizational factors third one is environmental factors and the last one is job factor.

CONCLUSIONS:

In Kurdistan region hospital staff nurses stressed due to routine shift and poor organizational structure are mostly influenced on organizational factors that are why it's ranked number one among the four domains.

KEYWORDS

Job stress, health, hospital, nurses, chi-square

INTRODUCTION

Nursing has been distinguished as a noble occupation and also it has given inherent amounts of pressure to the nurses. Occupation stress achieved dangerous effects on attendants' well-being and their capacities to adapt to work requests. Nowadays, work-related stress is recognized as a severe worldwide issue for employees and every organization. Many researchers revealed that work-related stress could cause many thoughtful health issues and adversely affect organizational results. People who suffer from work-related stress are more likely to have stumpy motivation, unhealthy lifestyle, less production, poor satisfaction levels, and feel not secure at the workplace. Those work-related stresses not only affect the work environment but also affect the employees' work-life balance and create pressure on work and their family life. Occupational stress produces negative outcomes for employees, including high healthcare fees. [1,2] The aim of this study is unique and will be useful in elucidating the level and sources of job stress among nurses working in government and private sector health institutions in the Kurdistan Region. This research could be useful in developing future nursing and healthcare manpower planning policies. The study's findings will contribute to the body of theoretical knowledge on human resource management and coping strategies for nurses in the healthcare industry.

LITERATURE REVIEW

At the most critical measurement, the pressure is our frame's reaction to weights from a condition or lifestyle occasion. What adds to stress can shift exceptionally from character to person and contrasts as indicated through our social and monetary situations, the earth we live in and our hereditary cosmetics. Some regular highlights of factors that could make us experience stress comprise encountering something new or startling, something that undermines our sentiment of self or feeling we've got little strength over a scenario. [3]

Stress can be characterized as how we feel overpowered or unfit to adapt because of unmanageable pressure. [4,5] Numerous factors can be the reason behind stress, such as the death of a loved one, separation or divorce, redundancy, and financial difficulties. [6] However, some positive changes can also lead to stress, such as moving to a bigger city, receiving a job promotion, or a short weekend trip. [7,8] Stress has been categorized as a person or something present or going on earlier than, specifically as the motive or origin of something current or taking place later or stimulus, as a result, or response and as an interaction. It has been studied from diverse frameworks. For example, a physiological evaluation changed into proposed helps thinking about the association between pressure and illness. [9,10]

On the other hand, Lazarus and Folkman [11] argued for a psychological perception in which stress is "a specific relationship between an individual and the environment that the individual appraises as taxing or exceeding his or her resources and endangering his or her health." Job stress is identified with one's activity. It often originates from unexpected duties and pressure that do not align with an individual's knowledge, aptitudes, or desires, hindering one's ability to adapt. Job stress can increment when employees do not feel upheld by administrators or partners or feel they have little command over work processes.[12] Stress can result from complex interactions between large frames of interrelated factors; there are several psychological theories and models that address job stress. [13, 14] In addition, work stress is identified as a problem in health care workers, and nursing has been recognized as an occupation with significant stress levels. Previous studies have established that stress leads to dangerous effects on nurses' health and ability to meet job demands. [15] This significantly impairs the availability of delicate care and the efficacy of fitness services shipping. [16] Stress exists in every employer both huge and small the work locations and companies have ended up loads complex due to which it exists, job-related stress has tremendous effects over the personnel job normal overall performance, and the corporations are seeking to deal with this scenario. [17,18]

In truth, work-associated stress has been labelled as significant health trouble. Interestingly, Work pressure in nursing became first examined and recognized for hysteria among nurses categorized: Patient care, decision making, taking duty, and change. The nurse's role has long been seen as stress-stuffed primarily based on physical labor, human suffering, work hours, staffing, and interpersonal relationships that are important to the work nurses do. Since the mid-Nineteen Eighties, nurses' paintings strain has been escalating due to the increasing use of generation, continuing rises in fitness care prices, and turbulence inside the paintings' surroundings. [19]

People in human beings and employees, in particular, can deal with strain for brief intervals; however chronic pressure produces prolonged changes in the physiological nation. The issues of task stress, coping, and burnout amongst nurses are of the usual challenge to all managers and administrators in fitness care. Following this view, work stress exists while human beings understand that they have trouble coping with the needs regarding work and that their feelings of nicely-being are being threatened. Many stressors associated with nursing have been identified. All these stresses may be changed pleasingly via the usage of suitable stress control abilities. [20-22] A few stressors are typically encountered by using nurses. [23,24]

Thus, this examination geared toward finding out the diploma of expert stress many of the body of workers nurses and various determinants, which affect it so that strategies to improve their private and expert first-rate of existence may be deliberate out ultimately. The study's main objective is to evaluate the job stress among hospital nurses in the Kurdistan region.

RESEARCH METHODOLOGY

The proposed study is descriptive, and the authors collected data from 252 staff nurses who work in 56 private and 34 public hospitals located in the Kurdistan region. In this research work, the authors used both primary and secondary data. To collect the primary data, the authors used well-strucutred questionnaires and duration for collecting of the data is from May 2021 to July 2021. It contains two sections the first section covers eight demographical variables like name, the gender of the respondents, marital status, age of the respondent, nationality, monthly salary, educational level and length of service in the present position. The second section covers 29 job stress-related variables. It is further subdivided into four domains, namely job factors, organizational factors, interpersonal relations factors, and environmental factors. All are on a five-point Likert scale. Information is collected from nurses those who work in both day and night shift. To collect the data author used a simple random sampling method. The author used statistical tools like descriptive statistics, mean, cluster, chi-square, and correspondence analysis to do the analysis. For data analyses author used SPSS.28 statistical software package. Before starting the analysis authors checked the reliability of the data. Cronbach's Alpha analysis is used to test the internal consistency of the scale. They conducted a reliability test for all job stress-related variables. The minimum recommended value for the Cronbachs alpha coefficient is 0.06.[25]

TABLE 1 RELIABILITY TEST

Slno	Particulars	Cronbach's Alpha
1	Job factor	0.890
2	Organizational factors	0.943
3	Interpersonal relations factors	0.927
4	Environment factors	0.912

In our study, table 1 portrays the Cronbachs alpha value as more than the recommended value for four domains Job factor, Organizational factors, Interpersonal relations factors, and Environment factors are ranging from 0.890 to 0.943, respectively. Table 1 shows that all constraints have passed the reliability test where all alpha – values have exceeded the recommended minimum value of Cronbach's alpha. This indicates that the variables of various domains have good internal consistency.

ANALYSIS AND RESULTS

Table 2 provides the following details concerning the demographic characteristics of respondents items like the gender of the respondents, marital status, accommodation, age of the respondent (years), monthly salary (US$), length of service in the present position and distance from home to workplace.

BASIC CAUSES OF JOB STRESS AMONG THE KURDISTAN HOSPITAL NURSES

From the above table, three portraits show the ranking of job stress domains of Kurdistan hospital nurses. In these four stress factors, interpersonal relations factor ranked number one, organizational factor ranked second, environment factors ranked third and the last one is job factor.

Many researchers are argued about hospital staff nurses regarding job stress and the causes of stress. In this research, the author ranked the stress factors based on opinions collected from the Kurdistan staff nurses. Table 3 shows the ranking of job stress variables in that job factors domain role conflict, job autonomy, and role contradiction has the highest-ranking rate. It shows the staff nurses in Kurdistan face more stress due to role conflict, job autonomy, and role contradiction. The variables like word load and role ambiguities have a moderate level in the job factor domain. The variable like responsibility and job identity have the lowest score. It shows that the responsibility and job identity variables have fewer stress causes among the Kurdistan staff nurses.

Organizational factor domains show that shift work is ranked number one, and it shows that the staff nurses are highly stressed based on shift work. Moreover, the organizational structure variable scored the minor rank. It shows that staff nurses are happy about the structure of the organization. In the domains of interpersonal relations factors, management style ranked number one, and the variable organizational support variable ranked sixth, indicating that nurses in the Kurdistan region get good support for the organization. It can be inferred from the environment domain staff nurses are worried about the hygienic condition in the hospital and happy about the working conditions it scored the least score in the environment factor domain. With the attempt of conducting an inept study on the job stress domain of Kurdistan staff nurses, cluster analysis has been used; it helps to segregate the respondents into a different group.

TABLE 2 DEMOGRAPHIC CHARACTERISTIC OF THE SAMPLING FREQUENCY AND THE PERCENTAGE OF THE RESPONDENTS (N=252)

Characteristic	Frequency	Percentage
Gender		
Male	92	36.50
Female	160	63.50
Marital status		
Married	91	36.10
Unmarried	161	63.90
Accommodation		
Bachelor	21	8.30
Forced bachelor	64	25.40
With family	167	66.30
Age of the Respondent (years)		
Below 20	37	14.70
21 to 30	184	73.00
31 to 40	23	9.10
41- above	8	3.20
Monthly salary		
Up to 400 US$	35	13.90
401 to 600 US$	155	61.50
601 and above US$	62	24.60
Length of service in the present position		
Below 2 year	68	27.00
2-5year	154	61.10
6-10 year	24	9.50
Above 10 year	6	2.40

Distance from home to the workplace		
Around 1km	43	17.10
1-5 km	101	40.10
5-10 km	90	35.70
Above 10 km	18	7.10

TABLE 3 RANKING OF JOB STRESS VARIABLES

Slno	Particulars	Mean	Rank
I	**Job factor**	**2.96**	**4**
1	Job identity	2.70	7
2	Workload	2.97	4
3	Responsibility	2.88	6
4	Role ambiguity	2.95	5
5	Role contradiction	3.05	3
6	Role Conflict	3.11	1
7	Job Autonomy	3.07	2
II	**Organizational factors**	**3.11**	**2**
1	Organizational structure	2.92	10
2	Policies and procedures	3.03	8
3	Pay	3.01	9
4	Rewards	3.13	5
5	Recognition and promotion	3.12	7
6	Job security	3.13	6
7	Leadership style	3.20	2
8	Training programs	3.15	4
9	Shift work	3.23	1
10	Career Advancement	3.15	3
III	**Interpersonal relations factors**	**3.11**	**1**
1	Organizational Support	2.98	6
2	Co-worker support	3.13	4
3	Patient behaviors	3.00	5
4	Communication quality	3.16	3
5	Working Relationships	3.17	2
6	Management Style	3.21	1
IV	**Environment factors**	**3.08**	**3**
1	Working conditions	2.99	6
2	Health/cold, noise	3.01	5
3	Space for work	3.10	3
4	Facilities	3.15	2
5	Physical Environment	3.07	4
6	Hygienic condition	3.17	1

SEGMENTATION OF RESPONDENTS BASED ON JOB STRESS

Cluster analysis has been used to segment the respondents based on job stress domains. K-mean cluster analysis has been used to segment the homogeneous group of the respondent based on the job stress domain. This analysis helped to handle a large number of the respondent and segregated into a related group.

By applying the K-mean cluster analysis, the respondents are segmented into three groups namely "Highly job stressed group", "Moderately job stressed group," and "Low job stressed group". Based on the mean value of the four domains, the first cluster scored 2.8975 and it's named as moderately job stressed group. The second cluster average score is 3.5475 and it is ranked number one and high when compared to another group, so it is named as highly job stressed group and the third cluster scored is 2.025 it very less compare to the other two groups so it is named as Low job stressed group.

It can be concluded from the above table that the F values of the four domains are statistically significant, and the values are less the 0.05. This implies that the three clusters are different significantly.

Table 6 displays the numbers of respondents are in the cluster each cluster. It can be observed from the above table that each cluster contains an almost equal number of respondents. Hence, the three clusters have almost equal strength and there is not much variance.

ASSOCIATION BETWEEN JOB STRESS AND DEMOGRAPHIC VARIABLE

It is necessary to understand the association between job stress segment and demographic variable impact. For that, the chi-square test is applied in this research. The following tables portray the chi-square value and their significance for the association between the job stress segment and the demographic variable. The demographic variable included is Gender, Marital status, Accommodation, Age of the Respondent (years), Monthly salary, Length of service in the present position, and Distance from home to the workplace.

TABLE 4 THE SEGMENT OF JOB STRESS IN FINAL CLUSTER CENTERS

Domains	Cluster		
	1	2	3
Job factor	2.83	3.36	2.09
Organizational factors	3.00	3.59	1.96
Interpersonal relations factors	2.90	3.65	1.97
Environment factors	2.86	3.59	2.08
Average	2.8975 (II)	3.5475 (I)	2.025 (III)

TABLE 5 ANOVA

Domains	F	Sig.
Job factor	149.084	.000
Organizational factors	401.666	.000
Interpersonal relations factors	396.085	.000
Environment factors	300.819	.000

TABLE 6 ARRANGEMENT OF THE CLUSTERS

Cluster	Cluster name	Number of Cases	Percentage
1	Moderately job stressed group	82	32.54%
2	Highly job stressed group	126	50%
3	Low job stressed group	44	17.46%
Valid		252	100%

TABLE 7 CHI-SQUARE VALUE FOR DEMOGRAPHIC VARIABLES

SL. No	Variables	Value	df	Sig.	Significant or not
1	Gender	19.991	2	.000	Significant
2	Marital status	1.045	2	.593	Not Significant
3	Accommodation	7.872	4	.096	Not Significant
4	Age of the Respondent (years)	58.759	6	.000	Significant
5	Monthly salary	9.987	4	.041	Significant
6	Length of service in the present position	21.465	6	.002	Significant
7	Distance from home to workplace	31.161	6	.000	Significant

It can be inferred from the above table that there is an association between the job stress segment and demographic variables. The demographic variable like Gender, Age of the Respondent (years), Monthly salary, Length of service in the present position and Distance from home to workplace variables has proved an association among job stress segment and demographic variable. It is found that there is no association between job stress segment and demographic variables like marital status and accommodation.

GENDER OF THE RESPONDENT AND JOB STRESS SEGMENT

To find out the association between the gender of the respondent and the job stress segment, the authors applied chi-square analysis. The job stress factors are in the form of metrics; the researcher converted the metric data into category data by applying cluster analysis. The cross-tabulation between the gender of the respondent and the job stress segment is shown in the following table.

TABLE 8 GENDER OF THE RESPONDENT AND JOB STRESS SEGMENT

Gender of the respondents	Job stressed group			Total
	Moderately job stressed group	Highly job stressed group	Low job stressed group	
Male	48.9%	42.4%	8.7%	100.0%
Female	23.1%	54.4%	22.5%	100.0%
Total	32.5%	50.0%	17.5%	100.0%

TABLE 9 AGE OF THE RESPONDENT (YEARS) AND JOB STRESS SEGMENT

Age of the Respondent (years)	Job stressed group			Total
	Moderately job stressed group	Highly job stressed group	Low job stressed group	
Below 20	21.6%	78.4%	.0%	100.0%
21 to 30	37.5%	47.3%	15.2%	100.0%
31 to 40	21.7%	43.5%	34.8%	100.0%
41 and above	.0%	.0%	100.0%	100.0%
Total	32.5%	50.0%	17.5%	100.0%

FIGURE 1 AGE OF THE RESPONDENT (YEARS) AND JOB STRESS SEGMENT
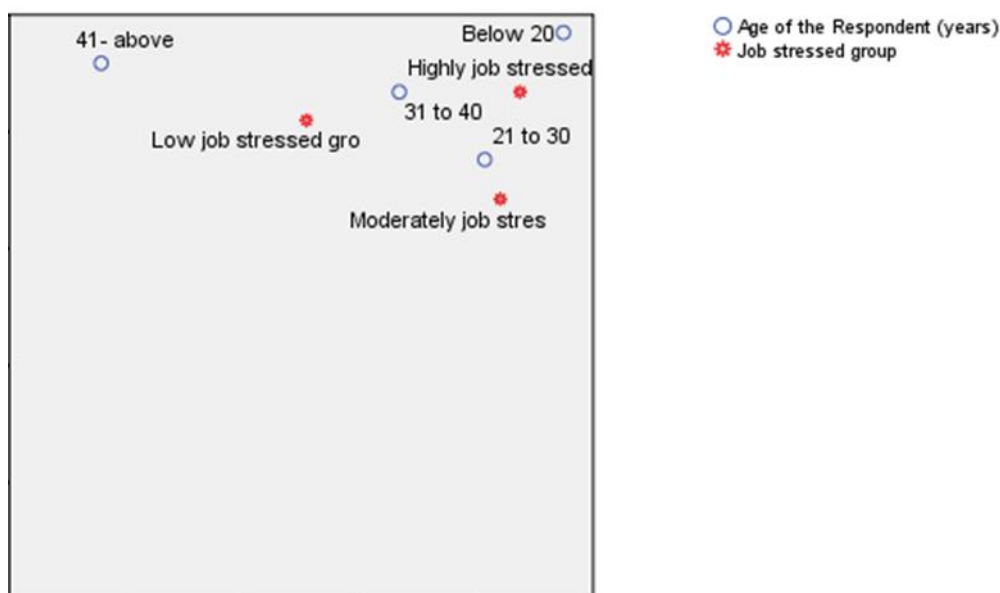
It can be inferred from the above cross-tabulation table that the gender of the respondent's category of male (48.90%) comes under moderately job stressed group. The gender of the respondent category of females comes under the highly job stressed group. It shows that females feel more stressed than males.

AGE OF THE RESPONDENT (YEARS) AND JOB STRESS SEGMENT

The author wants to find out the association between the age of the respondent (years) and the job stress segment, and the authors applied chi-square analysis. The job stress factors are in the form of metrics. The researcher converted the metric data into category data by applying cluster analysis. The cross-tabulation between the age of the respondent (years) and the job stress segment are shown in the following table.

From the above cross-tabulation table, it can be inferred that the age of the respondent category of below 20, 21-30, and 31-40 comes under the highly job-stressed group. The age of the respondent category of 41 and above comes under the low job stressed group. It shows that youngers are more stressed than old staff.

The above figure displays the result of the correspondence analysis explaining the association between the age of the

respondent and the job stress segment. The figure explicates that those under the category of below 20 and 31 to 40 are closely associated with a highly job stressed group. Those who come under the category of 21 to 30 are closely associated with moderately job-stressed groups. The age category of 41 and above come under the low job stressed group.

MONTHLY SALARY AND JOB STRESS SEGMENT

The main motto of the research is to find out the association between the monthly salary of the respondent and the job stress segment, so the authors applied chi-square analysis. The job stress factors are in the form of metrics, the researcher converted the metric data into category data by applying the cluster analysis. The cross-tabulation between the monthly salary of the respondent and the job stress segment is shown in the following table.

It can be observed from the cross-tabulation table that the monthly salary of the respondent's category of up to 400US$ and 401 to 600 US$ comes under a highly job stressed group. The monthly salary of the respondent category of those who get a salary of 601 and above US$ comes under low job stressed group. It shows that those who get more salary feels less stressed than others.

TABLE 10 MONTHLY SALARY AND JOB STRESS SEGMENT

Monthly salary	Job stressed group			Total
	Moderately job stressed group	Highly job stressed group	Low job stressed group	
Up to 400 US$	28.6%	62.9%	8.6%	100.0%
401 to 600 US$	33.5%	51.6%	14.8%	100.0%
601 and above US$	32.3%	38.7%	29.0%	100.0%
Total	32.5%	50.0%	17.5%	100.0%

FIGURE 2 MONTHLY SALARY AND JOB STRESS SEGMENT

The above figure shows the result of the correspondence analysis enlightening the association between the monthly salary of the respondent and the job stress segment. The figure explicates that those under the category of up to 400US$ are closely associated with a highly job stressed group. Those who come under the category of 401 to 600 US$ are closely associated with moderate job stressed groups and 601 and above US$ comes under low job stressed group.

LENGTH OF SERVICE IN THE PRESENT POSITION AND JOB STRESS SEGMENT

In this research, the author wants to find out the association between the length of service in the respondent's present position and the job stress segment, for those authors applied chi-square analysis. The job stress factors are in the form of metric, and the researcher converted the metric data into category data by applying cluster analysis. The cross-tabulation between the length of service in the present position of the respondent and the job stress segment is shown in the following table.

TABLE 11 LENGTH OF SERVICE IN THE PRESENT POSITION AND JOB STRESS SEGMENT

Length of service in the present position	Job stressed group			Total
	Moderately job stressed group	Highly job stressed group	Low job stressed group	
Below 2 year	25.0%	55.9%	19.1%	100.0%
2-5year	39.6%	45.5%	14.9%	100.0%
6-10 year	.0%	66.7%	33.3%	100.0%
Above 10 year	66.7%	33.3%	.0%	100.0%
Total	32.5%	50.0%	17.5%	100.0%

TABLE 11 LENGTH OF SERVICE IN THE PRESENT POSITION AND JOB STRESS SEGMENT

Length of service in the present position	Job stressed group			Total
	Moderately job stressed group	Highly job stressed group	Low job stressed group	
Below 2 year	25.0%	55.9%	19.1%	100.0%
2-5year	39.6%	45.5%	14.9%	100.0%
6-10 year	.0%	66.7%	33.3%	100.0%
Above 10 year	66.7%	33.3%	.0%	100.0%
Total	32.5%	50.0%	17.5%	100.0%

FIGURE 3 LENGTH OF SERVICE IN THE PRESENT POSITION AND JOB STRESS SEGMENT

The above table portraits the category of those staff working in Kurdistan hospital below two years, 2-5 years, 6-10 years length of service in the present position come under a high job stressed group. The category of staff under the above 10 years' service in the present position comes under a moderately stressed group. It shows that experienced staffs feel less stressed than others.

The above figure displays the result of the correspondence analysis clarifying the association between the length of service in the present position and the job stress segment. The figure explicates that those under the category of up to below 2 years are closely associated with a highly job-stressed group. Those who come under the category of 2-5 years and above 10 years are closely associated with moderately job stressed groups, and 6-10 years come under low job stressed groups.

DISTANCE FROM HOME TO WORKPLACE AND JOB STRESS SEGMENT

The authors investigated the association between the distance from home to the workplace of the respondent and job stress segment, for that authors applied chi-square analysis. The job stress factors are in the form of metrics, the researcher converted the metric data into category data by applying the cluster analysis. The cross-tabulation between distance from home to the workplace of the respondent and job stress segment is shown in the following table.

TABLE 12 DISTANCE FROM HOME TO THE WORKPLACE AND JOB STRESS SEGMENT

Distance from home to the workplace	Job stressed group			Total
	Moderately job stressed group	Highly job stressed group	Low job stressed group	
Around 1km	41.9%	23.3%	34.9%	100.0%
1-5 km	28.7%	50.5%	20.8%	100.0%
5-10 km	30.0%	65.6%	4.4%	100.0%
Above 10 km	44.4%	33.3%	22.2%	100.0%
Total	32.5%	50.0%	17.5%	100.0%

FIGURE 4 DISTANCE FROM HOME TO WORKPLACE AND JOB STRESS SEGMENT
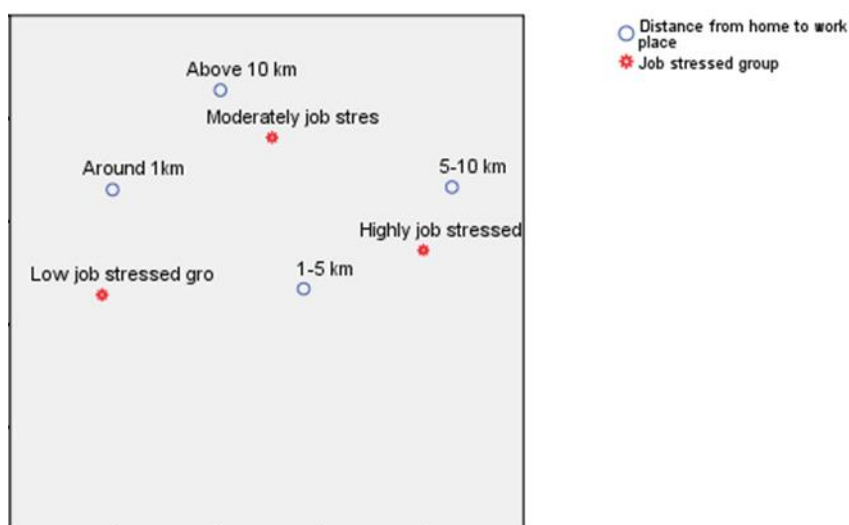
It can be inferred from the above cross-tabulation table that the respondents were categorized based on distance from home to workplace and job-stressed group. Those who travel from home to workplace 1-5 km and 5-10 km come under a highly stressed group. The distance from home to workplace category of around 1 km comes under a low job stressed group. The distance from home to workplace category of above 10km comes under a moderate job stressed group. It shows that those who work close to home fell less stressed than others.

The above figure shows the result of the correspondence analysis clarifying the association between the distance from home to workplace and job stress segment. The figure explicates that those under the category of 1-5 km and 5-10km are closely associated with a highly job-stressed group. Those under the category of above 10km are closely associated with moderately job stressed group and around 1km comes under the low job stressed group.

CONCLUSION

As our brain and body are constantly interconnected, stress can affect how we feel, think, and act. Among these four factors, job stress ranks highest in the results. Number one on the list is the importance of good interpersonal relationships. Organizational factors make up the second tier. The third factor is environmental, and the final one is a job factors. In the Kurdistan region, hospital staff nurses stressed due to routine shifts and poor organizational structure are mainly influenced by organizational factors that are why it's ranked number one among the four domains. The trouble of work-related pressure isn't new, and a lot of research has previously been performed on this discipline however there are lots of countries wherein this trouble isn't always been given deserving attention. [26-28] Work-related stress is harmful for each employee and organization. This paper highlighted the poor impacts that nurses need to endure due to strain.

This problem of work-associated strain can quickly be resolved by way of proper action plans and interest from the management. A good area is to pictures is proved to be successful among its competitors. In contrast, the survival of corporations with poor working situations is questionable. There are many studies this is nonetheless wished in this place in nations like Iraq and the Kurdistan Region. Like all other studies, this paper was subject to some limitations. Perhaps, the most difficult obstacles were obtaining information from the very people whom this paper is about (nurses) and their reluctance to provide answers to the questionnaires. Secondly, the privacy policy is like red tape, and hospital staff must not disclose any information without prior permission.

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THE IMPACTS OF FRIENDSHIP, ADVICE AND NEGATIVE TIES ON INTENTION TO LEAVE: THE CASE OF NURSES IN A SPECIAL BRANCH HOSPITAL

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ABSTRACT

OBJECTIVES

The high turnover rate of nurses has been a matter of debate among scholars. Nurses' social interaction patterns and the social structure they are situated within may provide clues about possible causes of their high turnover intentions. This study aims to investigate the possible effects of negative and positive ties on the intention of turnover among nurses.

DESIGN & SETTING

A hybrid research methodology was used. Social network analysis was used to reveal the positions of the nurses (n = 126) in the positive and negative networks. A statistical model was formed with varying types of centrality measures, intragroup conflict, and intention to leave variables. The data was collected from all the nurses working in a special branch hospital.

RESULTS AND CONCLUSION

The findings of the study clearly indicate that negative interactions directly and indirectly affect the intention to leave, and the nurses demand professional support from their colleagues. The findings also show the existence of a fragmented social structure among nurses, which suggests the increased importance of brokerage roles.
Managers should closely monitor the negative interactions among nurses, and they need to use conflict management techniques frequently to reduce hostile relations in the business environment. Managers should especially seek ways to increase altruistic tendencies among colleagues because nurses demand professional support ties more than friendship relations.

KEYWORDS

Social network theory, turnover rate, intention to leave, positive ties, negative ties, intragroup conflict.

BACKGROUND

Inpatient care services can be considered as one of the most salient characteristics of the hospitals when compared to all other health care organizations. Therefore, quality of nursing care plays a critical role in terms of organizational performance in hospitals. Despite their vital importance, nurses have considerably high rates of turnover, which Lagerlund et al. [1] defines as a global problem. The relevant literature highlights various negative impacts of having high nurse turnover rates on hospitals [2-10]. High turnover rate also signals high level of nurse mobility in the health care field, which may lead to inefficiency regarding the costs of employee recruitment, training, and orientation. There has been a significant number of empirical research efforts to reveal the causes of nurses' excessive turnover intention [11-16]. The findings have signified multi causal explanations ranging from job dissatisfaction, burnout, inappropriate leadership styles to the lack of professional autonomy, medication errors, and low social status. Most of these studies are based on individual responses of nurses towards certain statements in behavioral scales. Therefore, we believe these variables should be examined in conjunction with the social structure where the nurses are embedded in.

Nurses have social interactions with their colleagues and other clinical and administrative staff in hospitals. Nurses' social interaction patterns and the social structure they are situated within may provide clues about possible causes of their high turnover intentions. There has been an increasing trend in management and organization studies to understand how social interaction patterns impact dynamics in business life [17-34] but most of the network researchers have been concerned with the positive interactions among actors, such as those based on friendship, partnership and acquaintanceship. It is not inconceivable that positive ties among individuals in the workplace could somehow contribute to the positive organizational climate. However, negative ties which are based on dislike, hostility, jealousy, envy and rivalry among individuals may lead to more significant behavioral outcomes than positive ties. The importance of negative networks was emphasized by important scholars [35, 36] and the impacts of negative ties on various popular issues such as job satisfaction, organizational attachment and emergence of conflicts were examined by a series of studies [37-41]. The findings suggest that the patterns of positive and negative interactions among employees

should be considered together to provide detailed explanations concerning the ongoing social dynamics in organizations. Studying the dark side of organizational life may also yield interesting insights into the problem of high nursing turnover rates.

Findings of research conducted in the service sector highlight a strong and mutual positive relation between customer and employee satisfaction [42, 43]. It simply means unhappy customers lead to unhappy employees. Nurses may sometimes have to interact with the patients and their relatives having negative moods in their daily routines. The nature of nursing profession also requires emotional labor, which may increase psychological burden. These negative factors may diffuse throughout the inpatient units and may increase possibility of dyadic negative interactions and conflicts. It seems that the challenging aspects of nursing care can create a problematic social structure that might be positively associated with high turnover intention.

In this study, we aim at examining both negative and positive social networks among nurses to reveal multiple patterns of interactions that may have profound impacts on organizational climate. We believe that exploring the hidden social dynamics among nurses will provide important information about their interactions, such as the level of fragmentation, density of negative ties and the positions of disliked individuals in the positive networks. To this end, this study was conducted on nurses working in two special branch hospitals. Network data concerning friendship and advice, as well as negative ties were gathered and common centrality measures -degree, closeness and betweenness- were applied. In addition, data regarding the participants' level of perception of conflict, burnout and turnover intention were also gathered. A statistical model was tested by using the outcomes of social network analyses. This type of hybrid research methodology might be beneficial to explain the causes of this important problem in the health care sector. There hasn't been such a hybrid research approach aiming at studying the effects of both positive and negative ties on the nurses' turnover intentions.

LITERATURE REVIEW

1- TURNOVER INTENTION, NURSING CARE AND THE HEALTH SECTOR

Turnover intention is defined as the key factor explaining employees' decisions to leave an organization [44, 45]. Therefore, high turnover intention represents a tendency of an actor to quit his/her job. There are various definitions of turnover intention in the relevant literature. For example, seeking for alternative job possibilities in other organizations [46], having perceptions of individuals to leave their current position [47] and negative emotions towards sustaining organizational membership [48] are some well-known definitions. Turnover intention may not suddenly trigger an actual turnover decision, but it may cause multiple undesirable psychological, sociological and economic consequences for employees [49]. It is not possible to expect positive performance outcomes from an employee having an intention to quit his/her job as it is pointed out by Battistelli et al. [50]. The possible causes of turnover intention will be discussed later but it is worth mentioning here that there are two paradigms in the literature. A group of authors [44] claim that some behavioral variables determine turnover intention while others [51, 52] believe in the significance of social relations in the workplace. The question of whether the individual or contextual factors determine turnover intention is an important problem deserving empirical and theoretical efforts.

Hospitals rely on nursing care more than other health care organizations. Quality of nursing care directly affects discharge rates, and determines the efficiency of inpatient units. Hence, high turnover rate in this occupational group is more important than those in any other sectors. When nurses leave hospitals, quality of patient care drastically suffers [7-10, 53, 54]. Direct and indirect costs may emerge because of high nursing turnover rates in hospitals resulting from several reasons [55]. First of all, it may lead to an unstable work environment for the others [56]. Secondly, loss of members can prevent proper teamwork [4, 8, 57] and each resignation leads to extra time and resources for the new recruits [10, 14, 58, 59]. And finally, valuable human and intellectual capital of the health care institution are sacrificed [60]. These are the micro consequences of high nursing turnover intention, but this problem has also become increasingly important in parallel with ageing world population due to incremental needs for high quality nursing care [1, 61].

There is a significant number of empirical studies in the management literature which aim at examining the causes of turnover intention not only in the groups of nurses but also all in other types of occupational groups. Arnold and Feldman [62] classify the factors affecting turnover intention into five categories. These are macroeconomic factors (i.e. economic status of the country, characteristics of the labor market, etc.), organizational factors (i.e. size, HR policies, management or leadership style, etc.), individual job attitudes (i.e. satisfaction, citizenship, stress, commitment), demographic variables (i.e. age, marital status, education, sex, etc.), and non-work related factors such as family. In the relevant literature there are many findings specifically concerning the factors affecting turnover intention of the nurses. Some of the authors claim that organizational burnout, uncivil behavior and workplace bullying are among the main causes affecting not only the current staff but also the newcomer nurses [63, 64]. Tomietto et al. [65] highlight the influence of problematic socialization process for the newcomer nurses in parallel with these arguments. A group of researchers [66-68] state that occupational tenure and marital status are also critical variables that determine turnover intention because findings indicate young and single nurses are generally have higher turnover rates. The other causes of high turnover intention of the nurses are high physical demand of the job [69], work stress [14, 70-72], lack of professional autonomy because of the centralized structure [1, 14, 73-76], physician-nurse conflicts [4], role stres [77], and lack of professional respect [78]. The empirical findings suggest a complex and multi-dimensional view of high turnover intention problem of the nurses.

There are also studies underlining more contextual aspects of this problem. The type of hospitals may have an influence on turnover intention because teaching and research hospitals are characterized by low turnover rates than the others [79]. Opportunities to do research in this type of health care institutions may somehow contribute to nurses' self-actualization and professional recognition. Societal and organizational culture may also play a critical role in terms of turnover intention. Comprehensive studies in Korea indicate that strong organizational culture is positively associated with job satisfaction and negatively associated with intention to leave [80-82]. That seems quite normal in Eastern countries characterized by collective societal behavior but validity of these findings is quite suspicious in Western cultures having pragmatic and individualistic features. High turnover rates in hospitals can

cause an extra burden for the remaining nursing staff, which may sooner or later result in resignations [66]. Therefore, it is possible to state that inevitable increase of nursing turnover in the health care sector may cause a vicious cycle.

Turnover researchers imply that the decision to leave a job is a combination of workplace interactions, working conditions and psycho-social factors [83]. Some of the findings remind that establishing a positive organizational climate in inpatient care services may help overcome the triggering effect of multiple variables on turnover intention. Research evidence indicates that nurses seek social support, cohesive relations and a helpful social environment in their workplaces [52, 65, 80-82, 84]. However, social relations may also lead to controversial outcomes such as dysfunctional conflicts, deviant workplace behaviors and job dissatisfaction. Negative networks, which can be denoted as antimatter of positive networks, may lead to various unanticipated consequences in the workplaces. Stress, workload and other factors may also trigger employees' strained reactions to each other. This may create a social environment, which is suitable for the emergence of negative ties among nurses. It is also important to find out whether the nurses who have dyadic negative interactions can behave unprejudiced to each other in their professional networks such as advice. The positions of opponents and the patterns of their friends' mutual interactions in friendship networks may also provide critical information for the high nurse turnover rate problem. Nurses demand social support from their colleagues and look for an amiable work environment according to the relevant literature. Therefore, a close examination of the ongoing arguments in social network theory may help to define positive and negative aspects of the social structure.

2- POSITIVE VERSUS NEGATIVE WORKPLACE RELATIONS

The findings concerning turnover intention of the nurses' state that a positive organizational climate might be helpful to reduce negative impacts of multiple factors. High internal social capital, which is characterized by strong positive ties among organizational participants, could be very helpful to create an atmosphere of mutual trust and a peaceful work environment [17, 20, 85]. Development of strong ties requires incremental frequency of interactions between parties during the course of time [24, 86] and actors should spend extra effort to preserve their strong ties. On the contrary, negative ties may suddenly emerge in a

work group and can easily devastate a positive social environment. A considerable number of scholars claim that studying negative networks is more important than the positive networks because of various reasons [36, 39-41, 87, 88]. Negative ties increase actors' awareness and focus concerning the social structure, in other words actors who have negative ties with others start to cognitively evaluate ongoing relations in the workplace [41, 89]. Actors who are involved in dyadic negative relations generally seek supporters to gain power against their opponents [35] and this may cause rapid spread of hostile feelings into the social environment. Negative networks usually have lower densities than positive networks but their social impacts are much more influential [90, 91]. When actors experience negative interactions in their workplace they prefer to stay away as far as possible from the actors who are involved in such a relationship [35, 91]. This response of the actors' towards negative interactions makes it impossible to create an atmosphere of trust and increase social cohesiveness in a workplace.

There are also structural causes of negative relations among actors. A social structure, which is rich in terms of structural holes, may lead to the emergence of different types of negative relations. Ronald Burt considers the brokers, who are acting as bridges between unconnected parts of the social system, as the key actors having various advantages such as being able to reach valuable information, adjust knowledge or set barriers for undesired flow of critical information [19, 92-94]. However, all the structural power gained through brokerage positions is only valid for positive networks. Most of the network researchers haven't predicted the impact of brokers on negative interactions among actors in a fragmented social structure. Labianca et al. [36] highlight that the actors' unawareness about each other can increase the possibility of mutual negative interactions and brokers may have amplifying effects in this respect. Therefore, it is important to observe whether there are brokers between the actors and groups having negative relations in a workplace.

Employees may develop negative feelings towards others because of various reasons in the workplace but they may also hesitate to establish negative relations with some of the actors having special roles and positions in an organization or work group. Status distribution in groups is determined based on the formal power, members' contributions to the group goals, and personal characteristics [95]. Recent studies highlight that individuals are less likely to have negative relations with higher status

group members [96]. Managers, successful or popular employees can be regarded as actors having high status in the workplaces. There might be exceptional situations but it seems logical for the employees to have good relations with these actors.

3- A MODEL CONCERNING THE IMPACTS OF PROFESSIONAL, FRIENDSHIP AND NEGATIVE TIES ON TURNOVER INTENTION OF THE NURSES

A considerable number of researchers highlight that positive workplace relations can help reduce the impact of other factors such as stress, burnout, problematic personality and dysfunctional conflict on the employees' tendency to leave their jobs [97]. A positive organizational climate is especially important for the nurses trying to deal with unhappy patients and their relatives in a stressful work environment [52, 65, 80-82, 84]. In this study, we intended to examine how negative, friendship and advice - professional relations - interactions among nurses affect their turnover intention. It is important to study the reactions of the nurses towards negative and positive social interactions with their colleagues because a deep analysis of the social structure where nurses embedded in might give us clues about interactional causes of high turnover intention.

We assume that advice and friendship relations are positive ties and negative attitudes of the nurses towards each other are negative ties. The positions of the actors in advice, friendship and negative networks has been comparatively analyzed in an influential article [41]. In this study, we try to explore whether the positions of the actors in these three different types of networks have direct or indirect effects on turnover intention of nurses. Various types of centrality measures, which are indicated in Figure 1, may positively or negatively be associated with intragroup conflict and this in turn may affect intention to leave or these network variables might have a direct impact on the dependent variable -intention to leave.

FIGURE 1: RESEARCH MODEL
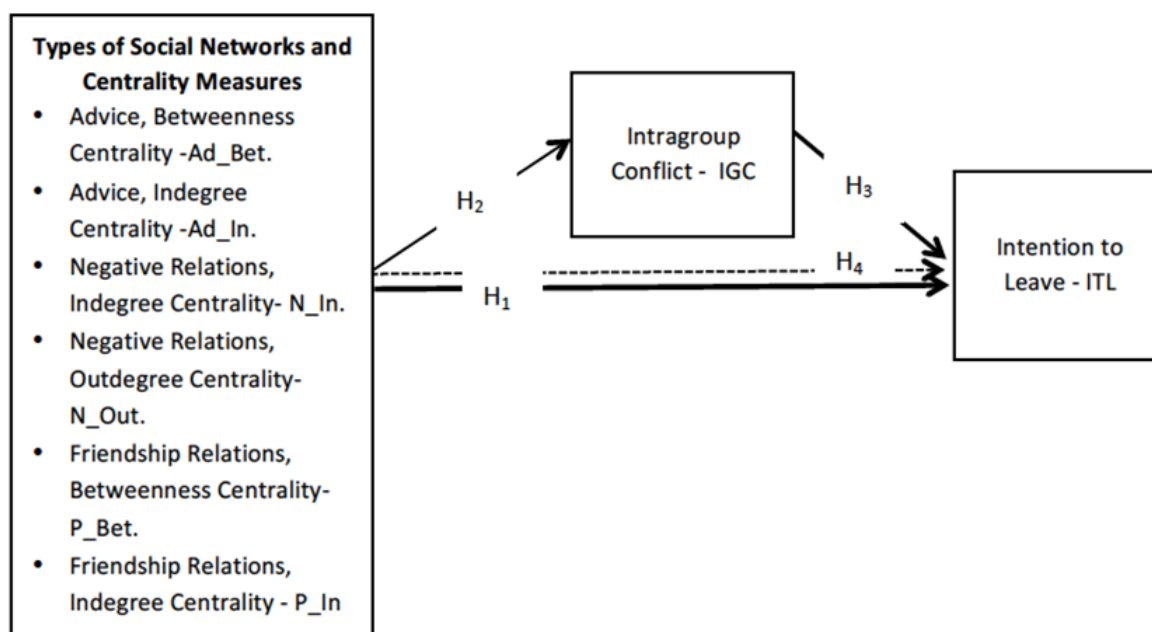
We have decided to apply the centrality measures - betweenness and degree-, which might affect the level of conflict among nurses and their intention to leave. Therefore, a series of hypothesis were generated to investigate the potential effect of actors' networking behavior on their basic attitudes and possible work-related actions.

The positive ties that contribute to social cohesiveness and satisfaction gained from professional relations in the workplace may directly impact the tendency of nurses to quit their jobs. Numerous negative interactions with colleagues may prevent emergence of a desirable work environment for a focal actor.

H1: Positions of actors in friendship, advice and negative networks affect intention to leave.

H1a: Betweenness centrality in advice networks is negatively associated with intention to leave.

H1b: Indegree centrality in advice networks is negatively associated with intention to leave.

H1c: Indegree centrality in negative networks is positively associated with intention to leave.

H1d: Outdegree centrality in negative networks is positively associated with intention to leave.

H1e: Betweenness centrality in friendship networks is negatively associated with intention to leave.

H1f: Indegree centrality in friendship networks is negatively associated with intention to leave.

Having mediator roles or relatively more direct connections with the colleagues in the positive networks may decrease the possibility of conflict emergence. The most disliked individuals in the negative networks may inevitably face various types of conflict cases because of their problematic relations in the workplace. It is important to determine whether certain features of social networks lead to intragroup conflict.

H2: Positions of the actors in friendship, advice and negative networks affect intragroup conflict.

H2a: Betweenness centrality in advice networks is negatively associated with intragroup conflict.

H2b: Indegree centrality in advice networks is negatively associated with intragroup conflict.

H2c: Indegree centrality in negative networks is positively associated with intragroup conflict.

H2d: Outdegree centrality in negative networks is positively associated with intragroup conflict.

H2e: Betweenness centrality in friendship networks is negatively associated with intragroup conflict.

H2f: Indegree centrality in friendship networks is negatively associated with intragroup conflict.

The extant literature highlights that conflict is not necessarily associated with the negative outcomes such as burnout, demotivation, and job dissatisfaction. Functional conflict may positively affect some of the well-known dependent variables in OB. It is important to determine whether positions of the actors in positive and negative networks lead to dysfunctional conflict, which may increase the tendency of employees to quit. Therefore, searching the mediator role of intragroup conflict between network centrality and intention to leave can help us to understand the role of multiple types of social interactions in this respect.

H3: Intragroup conflict is positively associated with intention to leave.

H4: Intragroup conflict has a mediator role in the relationship between centrality in friendship, advice and negative networks, and intention to leave.

H4a: Intragroup conflict has a mediator role in the relationship between intention to leave and betweenness centrality in advice networks.

H4b: Intragroup conflict has a mediator role in the relationship between indegree centrality and intention to leave in advice networks.

H4c: Intragroup conflict has a mediator role in the relationship between intention to leave and indegree centrality in negative networks.

H4d: Intragroup conflict has a mediator role in the relationship between intention to leave and outdegree centrality in negative networks.

H4e: Intragroup conflict has a mediator role in the relationship between intention to leave and betweenness centrality in friendship networks.

H4f: Intragroup conflict has a mediator role in the relationship between intention to leave and indegree centrality in friendship networks.

METHODOLOGY

This study was conducted on 126 nurses working in a special branch hospital located in a metropolitan area. Our research team applied formally to several hospitals and only few of them returned back. The sample characteristic of the special branch hospital seemed to be the most appropriate one. Table 1 indicates sample characteristics of the study. The descriptive statistics concerning gender, age, marital status and professional experience are given below. A great majority of the respondents are between 18 and 43 years old. The nurses in the research coverage have considerable levels of professional experience. 78.5% of the nurses are female, 21.4% are male; 37.3% are married and a great majority of them are single – 62.7%.

TABLE 1: SAMPLE CHARACTERISTICS

Characteristic	N	%
Gender		
Female	99	78.57
Male	27	21.43
Age (Year)		
18-30	51	40.48
31-43	57	45.24
44 >	18	14.28
Marital status		
Married	47	37.30
Single	79	62.70
Professional experience (year)		
10≥	97	76.98
10<	29	23.02
Total	**126**	**100**

A group of researchers had gathered both social network data and they used turnover intention and intragroup conflict scales during the face-to-face meetings with the respondents. Three different questions were asked to the respondents to determine their advice, friendship and negative ties with the others. A list of all the nurses working in the healthcare facility was formed and distributed to all the interviewers with the questionnaire forms including scales. It was requested from each respondent to denote the names of the nurses according to the three questions, which have been used frequently used to determine friendship, advice and negative ties in the relevant literature [36, 41, 98, 99]. These three questions are:

Friendship Relations: Do you consider this person to be a close friend?

Advice Ties: Do you go to this person for work related advice and knowledge?

Negative Ties: Sometimes people at work make us feel uncomfortable or uneasy and, therefore, we try to avoid interacting with them. Do you avoid interacting with this person? Yes/no.

The turnover intention scale, which was developed by Cammann et al. [100] was used in this study. That scale was adapted to the local culture by Gurbuz and Bekmezci [101]. Rahim [102] developed ROCI-I in 1983. The scale was adapted by Kocaman et al. [103]. It was initially aimed to determine indegree and betweenness centrality scores of the actors in positive networks - friendship and advice. These two centrality measures may lead to different consequences in a social structure because indegree shows influential actors in terms of incoming direct ties and betweenness shows how many times a focal actor occupies positions between two actors who don't have direct connections in a network. The relevant literature highlights that most of the centrality analyses don't work in negative networks. In a negative network it is not possible to have an information flow among nodes. Therefore, applying measurement items such as closeness, betweenness and eigenvector centrality to the negative networks seem to be useless [90]. However, degree centrality for asymmetric networks may show the most disliked individuals (i.e. indegree), and a focal actor's negative perception about the others (i.e. outdegree). Thus, we decided to use indegree and outdegree centrality measures in negative networks.

UCINET program was used to analyze the data concerning the positive - advice, friendship - and the negative networks. The centrality scores of each actor were put into

model with the data concerning intragroup conflict and intention to leave scales. SmartPLS was used for all types of statistical analyses. Validity and reliability studies were conducted before running the model. Internal consistency reliability, convergent validity and discriminant validity tests were applied to the data. Cronbach's alpha and composite reliability (CR) coefficients were examined for internal consistency reliability. Factor loads and AVE (average variance extracted) values were used to determine convergent validity of the scales. It was expected to have ≥0.70 for the factor loads and cronbach alpha and AVE values should be over ≥0.50 [104-106]. The results are indicated in Table 2.

TABLE 2: FINDINGS OF THE MEASUREMENT MODEL

Variable	Factor load	Cronbach Alfa	rho_A	CR	AVE
Ad_Bet	1,000	1,000	1,000	1,000	1,000
Ad_In	1,000	1,000	1,000	1,000	1,000
N_In	1,000	1,000	1,000	1,000	1,000
N_Out	1,000	1,000	1,000	1,000	1,000
F_Bet	1,000	1,000	1,000	1,000	1,000
F_In	1,000	1,000	1,000	1,000	1,000
Intention to Leave	0,882	0,896	0,897	0,935	0,828
	0,925				
	0,922				
Intragroup Conflict	0,773	0,846	0,855	0,892	0,627
	0,795				
	0,889				
	0,867				
	0,605				

Abbreviation: Ad, advice network; N, negative network; F, friendship network; In, indegree; Out, outdegree; Bet, betweenness.

Hair et al. [106] state that if factor loads are below ≥0.708; a) the items which are below 0,40 should directly be removed from the model, b) the items having values between 0.40 – 0.70 should be removed from the model if AVE or CR values are below then the edge value. Accordingly, items 1, 5 and 8 were removed from the model. The remaining items in the scale were reanalyzed and even though item 7 had a factor load value below .708 -.605- was kept in the model because AVE and CR values were above the edge values. It can be concluded that the scales have internal consistency reliability, because Cronbach's Alpha coefficients are between 0.892 – 1.000 and rho A coefficients are between 0.895 – 1.000, CR coefficients are between 0.892 and 1.000. It is evident

from the figures in Table 2 that the convergent validity was achieved because AVE values are between 0.627 -1.000 and the factor loads are 0.605 – 1.000. Cronbach Alpha, rho A and CR coefficients for social network centrality items -betweenness, indegree and outdegree values- were given value of 1 due to measurement by using single item.

Hetrotriat-Monotrait Ratio criterions - HTMT-, which was suggested by Henseler et al. [107] was used to determine discriminant validity. The authors highlight that more relevant concepts should theoretically be below 0.90 and less relevant concepts below 0.85. The HTMT values in Table 3 indicate that the research variables have discriminant validity.

TABLE 3: FINDINGS OF THE DISCRIMINANT VALIDITY ANALYSIS

	Ad_Bet	Ad_In	Intention to Leave	Intragroup Conflict	N_In	N_Out	F_Bet	F_In
Ad_Bet								
Ad_In	0,483							
Intention to Leave	0,038	0,048						
Intragroup Conflict	0,256	0,240	0,351					
N_In	0,238	0,151	0,404	0,267				
N_Out	0,110	0,103	0,045	0,149	0,074			
F_Bet	0,439	0,290	0,020	0,289	0,070	0,210		
F_In	0,305	0,636	0,077	0,430	0,024	0,035	0,499	

Abbreviation: Ad, advice network; N, negative network; F, friendship network; In, indegree; Out, outdegree; Bet, betweenness.

The centrality scores of the actors in friendship, advice and negative networks were put into the model together with the perception scores on their intention to leave and the level of intragroup conflict. Social network patterns were examined in detail and statistical tests were performed, because a hybrid research method was adopted in this research.

FINDINGS

A detailed analysis of the interaction patterns among nurses may provide useful clues concerning the social features of their workplace. Figure 2, 3 and 4 provide the diagrams representing friendship, advice and negative networks. The structural differences among these networks can simply be realized because each of them has a specific purpose. The two positive networks aim at satisfying socialization and professional needs of the organizational participants. On the contrary, negative relations indicate the actors' dislike or refraining from having any kind of a positive interaction.

Figure 4 shows professional relationships established by the nurses. The actors, who are effective in the friendship network, are not so influential in the advice network. When it comes to professional relationships among nurses, they may simply ignore their friends and look for the actors having experience and occupational knowledge. X1, X9, X12, X16, X20, X109 and X123 are the influential actors and some of them have managerial roles. Advice network is relatively less dense -0.33- than the friendship network. Average degree is 4.49, average distance is 3.19 and the diameter of network is 6. When compared to the network consisting of friendship relations, the advice network is characterized by a loosely coupled structure having less complicated relations.

Negative networks are generally expected to have lower densities than the positive networks [90]. The negative network in Figure 4 has a density of 0.03, which is significantly lower than the positive networks-friendship and advice. However, a core group of actors in the network have directional, reciprocal and indirect negative relations among themselves. There are also few dyadic and triadic

negative interactions located far away from this main group. Existence of this group signifies a high conflict potential in the social structure. X12 and X14, who can be regarded as influential actors in the friendship and advice networks, also seem to have significant levels of negative interactions with their colleagues.

The structural equation model to test the hypotheses is given in Figure 5. The model consists of the different centrality scores of the actors in each network as independent variables, intragroup conflict as mediator variable and attitudes of the participants towards intention to leave as dependent variable.

FIGURE 2: FRIENDSHIP NETWORK OF THE NURSES
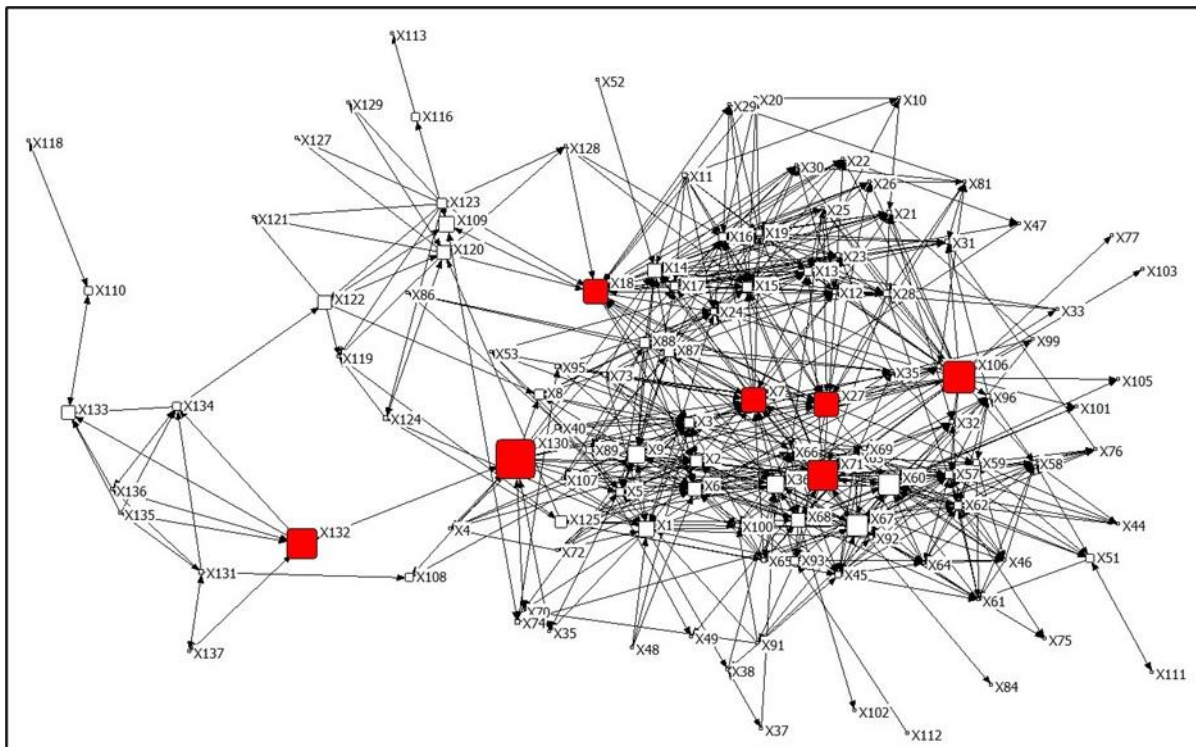
FIGURE 3: ADVICE NETWORK OF THE NURSES
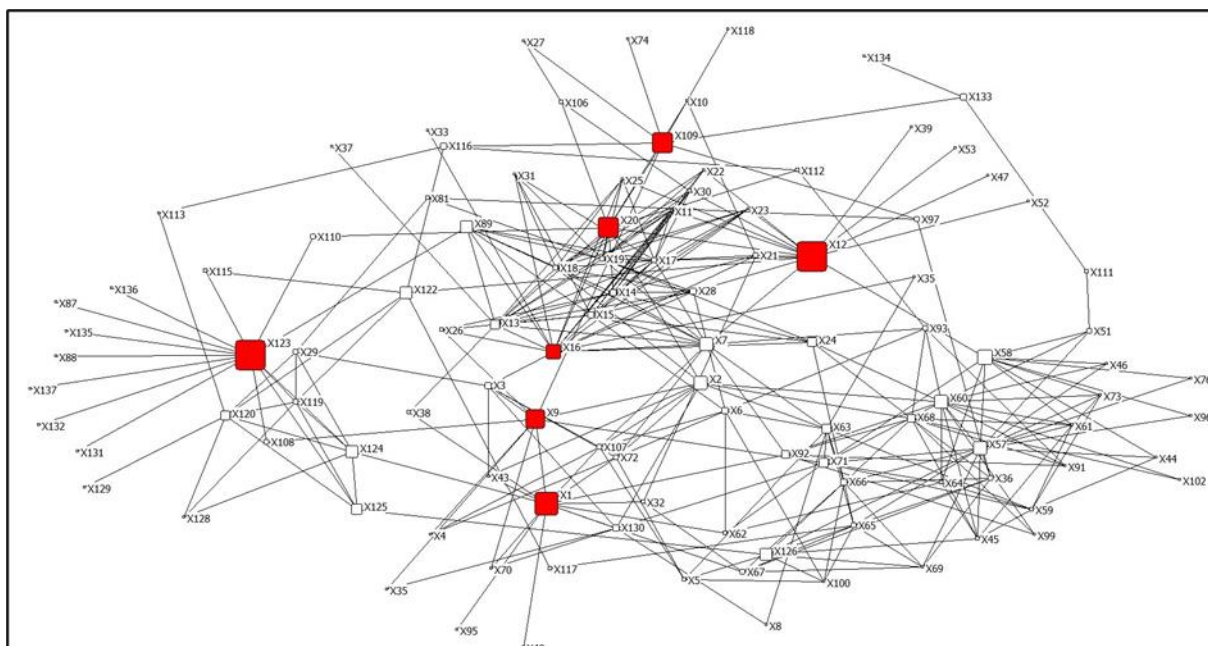
FIGURE 4: NEGATIVE NETWORK OF THE NURSES
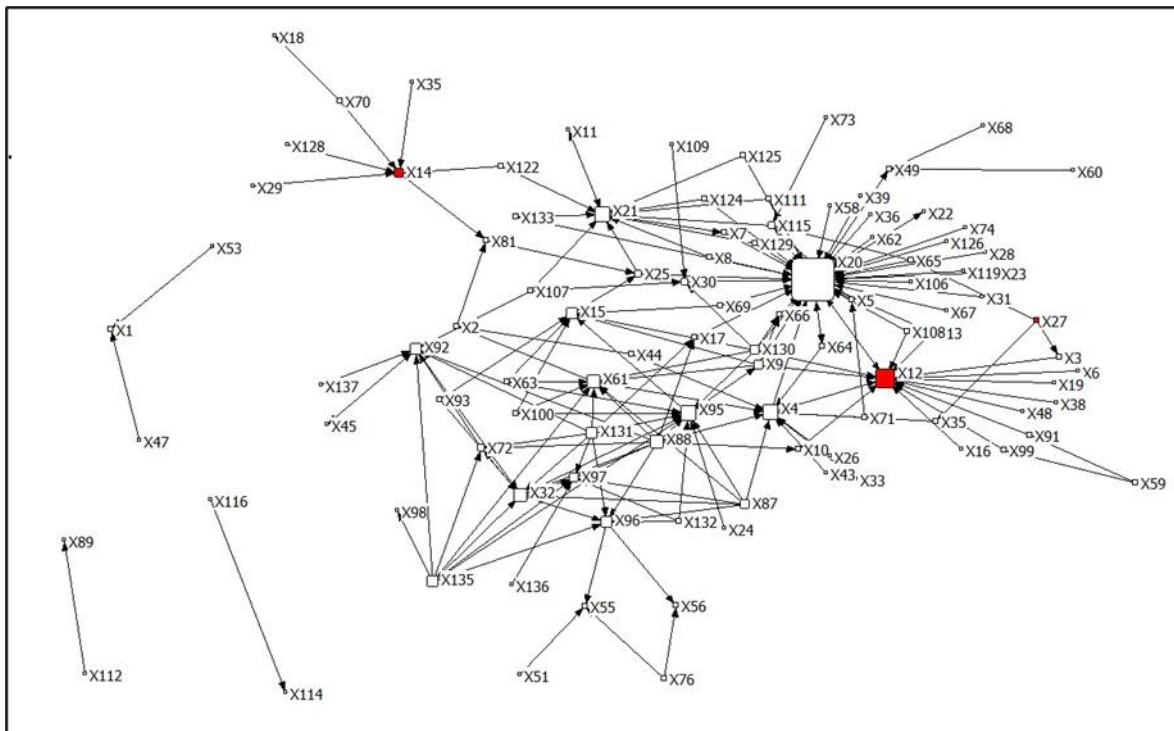
FIGURE 5: STRUCTURAL EQUATION MODEL
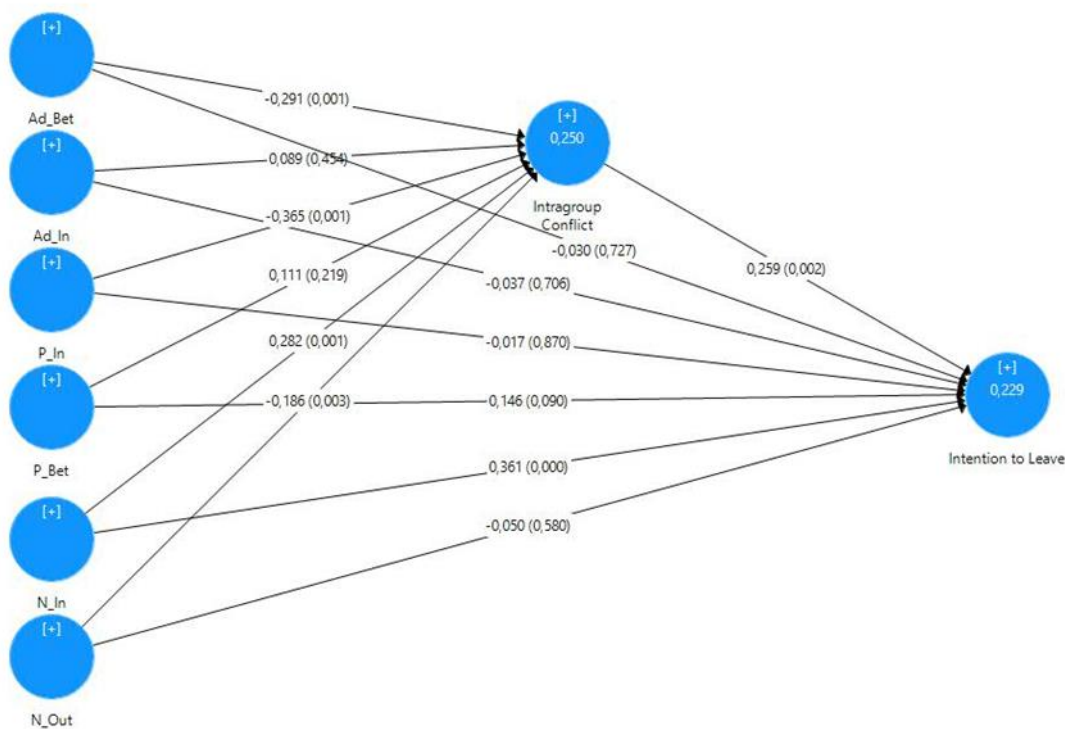
Partial least square equation modeling - PLS-SEM - was used to test the research model. The data were analyzed with SmartPLS - version 3.2.9 - program. PLS algorithm was used to calculate linearity, path coefficients, R2 and the impact scale (f2'); blindfolding analysis was conducted to calculate the prediction power - Q2. Bootstrapping method was applied and the t-values were calculated by taking 5000 subsample from the main sample to evaluate significance of PLS path coefficients. The VIF, R2 and Q2 values are presented in Table 4.

TABLE 4: FINDINGS OF THE RESEARCH MODEL

Variables		VIF	R^2	Q^2
Ad_Bet	Intragroup Conflict	1,743	0,29	0,161
Ad_In		2,169		
F_In		2,354		
F_Bet		1,697		
N_In		1,257		
N_Out		1,131		
Intragroup Conflict		1,385		
Ad_Bet	Intention to Leave	1,658	0,21	0,157
Ad_In		2,161		
F_In		2,126		
F_Bet		1,689		
N_In		1,121		
N_Out		1,105		

Abbreviation: Ad, advice network; N, negative network; F, friendship network; In, indegree; Out, outdegree; Bet, betweenness.

TABLE 5: DIRECT IMPACT COEFFICIENTS OF THE RESEARCH MODEL

Variables		Standardized β	Standardized Error	t value	p value	Confidence Interval (%95)
Ad_Bet	Intention to Leave	-0,104	0,091	1,138	0,255	-0,264; 0,091
Ad_In		-0,013	0,100	0,133	0,894	-0,211; 0,181
F_In		-0,107	0,098	1,090	0,276	-0,289; 0,095
F_Bet		-0,172	0,089	1,926	0,046	0,000; 0,351
N_In		0,438	0,095	4,621	0,000	0,248; 0,627
N_Out		-0,098	0,094	1,039	0,299	-0,284; 0,073
Ad_Bet	Intragroup Conflict	-0,291	0,088	3,315	0,001	-0,458; -0,112
Ad_In		0,089	0,119	0,748	0,454	-0,151; 0,320
F_In		-0,365	0,112	3,268	0,001	-0,584;-0,140
F_Bet		0,111	0,090	1,230	0,219	-0,056; 0,300
N_In		0,282	0,087	3,243	0,001	0,115; 0,462
N_Out		-0,186	0,063	2,937	0,003	-0,317; -0,068
Intragroup Conflict	Intention to Leave	0,259	0,085	3,038	0,002	0,093; 0,423

Abbreviation: Ad, advice network; N, negative network; F, friendship networ;, In, indegree; Out, outdegree; Bet, betweenness.

TABLE 6: INDIRECT IMPACT COEFFICIENTS OF THE RESEARCH MODEL

Variables			Standardized β	Standardized Error	t value	p value	Confidence Interval (%95)
Ad_Bet	Intragroup Conflict	Intention to Leave	-0,075	0,036	2,082	0,037	-0,155; -0,017
Ad_In			0,023	0,036	0,644	0,520	-0,035; 0,108
F_In			-0,094	0,048	1,970	0,049	-0,205; -0,021
F_Bet			0,029	0,027	1,054	0,292	-0,013; 0,094
N_In			0,073	0,032	2,249	0,025	0,021; 0,147
N_Out			-0,048	0,023	2,089	0,037	-0,99; -0,011

Abbreviation: Ad, advice network; N, negative network; F, friendship network; In, indegree; Out, outdegree; Bet, betweenness.

The linearity problem doesn't exist because it was noticed that the values are less than 5 when variance inflation factor - VIF- among variables examined [106]. It was found that 21% of intragroup conflict and 29% of intention to leave variables were explained when R^2 values examined. The research model has indigenous variables' prediction power because prediction power coefficients - Q^2 - are above 0 [106]. Therefore, it can be concluded that the research model has the prediction power on intragroup conflict and intention to leave variables due to below 0 Q^2 values in Table 5. Direct impact coefficients of the research model are presented in Table 5.

The mediator variable was taken out of the model at the initial step to test significance of path coefficients. It was observed that F Bet (β=0.172; p<0.05) and N In (β=0.438; p<0.01) variables have significant and negative impact on intention to leave. It was also determined that Ad Bet, Ad In, P In and N Out variables haven't significant effects on intention to leave. The hypotheses H_{1e} was accepted and H_{1a}, H_{1b}, H_{1c}, H_{1d} ve H_{1f} were rejected according to these findings.

The significance of the path coefficients was tested after including the mediator variable to the model at the second step. It was found that Ad_Bet (β=-0.291; p<0.01); F_In (β=-0.365; p<0.01); N_In (β=0.282; p<0.01) and N_Out (β=-0.186; p<0.01) were positively associated with intragroup conflict and intragroup conflict had a significant effect on intention to leave (β=0.259; p<0.01). There weren't any significant relations between Ad In, F Bet in and intragroup conflict. Therefore, hypotheses H_{2a}, H_{2c}, H_{2f} and H_3 were supported and H_{2d}, H_{2b} and H_{2e} were rejected. Indirect impact coefficients of the research model are presented in Table 6.

It is evident from the findings that Ad_Bet (β=-0.075; p<0.05); F_In (β=-0.094; p<0.05); N_In (β=0.073; p<0.05) and N_Out (β=-0.048; p<0.05) variables' indirect effects on intention to leave are significant, but Ad_In and F_Bet variables don't have any kind of indirect effects on intention to leave through intragroup conflict variable. Independent variables should have significant effects on the dependent variables to think about a mediator effect according to Baron and Kenny [108]. Besides that, independent variables should affect mediator variables and mediator variables should affect dependent variables when mediator variables are added to the model. On the contrary, Zhao et al. [109] claim that even there is no significant effect of independent variables on dependent variables; in case of a sequential and directional relation from independent variable to mediator variable, from mediator variable to dependent variable it is possible to think about a mediation effect. Thus, it is possible to state that there are mediator relations, because Ad_Bet, F_In, N_In and N_Out have indirect effects on intention to leave.

VAF - variance accounted for - values were calculated because mediator effect was determined [110]. VAF values are; Ad_Bet → intragroup conflict → on the path of intention to leave is 0.42, F_In → intragroup conflict → on the path of intention to leave is 0.47, N_In → intragroup conflict → on the path of intention to leave is 0.14 and N_Out → intragroup conflict → on the path of intention to leave is 0.39. It was found that intragroup conflict has a partial mediator role in the relationship between Ad_Bet, F_In, N_Out and intention to leave variables due to VAF values. There is not a significant mediation effect for N_In → Intragroup Conflict → on the path of intention to leave because VAF values which are below 0,20 are generally considered as insignificant [110]. We found empirical support for H_{4a}, H_{4d} and H_{4f}, but not for H_{4b}, H_{4c} and H_{4e}.

CONCLUSION

The research findings clearly indicate that having direct negative relations with others in the workplace increase nurses' tendency to quit their jobs. The individuals having incoming direct negative links increase their intention to leave their job. It is also evident that negative interactions can increase intragroup conflict, which may result in numerous resignations. Some researchers [80-83] have already emphasized the possible effects of workplace interactions on turnover rates. However, none of the scholars has focused on the dark side of the relations among nurses. This study reveals the fact that some occupational groups such as nurses seek intimate workplace relations and whenever they experience negative interactions with others, they might become much more sensitive.

The possible effects of centrality in the two types of positive social networks - friendship and advice - on intention to leave were also examined in this study. The literature clearly indicates that nurses facing various unanticipated events in their daily work routines demand cohesive and altruistic social relations [52, 65, 80, 81, 84]. The findings of this research also support the claims on the importance of satisfying socialization needs of the nurses, but the relevant literature hasn't explained whether professional or friendship ties decrease their intention to leave. This study clearly shows that having professional ties might be more important than having friendship ties in terms of decreasing nursing turnover rates. Centrality in advice network has an indirect effect through intragroup conflict on the dependent variable. The amount of direct ties in the advice network doesn't have a relation and effect on intention to leave but the nurses who have mediator or brokerage roles (i.e. high betweenness centrality) tend to stay in their jobs. This simply means that the actors who fill the structural holes by building bridges between unconnected parts of the friendship networks gain more satisfaction from their professional interactions [19, 92-94]. The actors having brokerage relations in the advice networks involving professional relations among nurses seem to have more positive attitudes towards workplace and it is highly possible that they don't want to leave the hospital. The fragmented social structure in the advice and friendship networks - Figure 2 and 3 – seem to increase the role and influences of the actors acting as brokers or cut points. These brokers may also be responsible for the emergence of this fragmented social structure and that of negative interactions among nurses, because brokers may have amplifying effects between unconnected parties according to Labianca et al. [36].

DISCUSSION

The intellectual efforts to reveal the causes of high nursing turnover rates have been centered on multiple individual and contextual factors such as economic status of the country, characteristics of the labor market, HR policies, leadership styles, job satisfaction, organizational citizenship, stress, burnout, workplace bullying, orientation problems, occupational tenure, marital status, high physical demand, lack of autonomy and physician-nurse conflicts [1, 14, 63, 64, 65, 66, 68, 69, 70, 72, 73, 76, 77, 78]. However, none of these studies have considered that most of these causes might be consequences of social interactions of the nurses in the workplaces. These individual and contextual factors may also shape the way an employee develops his/her relationships with others. Regardless of the ontological debate about this issue, examining the social networks of the nurses may provide significant clues that may bring practical insights to the problem of high nursing turnover and mobility. The claims of some scholars and research findings highlight the explanatory power of negative relations in organizations [36, 41, 87, 88, 89]. In parallel with the relevant literature, the findings of this study particularly support the significance of negative networks in terms of behavioral outcomes in organizations.

This study suggests an alternative viewpoint is required to understand and to solve the high turnover rates of the nurses. Increasing social solidarity may be a good option to overcome the impacts of negative ties but having friendly relations with colleagues doesn't contribute too much to the tendency of nurses to stay in the organization. It is quite rational to expect such a finding in the case of nurses because the existence of negative ties with the friendship relations can inevitably cause the emergence of rival groups. The actors who involve in mutual negative relations naturally rely on their friends and try to find out additional supporters [35, 41, 89]. This reaction will cause fragmentation of the social structure and may increase intergroup negative relations and conflict. The findings signify that those positive relations in the form of mentoring, consultation, or professional support instead of friendship may have a more significant effect on the nurses. The literature highlights the occupational burden of the nursing business. Therefore, professional relations with colleagues in

the workplace may help to cope with the challenges of being a nurse.

PRACTICAL IMPLICATIONS FOR HEALTH CARE MANAGERS

The findings of this study give important clues for possible managerial interventions to reduce the high turnover rates of the nurses. Managers should be aware of the level of possible negative interactions among nurses, and find out the degree of fragmentation of the social structure in which they operate. The ones who are at the center of the negative networks and isolated from the positive networks may have the highest possibility to quit their jobs. These actors have to be identified and the possible causes of negative ties should be examined in detail. The employees who will be assigned to administrative roles in nursing units must have sufficient knowledge about conflict management techniques. Moreover, it is possible to form a preferable organizational climate if HR units can find out the right methods to help nurses develop professional and friendly interactions.

A preferable organizational climate especially for the nurses should be isolated from hostile relations. High social solidarity is not necessarily required to persuade nurses not to resign. Management should find ways to increase the intensity and frequency of altruistic professional interactions among nurses. One way of achieving this is to give the task of mentoring to the tenured staff. The nurses who will act as mentors should also have brokerage positions in the friendship and advise networks. Shaping organizational culture by using slogans favoring intra-occupational cooperation is another way to promote these relations.

ETHICS DECLARATIONS

Funding: No external funding has been received for this study.

Conflict of interest: The authors declare that they have no conflict of interest.

Ethical approval: All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee, and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study protocol was approved by the ethical review committee of X Hospital (Approval no:2145). All participants read a statement that explained the purpose of the survey and provided written informed consent before participation in the study.

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PHENOMENON OF CAUSAL FRAUD HEALTH INSURANCE IN HOSPITALS: THEORY OF GEAR FRAUD

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ABSTRACT

OBJECTIVE

To describe and explore the experiences of hospital employees with the causes of fraud in the health insurance program at the hospitals.

DESIGN AND SETTING

This research was carried out at government hospitals in the Southeast Sulawesi Province in collaboration with BPJS Health, namely the Bahteramas Regional General Hospital and the Kendari City Regional General Hospital. Triangulation was carried out at BPJS Health, the Center for Health Insurance Financing at the Ministry of Health and the Center for Health Policy and Management at Gadjah Mada University, Yogyakarta. This research was conducted for one year, namely January 2020 to February 2021 qualitative method with a phenomenological approach. Data collection methods were carried out through in-depth interviews, focus group discussions, and document studies. The number of participants in this study was 44 people consisting of doctors in charge of services, nurses, midwives, and case-mix team including coders who met the inclusion criteria. Data analysis used the Moustakas method.

RESULT

The causes of health insurance fraud in hospitals financial motives (the desire to get money or material or economic or welfare benefits, get high service services and low employee salaries), behavioral motives (low integrity, lifestyle and employee habits of committing fraud0, and social motives (kinship, humanitarian factors, avoiding conflict, social position, and the existence of pressure), internal controls (a weak monitoring system, poorly enforced regulations, unclear regulations and limited hospitals providing services, no monitoring and evaluation, and there are no sanctions for fraud perpetrators), revenue targets (hospitals income and increasing the number of claims), leadership (leadership style or weak leadership in the hospitals and the absence of transparency), incentive systems (poor distribution of incentives and the absence of transparency of services from hospitals management), National Health Insurance (NHI) regulations (dynamic regulations and the availability of the National Guidelines for Medical Services has not been fulfilled and there is no standard for readmission and fragmentation), the NHI financing system (inconvenience of the financing system and the adequacy of the INA-CBGs tariff calculation), and the BPJS Health system (inconvenience of the BPJS Health system and the BPJS Health system which makes it difficult).

CONCLUSIONS

The causes of health insurance fraud in hospitals can be explained by the gear fraud theory that Internal factors are the main cause and external factors predispose to health insurance fraud in hospitals. These internal and external factors

interact with each other like the working mechanism of a gear. Understanding the theory of gear fraud will help formulate fraud prevention efforts in health insurance programs in hospitals that are more comprehensive and focus on eliminating the causes of fraud.

INTRODUCTION

The potential for fraud that may occur in mental hospitals includes efforts to extend or shorten the length of treatment (AvLOS), making fictitious bills for examinations and actions taken, and lodging patients for unclear indications. This is supported by the data obtained that there was a decrease in AvLOS during the implementation of the health insurance system with a payment system per diagnosis package but accompanied by an increase in the hospitalization rate by five times. This shows an indication that the potential for fraud affects the quality of outcomes for mental hospital patients.[1]

The National Health Insurance (NHI) program found the potential for fictitious claims of 175 thousand claims from hospitals with a loss value of around Rp. 400 billion during 2015 and increased to 1 million fictitious claims in 2016 valued at Rp. 1.9 trillion.[2]

Moral hazard and fraud still occur and have the potential to continue with the current policy environment. The findings show that the cause is the desire to increase the profit/profit and economic value of the Indonesia Case Base Group's (INA-CBGs) and capitation funds in the Health Insurance scheme.[3]

The potential for fraud in health insurance that can occur in hospitals of July 2016 is: coding errors as many as 528,285 cases (49.77%), service unbundling or fragmentation as many as 265,572 cases (25.02%), phantom billing as many as 6,105 cases (0.66%), phantom procedure as many as 7,221 cases (0.68%), change in inpatient class as many as 37,714 cases (3.55%), recurring bills as many as 12,025 cases (1.13%), length of hospitalization as many as 2,266 cases (0.21%), readmissions as many as 63,980 cases (6.03%), services that did not benefit were 45,262 cases (4.26%), service cancellation but still billed as many as 35,659 cases (3.36%), service standards as much as 32,013 cases (3.02%), 20,705 (1.95%) unnecessary therapy, 1,847 cases (0.17%) excess bills, 1,072 cases (0.1%) referral, 800 cases (0.08%)

cloning, fee contributions as many as 559 cases (0.05%) and users Excess ventilator training in 331 cases (0.03%).[4]

The variables of pressure, rationalization, and opportunity have a positive and significant effect on fraud prevention.[5] organizational commitment and leadership morality have a positive effect on the intention to commit fraud while the love of money, moral leadership, work environment, religious beliefs, and organizational culture have a negative effect on fraud. [6]

The novelty of this study is that the gear fraud theory is able to explain the factors that cause fraud in the health insurance program in hospitals more comprehensively, both internal and external factors.

METHODS

This research was carried out at government hospitals in the Southeast Sulawesi Province in collaboration with BPJS Health, namely the Bahteramas Regional General Hospital and the Kendari City Regional General Hospital. Triangulation was carried out at BPJS Health, the Center for Health Insurance Financing at the Ministry of Health and the Center for Health Policy and Management at Gadjah Mada University, Yogyakarta. This research was conducted for one year, namely January 2020 to February 2021. The research design used qualitative method with a phenomenological approach. The object of this research is fraud in the health insurance program at the hospital and the research subjects are Physicians in Charge of Services, Nurses, Midwives, Casemix Team including coders. The selection of participants with inclusion criteria has experience related to fraud in the health insurance program in hospitals and work in hospitals. The number of participants in this study was 44 participants including 4 participants as source triangulation, expert/researcher triangulation. Data collection was carried out through in-depth interviews, focus groups discussion, and document studies. The data analysis technique in this study uses the

Moustakas method. Ethics approval was not required for this study.

RESULTS

FINANCIAL MOTIVE

Financial motives include the desire to get money or material or economic or welfare benefits, get high service services, and low employee salaries. This is as expressed by the following participants:

"Can the welfare factor eh financial means money, financial, economic, welfare is felt to be lacking."(P17)

BEHAVIORAL MOTIVE

The behavioral motives that arise include low integrity, lifestyle, and employee habits of committing fraud. This is as expressed by the following participants:

"The first factor is the low integrity of the perpetrator. "(P1)

"Talking about finances, we can't relate to saying the whole thing, because there are also financial people who are fulfilled, but because there are habitual factors and maybe finances are sufficient, but because their lifestyle is higher, deviant things can be done."(P!3)

SOCIAL MOTIVE

Social motives that arise include kinship, humanitarian factors, and avoiding conflict. This is as expressed by the following participants:

"In my personal experience, on average we commit fraud, maybe from a psychological point of view, so we want to help patients, especially families of people, meaning families of fellow officers, health workers like that."(P3D)

"A factor of avoiding conflict such as the case in the emergency room for fear of a conflict being accepted by the patient, but with that, it changes, then the human factor, why do I say humanity like that described by a friend, he helps to direct it so that it will be claimed later because he is his heart said they could not but humanity."(P1)

Some of the participants also revealed that other social motives for health insurance fraud in the hospitals were social position and the existence of pressure, as expressed by the following participants:

"There is a special appreciation for someone, so in the end fraud like that happens."(P3D)

" Then usually there is also pressure from the doctors in charge of services parties."(P16)

INTERNAL CONTROL

Poor internal controls include a weak monitoring system, poorly enforced regulations, unclear regulations, and limited hospitals providing services. This is as expressed by the following participants:

"*Weak monitoring system like in case mix, for example, a diagnosis written by a doctor like this, but we replace it with another one so that for tariffs, to increase rates, that way."(PCM1B)*

"Maybe the rules are not clear enough, the hospital's rules."(PCM5B)

"…the rules are not enforced." (PCM3B)

"The limitations of hospitals in providing pharmacies, uh yes, pharmacies continue to be with the same lab and support, that's finally the examination, even though it can take one day, sir, but two days and three days, repeating, even though one cycle, deliberately beheaded, cases 400 to 700."(PCM6B)

In addition, some participants revealed that poor internal control also means that there is no monitoring and evaluation, there is an opportunity for trial and error and there are no sanctions for fraud perpetrators, as expressed by the following participants:

"No monitoring, no evaluation."(P17)

"Cheating is done because there is an opportunity. Maybe the services are lacking. At first, maybe he was just trying it for fun, the joy was fun, yes it continues." (P2)

"There is no enforcement of sanctions or punishment. There is no clear sanction for the perpetrator, it ends up happening continuously."(P11)

REVENUE TARGET

The results showed that a hospital's income is one of the causes of health insurance fraud in hospitals from the aspect of hospital governance. The causes of hospital's income include increasing hospitals income and increasing the number of claims. This is as expressed by the following participants:

"of course he wants to increase income, nothing else, with the Diagnosis Related Group's (DRG), indeed, if the DRG adjustment, the rate from 2016 to the present, doesn't increase too much, so we say it's a tariff adjustment because some have increased, some have decreased indeed at that time and indeed in hospitals, especially private ones, maybe the margins might not be that big, maybe from that side of things, so you want or don't want them to play until they indicate upcoding, indicated double claims and so on, yes you don't want to yes they encourage their run towards income."(P3P)

Other participants revealed that the causes of hospital revenue that can lead to fraud include indirect management directives so that income is not minus and the hospital's income is low. This is as expressed by the following participants:

"Maybe there was direction from internal but not directly, actually we felt when we were presented that it was minus income, so we, that's why I started to finally think about how to make this plus, want to do several ways, for example speeding up patient hospitalization, the medicine is given at a minimum so that it is more, more profitable. Maybe that is what is meant, but that was not a direct direction, right, like that."(P3D)

"Internal factors can also be included, especially if for example the hospital has low income. So the manager tries how to make the hospitals' income increase."(P2D)

LEADERSHIP

Leadership factors include leadership style or weak leadership in the hospitals and the absence of transparency, as revealed by the following participants:

"Leadership style or weak leadership, it can have a huge impact, on all the staff involved, in their field to carry out their duties."(PCM8B)

"The factor may also be that there is no transparency from the management so that people are competing how to make a profit, how to improve their welfare and also Internal Control Unit frankly I have been visited by the internal control unit, I am honest about why they want to find out why this doctor he was a fraud, Internal Control Unit already knew he was a fraud, the doctor but until now there has been no action from Internal Control Unit or the management for the doctor, instead I am the head of the room who is hated, because why I gave information. There was no enforcement of sanctions or punishments."(P2)

INCENTIVE SYSTEM

Incentive systems include poor distribution of incentives and the absence of transparency of services from hospital management. This is as expressed by the following participants:

"Because the distribution of the service system is not good, it is not transparent, we continue to provide services with a conscience. But what about our optimal service, which is minimal."(P15)

"Then in the distribution of the incentives it is lacking, it is not enough for them."(P4)

"Lack of transparency on the part of management in terms of service sharing." (P5)

"Then also nobody cares about it, we also do not affect us, we still receive that kind of service, it's the same."(P3D)

NATIONAL HEALTH INSURANCE REGULATIONS

Health insurance regulations include dynamic regulations and the availability of the National Guidelines for Medical Services has not been fulfilled and there is no standard for

readmission and fragmentation, as disclosed by the following participants:

"The first is the regulation that has just been running, we just started the NHI program in 2014, now along with that, if you pay attention to it, there are a lot of very dynamic regulations meaning that they are still changing and looking for patterns and if this is linked With the fraud theory itself, one of the fraud theory is that there is an opportunity when there are gaps in the regulations that are still rolling and the changes are still dynamic, it can be an opportunity for each party to commit fraud motives."(P2P)

"Maybe in Indonesia itself, the National Guidelines for Medical Services is not entirely available for all fields, whether in the medical field or the medical field, and maybe what I know is that the update until now has not reached there are 10 maybe more or maybe, but not all of these are one thing, meaning they have not been fulfilled. availability of the National Guidelines for Medical Services which applies nationally."(P2P)

"There is no standard of readmission and fragmentation."(P3P)

NATIONAL HEALTH INSURANCE FINANCING SYSTEM

The health insurance financing system includes the inconvenience of the financing system and the adequacy of the INA-CBGs tariff calculation, as disclosed by the following participants:

"Because this funding has just been carried out in this program, so maybe many of them still haven't quickly adjusted what the financing pattern is. that given will certainly be the initial point of view for service providers to see the enactment of such regulations on health insurance financing."(P2P)

"Yes, because from the INA-CBGs concept, the tariff calculation is indeed from the average side, yes, we calculate it. Out layer has an inlayer, there is an above that is below the line right? because the average is drawn, now for cases that are below the average that is below the average, the chances of that diagnosis or procedure will usually be done by the hospitals later, so indeed one of the factors could

be due to sufficient because from the best average. That's in terms of calculating the rate."(P3P)

THE BPJS HEALTH SYSTEM

The BPJS Health system includes the inconvenience of the BPJS Health system and the BPJS Health system which makes it difficult, as stated by the following participants:

"The BPJS Health system that he must self-examine. The existing system in the BPJS Health is too difficult, sometimes because there are several criteria that we must meet to be able to claim a diagnosis." (P6)

"The second is the discomfort with the BPJS Health system, they are not comfortable with the BPJS Health which is like a superpower." (P1P)

DISCUSSION

This study showed that personal motives are a cause of health insurance fraud in hospitals. Personal motives consist of financial motives, behavioral motives, and social motives. Financial motives include the desire to get money or material or economic or welfare benefits, get high service services, and low employee salaries. Financial motive is the main motive for fraud, although fraud requires the presence of other factors such as opportunity and justification for the fraud committed by the perpetrator. Financial pressures experienced by employees to make ends meet encourage people to look for other ways to resolve these financial pressures. Low salaries and services received are one of the causes of fraud in hospital health insurance. The fraud triangle defines three elements that exist in every fraud situation. These three elements must be existed for fraud to occur. If one element is omitted, fraud will not be committed or will be prevented by the organization's internal control. The three elements are motive, rationalization, and attitude.[7] In general most of the participants felt that fraudsters showed an extraordinary urge to be successful and rich.[8] In almost every case, health care fraud focuses on money.[9] the potential for fraud Hospitals can occur because of pressure, opportunity, and rationalization. The pressure factor is caused by the high unmet needs and the low salary received.[10]

The behavioral motive that arises include low integrity, lifestyle and employee habits of committing fraud. Behavior is one of the factors that influence the occurrence

of fraud. Behavior is an action or action carried out by a person or group of people based on personal values that are believed and if the behavior is carried out continuously it will form a pattern of behavior in acting. Behavior is also a manifestation of the thoughts and feelings experienced by a person or group in response to a stimulus in that person or group. Dishonest behavior and hedonism will encourage people to commit fraud. At the health service level in the hospitals, employees who behave dishonestly and unethically will easily commit fraud, and behavior like this will also tend to be repeated. A theory rooted in psychology is based on the view that criminal behavior is a product of mental processes.[11] the sociology and criminology literature describes fraud perpetrators as "trust violators" in other words, trust violators are people who are usually not suspected of committing fraud.[12] In particular, belief-breakers and fraudsters must be able to justify their actions against themselves and others as a psychological coping mechanism for dealing with the inevitable "cognitive dissonance," a lack of conformity between their perceptions of honesty and the deceptive nature of their actions or behavior.[12] Furthermore, that personal incentives and perceived pressure drive human behavior, and the need to rationalize wrongdoing as something that can be psychologically defended is deeply rooted in the notion of cognitive dissonance.[12]

The social motive that arises includes kinship, humanitarian factors, avoiding conflict, social position, and the existence of pressure. Social motives are extrinsic motives that a person has to behave by social demands. This social motive presence can contribute to the incidence of health insurance fraud in hospitals. The pattern of kinship relationships and the nature of wanting help to ease the burden on family members or community members in social kinship clumps trigger Health insurance fraud in hospitals. The use of other people's health insurance cards by patients and is assisted by the involvement of internal hospital parties because of kinship factors or because of a sense of social humanity further adds to the vulnerability of health insurance fraud in hospitals. In the social structure, it is also known as the social strata, which this phenomenon still exists until now, especially those who have a position or position in the government, usually will get priority in getting health services even though procedurally there are things that must be violated. Besides that, the superior position of a certain person sometimes makes people in a lower position silent to avoid conflict and allow fraud to occur even though they knowingly know that what is being done is fraud. Six motivational factors that encourage employees

and managers to engage in fraudulent behavior are business financial pressure, incentives and social pressure, greed, operational problems, internal pressure, and a working environment. evil. In addition, fraudsters rationalized their behavior through five significant neutralization techniques which were identified as social weighting, error switching, injury denial, attitude, and previous history of fraud.[13] All justifying collusion is a central element in many complex and expensive fraud and white-collar crimes.[11]

This study showed that hospital governance can because of health insurance fraud in hospitals. The hospital governance internal control, revenue target, leadership, and incentive system. Hospital governance is a fundamental thing in good hospital management. Internal control includes a weak monitoring system, poorly enforced regulations, unclear regulations and limited hospitals providing services, no monitoring, and evaluation, and there are no sanctions for fraud perpetrators. Internal control is an internal system developed by the organization so that business processes are carried out effectively, efficiently, economically with high compliance with existing regulations. Internal control is very important for hospitals to minimize fraud in health insurance services. The better the internal control system built by the hospital, the more it will be able to identify, detect and prevent fraud. The current phenomenon associated with this internal control system is that many hospitals consider that the internal control system is only a document formalization process to complete the parameters of good hospital governance so that the hospitals turn into a "document storage warehouse" because the documents have very minimal implementation. The internal control system is not only the availability of the infrastructure for policy documents, guidelines, standards, fixed procedures, and others but the most important thing is the implementation of the entire internal control system infrastructure. The complete infrastructure of the internal control system, especially to prevent fraud in hospital's health insurance, will be meaningless if the entire infrastructure system is not functioning optimally. Organizations as victims of fraud are identified as having three main opportunities for fraud, namely poor control environment, inadequate control activity, and circumstances that allow collusive behavior among fraud perpetrators.[13]

The revenue target includes increasing the hospital's income and increasing the number of claims. In the current context of hospital management where hospital

management implements the financial pattern of the Public Service Agency, hospital revenues are important to ensure the continuity of hospital operations. The current era of National Health Insurance with a payment system that is implemented with a prospective payment requires hospitals to apply the principle of service efficiency while maintaining the quality of services provided. The Indonesia Case Base Group's (INA CBGs) system that is used to pay hospitals claims bills also affects hospital's revenues. The slow payment of claims by BPJS Health is also a factor affecting the cash flow from the hospital's revenues. The importance of high income of hospitals meets operational needs and also the investment costs of medical devices can be a driving force for health insurance fraud in hospitals. The setting of high-income targets by the hospitals will force the hospitals to look for various ways to achieve this income target. One of them is trying to find loopholes in the system of health insurance.

Leadership factors include leadership style or weak leadership in the hospitals and the absence of transparency. Leadership is a person's ability to influence others in the form of words or actions. In the context of organizational management, leadership is the ability to move the resources owned by the organization in achieving goals. Every leader has a different leadership style even though scientifically the leadership style has been grouped by experts into several leadership style groups. In the context of health insurance fraud in hospitals, the leadership factor is one of the causes of fraud. The role of leadership in hospitals is very important to prevent health insurance fraud. A strong commitment accompanied by concrete actions taken by the leader is a real portrait that will become an example for employees in building anti-fraud attitudes and actions. Leadership that is weak and tends to be tolerant of acts of fraud will nurture fraud in the organization. To build a work environment in an anti-fraud hospital, the role of the leader is as a command in efforts to prevent fraud. Organizational justice, internal control systems, organizational commitment, and leadership style affect fraud. [14] Organizational commitment and leadership morality have a positive effect on the intention to commit fraud.[6]

Incentive systems include poor distribution of incentives and the absence of transparency of services from hospital management. The incentive is a type of compensation received by employees in the form of money as a reward for performance. Good and fair incentives will increase employee motivation to achieve the best performance.

Incentives in hospitals are given in the form of remuneration for hospitals that apply the financial pattern of the Public Service Agency and hospitals that are not Public Service Agency will provide incentives in the form of services. This incentive system must be established by considering the hospital's income, corporate grade, performance targets, and achievements so that employees are satisfied with the work incentives received. The determination of the number of incentives must also be communicated to employees including the formula used so that the openness and objectivity of performance measurement and the incentives received can be understood by all hospital employees. Lack of transparency and employee involvement in developing an incentive system will affect the working climate in the hospital. Rewards for performance are not good if the process of building a fair and objective incentive system is not carried out transparently. This will encourage fraud in health insurance in hospitals. Fraud among clinicians may be due to an imbalance between the health care system and the burden, service providers do not provide adequate incentives, inadequate supply of medical devices, system inefficiency, lack of transparency of health facilities, and cultural factors.[15]

This study showed that there are external factors that contribute to health insurance fraud in hospitals, namely health insurance regulations, health insurance financing system, and the BPJS Health system. Health insurance regulations include dynamic regulations and the availability of the National Guidelines for Medical Services has not been fulfilled and there is no standard for readmission and fragmentation. Regulation has an important role in the management of organizations and systems because it will provide order. Regulation is a set of rules or policies established by the regulator as a common guide that all elements related to the regulation must comply with. There are quite a lot of stakeholders in the NHI program, starting from the central government, local governments, BPJS Health, the community, the business world, and health service facilities. Therefore, the presence of the government as a regulator has an important role in formulating regulations that will guide all stakeholders in carrying out their roles following existing regulations. Unclear or lack of regulation will encourage irregularity in the implementation of the NHI program and have the opportunity to increase the risk of fraud in hospital health insurance. There are still many problems in the implementation of NHI, especially in the early stages of implementation. Problems related to policy and

institutional aspects, program transformation, advocacy and socialization of the NHI program, membership, service infrastructure at health facilities, referral systems, and Human Resources and Capacity Building, aspects of financing, risks of fraud in the implementation of NHI, and the impact of NHI on utilization, participant and provider satisfaction.[16]

The health insurance financing system includes the inconvenience of the financing system and the adequacy of the INA-CBGs tariff calculation. Health Financing is one of the important sub-systems in the National Health System and plays an important role in improving the management of the health service system in Indonesia. The health financing sub-system is the management of various efforts to control, allocate and spend health funds to support the implementation of health development to achieve the highest public health degree. The principles of the health financing sub-system are adequacy, effectiveness and efficiency, fairness, and transparency. The "inconvenience" in the health system causes various parties to make efforts to "save themselves" to survive while participating in the NHI program.[2] It is further argued that the INA CBG's rates are considered low by clinicians and the high workload makes them think about unnatural efforts to defend themselves so as not to lose money. To make matters worse, these clinicians sometimes share their "experiences" to "save themselves". They then apply these experiences in providing health services so that it becomes a culture. The basis for setting tariffs is also still mysterious for most groups, causing dissatisfaction with the system.[2]

The BPJS Health system includes the inconvenience of the BPJS Health system and the BPJS Health system which makes it difficult. As the provider of health insurance, BPJS Health is required to build and develop a good system with health service providers so that an equal partnership system is built between partners and BPJS Health. Moreover, based on the authority possessed by BPJS Health in terms of payments to health facilities which refer to government tariff setting and also making or terminating cooperation contracts with health facilities, make BPJS Health position as if it is above health service facilities. This condition creates discomfort in the relationship between the health insurance system. The non-uniform implementation of BPJS Health policies in the field makes health facilities seem "frustrated" with the existing system. Clinicians are required to comply with administrative procedures so that medical actions can be paid for by BPJS Health. So that in the field sometimes they have to be faced with conditions of "administrative manipulation" to meet the standards for filing claims and tend to sacrifice scientific autonomy and independence of clinicians.

The limitations of this study include, among others, that it was only conducted at two government hospitals, so further research is needed with a larger number of hospitals. In addition, the measurement of the influence of each variable causing health insurance fraud in hospitals has not been carried out in this study. The implications of this research for hospitals and policymakers are to become the basis for implementing improvements to the fraud prevention system in hospitals and for researchers to be the basis for future research in the science of health insurance fraud.

CONCLUSION

Gear Fraud theory is a new theory that was born to explain the causes of health insurance fraud in hospitals. This theory explains that there are two main factors causing health insurance fraud in hospitals, namely internal factors in the hospitals and external factors. Internal factors consist of employee personal motives and hospital governance. Employee personal motives consist of financial motives, behavioral motives, and social motives while hospital governance consists of internal control, revenue targets, leadership, and an incentive system. External factors consist of health insurance regulations, health insurance financing systems, and the BPJS Health system. Internal factors are the main cause and external factors predispose to health insurance fraud in hospitals. These internal and external factors also interact with each other, such as the working mechanism of a gear.

Understanding the theory of gear fraud will help formulate fraud prevention efforts in health insurance programs in hospitals that are more comprehensive and focus on eliminating the causes of fraud.

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RESEARCH ARTICLE

THE COSTS OF MEDICAL CARE FOR COVID-19 PATIENTS: A CASE STUDY IN TURKEY

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ABSTRACT

OBJECTIVE:

This study aims to calculate the medical costs of Covid-19 patients for hospitals based on the severity of clinical care.

DESIGN:

The study was conducted in a hospital in Istanbul/Turkey. A micro-costing approach was performed using historical cost data for one year. All direct and indirect medical inputs were determined in quantities and monetary values for four types of Covid-19 patients in the hospital.

RESULTS:

The analysis calculated the unit cost of an outpatient to be 459,99 ₺, while the cost per day for inpatient to be 1.184,63 ₺, for non-intubated in intensive care unit to be 1.938,11, for intubated in the intensive unit to be 2.393,99₺. The study also indicates that the total cost of a non-intubated patient in intensive care units is 1,54 times higher than the total cost per inpatient. An intubated patient's cost is 2,08 times higher than an inpatient's cost.

CONCLUSION:

This study indicates that Covid-19 patients incur significantly high costs for hospitals. The findings of the study provide empirical data for different types of patients which can be used in clinical management and can help all related governing bodies to plan their actions and make the decisions.

KEYWORDS

Covid-19, hospitalization, health care costs, Turkey

INTRODUCTION

Since it has been declared as a pandemic, there have been over 180 million confirmed Covid-19 cases worldwide. [1] Covid-19 can cause severe respiratory disease and long-term hospitalization. Medical care for Covid-19 patients is complex and costly. Especially, the treatment procedure is getting complex as the symptom severity increases. [2] There is evidence that direct medical costs of symptomatic Covid-19 cases are higher than other infectious diseases. [3] Due to the high number of cases and its complexity, the pandemic put many countries and hospitals' capacity to a severe level. Hospitals in the regions with great numbers of Covid-19 cases had to operate over capacity most of the time. [4] Many hospitals have been affected by the burden of Covid-19 patients. The pandemic has negative impacts on hospitals' revenue cycle, financial operations, and service operations. [5] According to early reports, Covid-19 hospitalizations caused nearly $36.6 billion loses from March to June 2020 in the United States. Hospitals have been also suffering from additional costs caused by Covid-19 treatment such as personal protective equipment (PPE) and costs of front-line workers. American Hospital Association indicated that non-treatment costs for hospitals were $2.4 billion for a period of 4 months. [6]

Turkey has over 5 million confirmed cases so far. Nearly 50.000 people have died due to Covid-19. Ministry of Health reported that the hospitalization rate was %53,1 among all Covid19 patients while %7,8 of them were intubated by the date August 2020. [7] According to the study carried out by Istanbul University Cerrahpasa Medical Faculty and Baskent University, direct medical costs of Covid-19 constituted %2 of total public healthcare expenditure. The burden of the pandemic on the health system for 12 months was calculated as 3.7 billion Turkish Lira. The study also indicated that costs were nearly duplicated for patients with severe symptoms especially those in intensive care units. [8]

All the hospital managers around the world experienced how much a communicable disease can affect their managerial process during the last year. [9] Hospitals need to analyze costs to ensure financial sustainability. This is much more important in pandemic conditions which cause a decrease in hospitals' revenue while an increase in costs Unit costs calculation may be useful in budgeting and allocation resources for Covid-19 medical treatment with the aim of improving the quality and sustainability of medical care. Several papers have studied the costs of Covid-19 treatment around the globe. A few studies analyzed healthcare resource consumption and costs for Covid-19 treatment but did not obtain data from patients' records. [10] Some of the studies focused on the costs of inpatients, [11, 12] while some examined unit costs for different patient categories such as; asymptomatic, mild to moderate symptomatic patients, COVID-19 patients admitted in intensive care units. [13,14,15,16] Also, some studies examine the operating costs in and responses of hospitals to pandemic conditions. [17] However, to the best of our knowledge, no study focuses on the medical costs of Covid-19 treatment in Turkey derived from actual patients' data except for the study conducted by Istanbul University and Baskent University. In this context, this study focuses on investigating the medical costs of Covid-19 patients for hospitals in Turkey. This study aims to contribute to the literature on Covid-19 medical cost in Turkish hospitals by collecting empirical data and providing information on resource consumption for each level of clinical care. Given that each level of clinical care requires different quantities of resource consumption, the cost per patient and day is expected to differ according to patient types. Thus, the current study makes estimations for patients from each clinical level providing detailed input information.

The studies which include real and empirical data on the cost of medical treatment of Covid-19 providing detailed resource consumption information are limited. Although most of the studies provide the total burden of Covid-19 on health systems or hospitals, this study differs from them providing more comprehensive information on inputs for medical care. Even, the study focuses on Turkey, it provides significant findings on types of resources consumed by patients at a different level of care in quantities and monetary values which may be helpful for hospitals from different countries. The study also aims to contribute to practical implications on hospital cost management by providing a helpful tool that can be used by different hospitals to calculate costs of Covid-19 patients.

METHODS

COSTING APPROACH

A micro-costing approach was adopted. The micro-costing method is based on "enumeration and costing out every input consumed in the treatment of a particular patient". This method is useful for studies that aim to examine the

costs of a new treatment method and includes procedure variations. A micro-costing approach enables researchers to go deeper into the case and analyze all the inputs related to medical care and patients. [18] Considering the aim to shed light on resource consumption and medical costs of different types of Covid-19 patients, micro-costing stands out as the most appropriate method. There are many studies on the cost of different diseases [19,20] including Covid-19 [11] which have used a micro-costing approach.

The study was conducted in a private hospital in Istanbul. The historical costs were used for calculations. The data were obtained for 1 year (04.2020-04.2021) The costing process was carried out in three phases. At all phases, face-to-face conversations were carried out with the hospital manager, physicians, clinical managers, and head of accounting departments. A template that includes input variables for each type of patient was designed on Excel software to collect cost data. In the first phase, the types of Covid-19 patients in the hospital were determined. The cost calculation was made for four types: outpatients, inpatients, intubated patients in ICU, and non-intubated patients in ICU. Secondly, relevant inputs that are consumed to provide medical care for each patient type were identified. Thirdly, quantities and monetary values of inputs were calculated. In the identification process of inputs and their quantities, conversations were carried out by physicians and clinical managers. For each type of patient, required inputs including labor force were determined. The time spent by the physician for each type was determined by observing and using a timer. For each type of patient, costs of staff, laboratory and radiology costs, pharmaceuticals costs and costs of medical consumables, personal protective equipment, cost of oxygen, and cost of accommodation were calculated based on the data on quantities and theirs' monetary values.

TYPES OF PATIENTS AND UNITS

Outpatients refer to those who test positive for Covid-19 but do not need medical care in the hospital. They are asymptomatic or mild symptomatic on home-based care. They are given medicine which is provided and compensated by the Social Security Institution and isolated in their own home. Inpatients refer to those who are moderately symptomatic. They are admitted to the hospital for isolated general wards and may need oxygen support. Intubated patients are patients with severe symptoms admitted to intensive care units (ICU). They are under invasive mechanical ventilation. Non-intubated patients are also with severe symptoms but breathing stable just provided oxygen support if it is needed. For the outpatients, the costs were calculated per patient. For inpatients and patients with severe symptoms, the unit is per day (total cost per day- TCPD). We calculated the total cost per patient (TCPP) for inpatients and ICU multiplying the cost per day by the average length of stay.

MEASURING INPUTS

Direct and indirect costs of medical care for Covid-19 were considered separately for four types of patients. All inputs were determined using patient information documents and records of clinical departments. Medical care procedures were observed and examined in outpatient and inpatient departments and intensive care units. These procedures mostly follow the Covid-19 Patient Treatment regulations published by the Turkish Ministry of Health [21]. Considering the treatment procedure, the cost categories of the study are determined as; direct and indirect labor, medical consumables, Covid-19 test kits, laboratory tests, costs of radiological examinations, and accommodation (Table 1).

TABLE 1. COST CATEGORIES FOR COVID-19 PATIENTS.

Cost Category	Inputs
Staffing/Labor	Medical doctors, nurses, anesthetists, medical secretaries
Medical consumables and pharmacies	PPEs, endotracheal tubes, nasal cannula, catheters, hygiene and disinfectants Paracetamol, Azithromycin, Dexamethason, Propofol, Morphine

Laboratory	Costs of labor, amortization and consumables aggregated to calculate per CRP, hemogram, D-dimers, blood gas analysis.
Radiological examination	Costs of labor, amortization and consumables aggregated to determine cost of a CT scan
Oxygen support	Oxygen consumption based on users' information
Accommodation	Patient bed and bed linen, patient monitors, mechanical ventilator, cleaning, laundry, electricity and catering.

Labor/staffing

The data for staffing was obtained on the type of staff which are medical doctors, nurses, medical technicians, and medical secretaries. The direct labor costs consisted of doctors and nurses while indirect costs are the costs of medical secretaries. Technicians refer to laboratory and radiology departments' staff. The costs of technicians were included in the department which they work for and were used to calculate radiological and laboratory costs. Labor costs are calculated by using the data of the human resources department. Staff providing clinical care for inpatients and patients in ICU are medical doctors, anesthetists and nurses. To allocate direct labor cost time spent on a patient in a day determined. Indirect labor costs for patients include the costs of medical secretaries which are allocated using the ratio of total cost divided by the number of patients. Firstly, for inpatients and ICU patients, the total medical staff time in hours and the cost of an hour were calculated. Costs include day and night shifts. Secondly, the time spent by each staff for each type of patient was determined on average based on the information obtained from doctors, nurses and department managers. For example, patients in ICU get 4 visits from medical doctors in a day that makes 4 hours of direct clinical care in a day. Finally, the time allocated for patients and cost for an hour were multiplied to have the labor cost for each patient type (For instance 4 hours * 59, 84=239, 39₺). For outpatients, the total costs of doctors are divided by the number of patients.

Pharmaceuticals and medical consumables

Consumables stand for non-durable items which can be used at most for a year effectively. It includes personal protective equipment (PPE), disinfectant, and hygiene material in the case of Covid-19 patients. PPE includes

medical gloves, medical coveralls, visors and N95 masks. The amount of consumption was determined based on users' information. For example, it was determined that 4 pairs (1 for doctor, 1 for laboratory, 1 for radiology, 1 for PCR test) of gloves were used for one outpatient. For clinical care in a day approximately, 2 N95 masks, 1 gogle, 5 latex gloves, 4 shoe covers, etc. are being used by staff. The costs of coveralls are mostly incurred in inpatient and ICU. Medical consumables also include disposable medical equipment; endotracheal tubes, nasal cannula, catheters which are used for ICU patients once during the care.

The costs of medicines (pharmaceuticals) are included in medical consumables in reported tables (direct cost). Consumed medicines by different types of patients were determined in types and quantities based on information obtained from medical doctors and nurses in charge and Covid-19 Patient Treatment regulations published by the Turkish Ministry of Health. [21] Inpatients in the general ward typically 1 gram paracetamol three times, 500mg azithromycin, and 6 mg dexamethasone once in a day. Intubated patients additionally get propofol for intubation and morphine for sedation and parenteral feeds. Propofol is given 1 mg per kilogram and morphine 10 mg every 4 hours according to doctor orders. The costs of each medical consumable are calculated using purchasing prices obtained from accounting records.

Laboratory and radiological examinations

The total costs of the departments were calculated including direct costs and overheads. Then, unit costs were calculated by dividing total costs by the number of tests. In radiology, the cost of a CT scan was calculated. Outpatients take 1 CT scan, inpatients in general wards and ICU take 2, and intubated patients take 3 CT scans. In the laboratory, the costs of a CRP, a hemogram, and D-dimer

tests which are examined for Covid-19 patients were calculated. Unit costs were transferred by the number of tests performed for the patients. For instance, CRP, full hemogram and D-dimers are carried out for once for outpatients after PCR test. Costs of on CRP, hemogram, and D-dimer make 60₺. Another CRP and hemogram test are carried out for inpatients during care episodes which bring an additional cost of 20₺.

Oxygen support

Nearly half of patients in general wards receive oxygen support 2L/min. Non-intubated patients get 10L/min, while patients with critical disease in ICU 15L/min. The costs of oxygen was determined on average calculations due to difficulty in measuring exact flow. The cost of oxygen per patient in general ward was assumed to be 100 ₺, while it is 225 for a non-intubated and 300 for an intubated patient.

Accommodation

The per-day costs for accommodation were obtained. The costs of accommodation include the cost of the bed, cleaning, laundry, electricity, and catering. The amortization costs of medical equipment such as patient monitors, mechanical ventilators, beds are also included in this section. This cost is valid for inpatient and ICU patients. The cost of a day for accommodation was calculated

using data for mentioned components. The average length of stay was used for allocating costs to patients.

RESULTS

Table 2. outlines the number of patients and length of stay for a year for each type. The total number of Covid-19 patients for a year was 6.242. 20,34 % of patients were inpatients while 14,65% were ICU patients. The highest average length of stay belongs to patients who intubated in ICU.

Table 3 outlines the cost of an outpatient who is asymptomatic or mild symptomatic. This type gets no medical care in the hospital. The costs of these patients mostly consist of labor and radiological costs. The cost of an outpatient is estimated to be 459,99₺. A standard Covid-19 outpatient gets a CT scan after laboratory tests and first PCR and then needs to test negative out of three examinations to be released from home quarantine. Therefore, the PCR costs include the costs of three examinations. Laboratory costs refer to CRP, hemogram and D-dimer examinations before the diagnose. According to results, outpatients mostly incur costs related to PCR test (42,39 %) and radiological examination (26,90 %).

TABLE 2. THE NUMBER OF PATIENTS AND LENGTH OF STAY BY PATIENT TYPES.

Types	Number of patients	Total length of stay (day)	Average length of stay
Outpatients	4057	-	-
Inpatients	1270	10.703	8,43
ICU-intubated	657	5.710	8,70
ICU-non-intubated	258	2059	7,98

TABLE 3. COSTS OF COVID-19 OUTPATIENTS

Inputs		Turkish Lira ₺	% of total cost per patient
Labor costs	Direct	53,33	11,59%
	Indirect	18,94	4,12%
Medical consumables	Indirect	9,72	2,11%
Covid-19 test (PCR)		195	42,39%
Laboratory tests		60	13,04%
Radiological examination (CT)		120	26,09%
TCPP		459,99	100%
Total outpatient cost (TCPP x number of patients for a year		1.866.179,43	

Table 4 outlines the costs of an inpatient who is in general hospital wards. Per-day unit cost for an inpatient is estimated to be 1.184,63₺. This makes a 9.986,431₺ total cost per patient. Inpatients incur higher labor and medical consumables costs. These patients also get oxygen support and incur an accommodation cost. The medical care time spent of inpatient is higher than an outpatient by nearly %55. Total cost of an inpatient in general wards consists of %13,16 labor cost, %10,60 medical consumable costs, %16,46 PCR cost, %20,26 CT scan cost and %25,32 accommodation cost. The cost of a mild symptomatic inpatient differs from outpatient in terms of accommodation and basic oxygen support. When an outpatient just gets an ordinary examination by the physician, an inpatient gets two visits in a day. An inpatient also consumes medicines and some direct medical consumables. They get at least two CT scans. Therewithal, accommodation costs which include laundry and catering incur for an inpatient.

Table 5 and 6 outlines costs for patients in ICU. The costs of ICU patients differ from inpatients because of additional costs especially for labor, medical consumables, oxygen,

and accommodation. The largest share of costs for ICU patients is accommodation (%30,96). Severe patients also incur higher labor costs (%16,53) due to more staff are being involved and more time spent per patient. The costs of medical consumables (%10,2) are higher because of pharmaceuticals (direct cost) and PPE (indirect). %11,61 of the total cost is oxygen for non-intubated patients in ICU.

Intubated patients incur higher medical consumables cost and oxygen costs than non-intubated ones. Pharmaceuticals are important contributors to medical consumables costs. %11,76 of the total cost is the cost of medical consumables. The biggest share is taken by accommodation with %25,06. Additionally, costs of laboratory tests (%10,86) and costs of radiological examination (%15,04) are higher for intubated patients. The average length of stay for intubated patients (8,70) is longer than non-intubated ones (7,98). While a relatively small difference occurs in per day cost, due to longer length of stay, total cost per intubated patient is dramatically higher compared to non-intubated patients.

TABLE 4. COSTS OF COVID-19 INPATIENTS

Inputs		Turkish Lira ₺	% of total cost per day
Labor costs	Direct	117,96	9,96%
	Indirect	37,89	3,20%
Medical consumables	Direct	75,6	6,38%
	Indirect	38,18	3,22%
Covid-19 test (PCR)		195	16,46%
Oxygen		100	8,44%
Laboratory tests		80	6,75%
Radiological examination (CT)		240	20,26%
Accommodation		300	25,32%
TCPD		1.184,63	100%
TCPP (TCPD x average length of stay)		9.986,431	
Total inpatient cost (TCPP x number of patients for a year)		12.682.767,243	

TABLE 5. COSTS OF COVID-19 NON-INTUBATED PATIENTS IN ICU

Inputs		Turkish Lira ₺	% of total cost per patient
Labor costs	Direct	239,39	12,35%
	Indirect	81,06	4,18%
Medical consumables	Direct	151,2	7,80%
	Indirect	46,46	2,40%
Covid-19 test (PCR)		195	10,06%
Oxygen		225	11,61%
Laboratory tests		160	8,26%
Radiological examination (CT)		240	12,38%
Accommodation.		600	30,96%
TCPD		1.938,11	100%
TCPP (TCPD x average length of stay)		15.466,1178	
Total intubated patients cost (TCPP x number of patients for a year)		3.990.258,39	

TABLE 6. COSTS OF COVID-19 INTUBATED PATIENTS IN ICU

Inputs		Turkish Lira ₺	% of total cost per patient
Labor costs	Direct	239,39	10,00%
	Indirect	81,06	3,39%
Medical consumables	Direct	226,8	9,47%
	Indirect	54,74	2,29%
Covid-19 test (PCR)		195	8,15%
Oxygen		300	12,53%
Laboratory tests		260	10,86%
Radiological examination (CT)		360	15,04%
Mechanic ventilation		77	3,22%
Accommodation.		600	25,06%
TCPD		2.393,99	100%
TCPP (TCPD x average length of stay)		20.827,71	
Total not-intubated patients cost (TCPP x number of patients for a year)		13.683.805,47	

Graph 1 indicates the costs difference between patient types. The total cost per inpatient is 21,71 times higher than an outpatient. The total cost of non-intubated in ICU is 1,54 times higher than an inpatients cost. An intubated patient's cost is 2,08 times higher than total cost per inpatient.

GRAPH 1. COST OF COVID-19 PER PATIENT FOR EACH TYPE OF PATIENTS
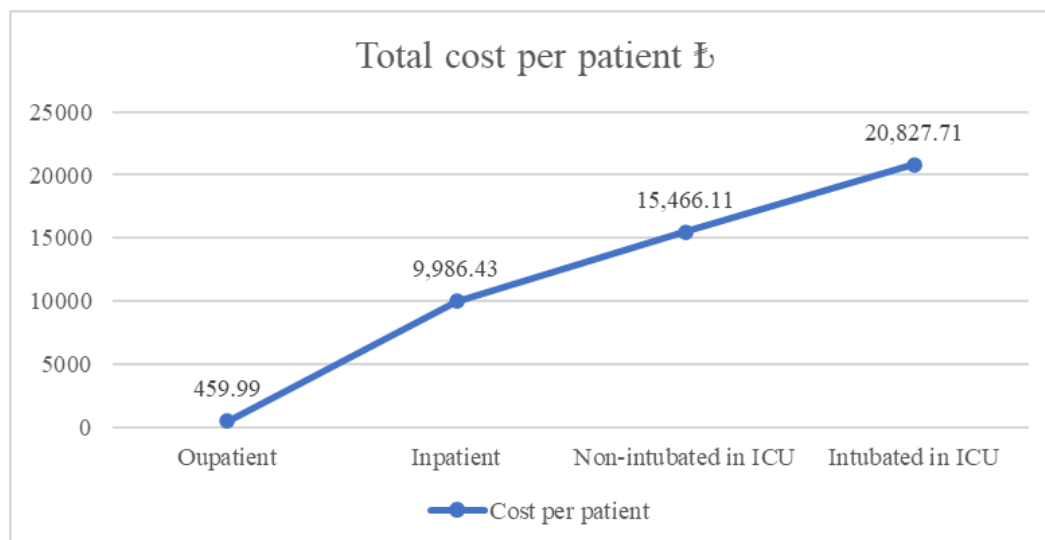
DISCUSSION

The Covid-19 pandemic causes significant challenges to hospitals in terms of resource consumption and cost management. Governments and hospitals have to make difficult decisions on resource allocation. Empirical data is substantial for decision-making. Deci-sion-makers could benefit from cost studies on Covid-19 medical care to be able to make decisions precisely. This study provides a deeper understanding of medical care processes and resource consumption. To the best of our knowledge, there is a limited number of studies on the medical costs of Covid-19. Although these studies provide significant findings for further studies and decision makers, a few provide empirical data. In a study that calculated unit costs for asymptomatic patients and patients with mild-to-moderate COVID-19 disease under home-based care were in Kenya, it has been found that COVID-19 case management costs are substantial for all treatment categories and in-crease as severity increases. [13] A study that considered only direct medical costs of Covid-19 in South Africa indicated that the highest average daily cost was for ICU admissions. [11] A study in Saudi Arabia also outlines those admissions to general medical wards incur fewer costs than admission to the ICU. [22]

In the current study, an estimation for four types of patients has been conducted using a micro-costing approach in a private hospital. The study provides empirical evidence on the costs of Covid-19 patients' medical care processes. Unit costs for the different types of asymptomatic, moderately and severely symptomatic patients are presented. Given that the severity of clinical indicators varies by patient type, different types and quantities of inputs are used for clinical care. As much as possible inputs which are related to medical care for patients are provided in monetary values based on available data. The results show that cost of medical treatment increase as severity increases. The highest medical cost per patient was estimated for ICU patients. The cost of a day for an intubated patient was 2.393,99 when the average length of stay was 8,70. That makes a total of 20.827,71 cost per patient in ICU. This amount is 2,08 times higher than the cost per inpatient and 45,27 times higher than the cost per outpatient. The costs of accommodation and medical consumables especially come to the front for ICU patients. This means the cost of Covid-19 is mostly incurred from hospitalization.

The cost of medical care for Covid-19 is not an important topic only for hospitals. The burden of the cost related to Covid is also affecting the social health insurance system in Turkey. Nearly all expenses are covered by General Health Insurance which is under Social Security Institution regardless of the care is provided in private or public hospitals. As the severity of cases increases, the medical costs are increasing the burden on the health and social security system. Therefore, this type of study can help all

related governing bodies to plan their activities and to make decisions.

The current study is not without limitations. The study has three main limitations. First, an exact determination for some inputs was not possible due to their unstandardized use. For example, PPE and disinfectant costs and oxygen are mostly determined based on users' information. Second, pharmaceutical consumption was calculated mostly based on information obtain from caregivers. Finally, the study presents findings for the private healthcare sector in Turkey. The costs may differ in public hospitals.

CONCLUSIONS

In this hospital-based Covid-19 cost calculation study, costs of outpatients and hospitalized patients were examined in a broad framework. The study provides useful insights into the costs of treatment of Covid-19 in Turkey providing detailed information on consumed inputs for the treatment. Following conclusions and recommendations can be drawn from the results of the study;

- Treatment for Covid-19 gets complicated so that requires more medical consumables as the level of care increases. Healthcare providers need to periodically analyze resource consumption to ensure financial sustainability.

- The cost of treatment increases dramatically as the severity of cases increases. This highlights the importance of preventive approaches for Covid-19. It is recommended for hospitals, policy, and decision makers to enhance the preventive public health programs.

- Calculating costs per patient is a hard effort in hospitals due to complex and insufficient data. It is recommended for hospitals to establish an effective cost accounting system in their accounting mechanism to be able to track costs easily.

- The limitations of the study constrict the recommendations to a narrow-scoped implication area. Further studies may benefit from data from this study to conduct more comprehensive studies including public hospitals or health systems as a whole.

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RESEARCH ARTICLE

CROSS SECTIONAL STUDY ON THE ASSOCIATION OF DAILY SPIRITUAL EXPERIENCE ON MENTAL WELL BEING DURING COVID 19 AMONG THE AFRICAN STUDENTS IN INDIA

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ABSTRACT

OBJECTIVES:

The current research focussed to explore the association of daily spiritual experience on the mental well- being of international students hails from Africa and pursuing studies in various higher education institutions in India. The research also tried to explore whether age and gender plays a significant role in the mental well- being of the respondents.

DESIGN:

The study is an exploratory cross-sectional in nature. The research tool comprised of the Daily Spiritual Experience Scale (DSES) and Warwick-Edinburgh Mental Well-being Scale (WEMWBS) along with the demographic details. Post reliability and validity tests established scales are used to study the variable in the research. The data was analysed using Smart PLS SEM 3.3.2.

SETTING:

The respondents comprise of international students hails from Africa and pursuing various undergraduate, post graduate and PhD courses from various institutions at Bhopal, Delhi, Mumbai and Rajasthan in India. The respondents include a cohort of 102 respondents who gave consent to be part of the study during first week of July to first week of August 2021 and were selected through purposive sampling technique.

MAIN OUTCOME MEASURES:

The research measures the association of daily spiritual experience and mental well- being during pandemic and also the coping strategies used by the respondents.

FINDINGS:

The research report shows an insignificant relation of gender to the mental well-being whereas age reported a significant association. A significant association is reported between daily spiritual experience and mental wellbeing of the respondents amidst pandemic situation.

CONCLUSION:

Pandemic outbreaks influences the mental well-being of individuals specially when they are away from the social support system. Hence counselling services and other interventions to cater to the needs of students requires a serious deliberation at the policy level.

KEYWORDS

mental well-being, daily spiritual experience, coping mechanism

INTRODUCTION

COVID 19 outbreak has created a havoc across the world specially students. Covid-19 has radically changed the educational landscape for millions of students in the sector of higher education around the world. The international students have their own set of unique challenges such as going back to their native country, managing financial constraints, covid management, managing daily needs, shelter are few among them. [1] The swift changes, along with the chronic stress of the pandemic, may pose mental-health challenges, particularly if students suffer from pre-existing mental-health issues. [1] The University students are ever more recognized as a vulnerable section, suffering from higher levels of mental health issues compared to the general population. Therefore, when the nature of their educational pattern drastically changes the burden on the mental health of this community is furthers amplified. [1]

The COVID-19 pandemic has fetched the focus of mental health needs and issues of various affected populations. It is known that the prevalence of epidemics heightens or creates new stressors including fear and worry for oneself or loved ones, constraints on physical movement and social activities due to quarantine, and sudden and radical lifestyle changes. A topical review of virus outbreaks and pandemics documented stressors such as infection fears, frustration, boredom, inadequate supplies, inadequate information, financial loss, and stigma. [2]

Literatures also shows low levels of mental well-being can reduce motivation, diminish concentration and hinder academic attainment. [3] Similarly other studies reported, low levels of student mental well-being can also be a major factor in self-harm and suicide ideation [4]. Previous studies suggest that factors such as race, gender, age, and financial strain are likely associated with student mental well-being. [5,6] Isolation and conflicts within the home was also reported in literature. The pandemic has profoundly changed the way of life in society, starting from the need for "social distancing" even among close relatives. [7] Students experienced the pandemic's impact worldwide, many campuses closed, while courses moved to online

Platforms. [36] A cross-sectional, nation-wide study of students in China that acute stress (34.9%), anxiety (21.1%) and depressive symptoms (11.0%) were prevalent during the pandemic. Mental health problems were related to fears of being infected and having decreased social support. [37] Using the 7-item Generalized Anxiety Disorder (GAD-7) scale it was found that 24.9% of college students experienced elevated levels of anxiety because of COVID-19's impact on their academic activities, daily lives (social distancing) and economic prospects. [38]

Research on Spiritual health during COVID 19 among the higher education students showed that the following are factors regarding spiritual health of students, they are in terms of developing worship of the Creator, developing oneness with God, developing peace with God, developing joy in life, developing prayer life, developing infer peace, developing respect for others and developing kindness towards other people [35].The activities, particularly of a religious nature, made it possible to reduce the physical distances imposed by forced isolation without putting people's health at risk [8,9], helping to reduce the negative effects of isolation, particularly in older people. [10,11] For many people, spiritual and religious practices give meaning, purpose and constitute a supportive community. [12,13] By spiritual needs we mean everything that refers to the need to find meaning, value in one's life, peace and a sense of connection. These needs are not necessarily exclusively religious, even those who do not have a religious faith still refer to belief systems that provide feelings of meaning and purpose [14] which in this period of the COVID-19 pandemic seem to assume a role and an even deeper meaning in relation to the bewilderment that people are confronted with in the face of such a pervasive, disruptive event creating fragility, fear and daily uncertainties.

OBJECTIVES

With this background the study tried to compare and find the divergence between daily spiritual experience and mental well-being among the students from African countries and mental well-being also across different age groups and gender. It tries to understand the challenges

faced by the respondents and coping mechanisms adopted by them amidst this crisis situation as they are away from the family support system.

RESEARCH METHODS

Cross-sectional data were collected through web-based questionnaires from the students' hail from African countries and pursuing various undergraduate, postgraduate and PhD course from higher education institutions in India located at Bhopal, Delhi, Rajasthan and Mumbai. Purposive sampling was used to invite students to complete the questionnaires from first week of July to first week of August 2021 when the alarm for delta variant, third wave hitted India. The researcher received 110 responses and excluding the invalid and repeated entries 102 were analysed PLS SEM 3.3.2. [15]

TOOLS OF DATA COLLECTION

Standardised tools on mental well being and daily spiritual experience were administered. The tool comprised of four sections such as demographic details, mental well being, daily spiritual experience and coping strategies used to manage the life situation during pandemic. The Daily Spiritual Experience Scale (DSES) developed by [16] is a 16-item self-report measure designed to assess ordinary experiences of connection with the transcendent in daily life. It includes constructs such as awe, gratitude, mercy, sense of connection with the transcendent and compassionate love. It also includes measures of awareness of discernment/inspiration and a sense of deep inner peace. The Warwick-Edinburgh Mental Well-being Scale (WEMWBS) comprises of 14 items of mental well-being covering subjective well-being and psychological functioning, in which all items are worded positively and address aspects of positive mental health. [17]

TABLE 1 DEMOGRAPHIC DATA OF THE RESPONDENTS

Sl No	Frequency		Total
Age	(25 – 40)- 17	(26-35)- 85	102
Gender	Males- 56	Females- 62	102
Education	Completed UG – 26 Completed PG -22	Pursuing UG- 28 Pursuing PG-14 Pursuing PhD - 12	102

FIGURE 1 PRELIMINARY CONSTRUCT OF THE STUDY
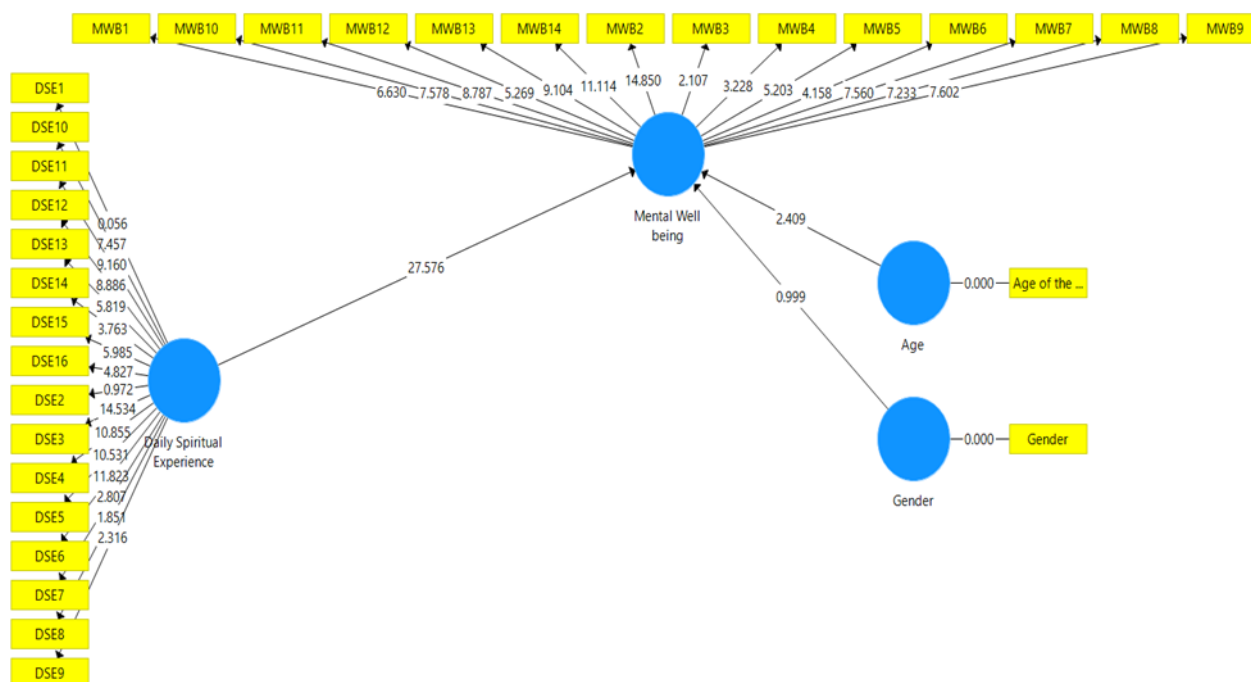
FIGURE 2 FINAL CONSTRUCT OF THE STUDY
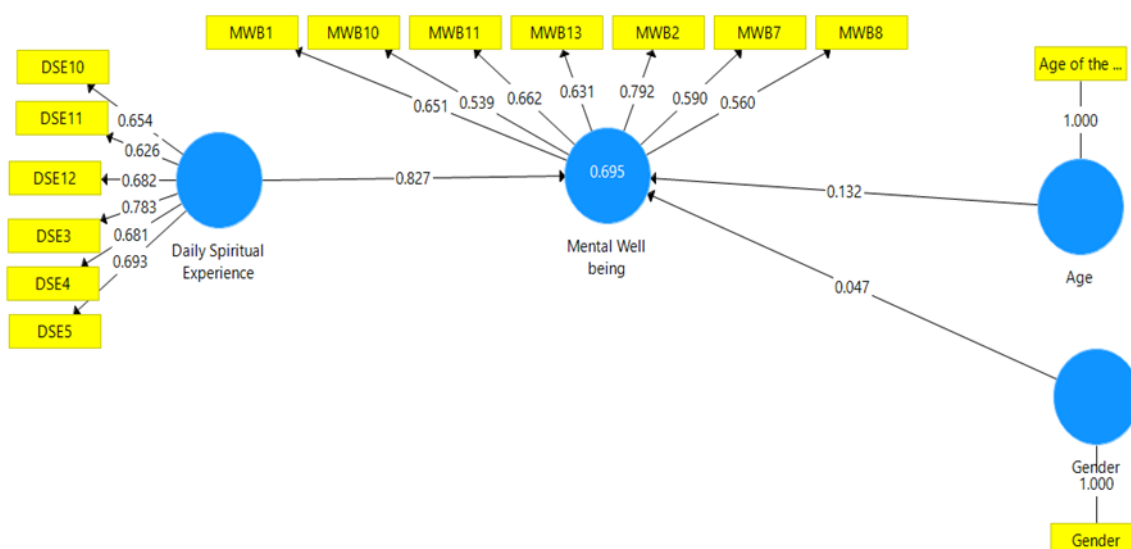
HYPOTHESES

H1 – Daily spiritual Experience is significantly corelated to mental well being

H2- Age is significantly corelated to mental well being

H3- Gender is significantly corelated to mental well being

The study is based on two constructs mental well-being and daily spiritual experience. The two constructs of the topic under studyhad a total of 30 indicators. After preliminary analysis the reliability and validity analysis items were conducted and the items with loadings<.50 were removed. [18]

Based on the chronbach alpha scores of MWB and DSE is greater than the threshold value of 0.7 and at the same time a closer look at other reliability analysis method pf Rho A, Composite reliability and AVE the scores are as per the stated limits as stated by Hair et al. [19] All the variables under the study met the stated criteria of acceptability. As such the constructs are meeting the reliability test and further analysis was commenced. The value as per the test of Dijkstra and Henseler's rho A are in accordance with the limit stated that is higher than 0.6. [20] As the values of AVE are under the limit generally accepted that is 0.5 the results show that convergent validity exists. Average Variance Extracted (AVE) is higher than 0.5 but we can accept 0.4. Because Fornell and Larcker stated that if AVE is less than 0.5, but composite reliability is higher than 0.6, the convergent validity of the construct is still adequate. [21] The discriminant validity of the study was undertaken to analyse that the constructs under study are different from each other and on the basis of which further statistical analysis can be undertaken or not. Discriminant validity analysis was done by Fornell and Larcker criterion [21]and HTMT criterion, the results of which are presented in the tables given below. The figures showed that the constructs under study are different to each other and not overlapping.

TABLE 2 RELIABILITY TEST

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
MWB	0.751	0.760	0.825	0.406
DSE	0.777	0.782	0.843	0.474

TABLE 3: VALIDITY TEST DISCRIMINANT ANALYSIS – FORNELL & LARCKER

	MWB	DSE
MWB	0.637	
DSE	0.822	0.689

TABLE 4: VALIDITY TEST – DISCRIMINANT ANALYSIS HTMT

	MWB	DSE
MWB		
DSE	**1.068**	

TABLE 5: VIF

	VIF
DSE10	1.610
DSE11	1.334
DSE12	1.505
DSE3	2.164
DSE4	1.616
DSE5	1.970
MWB1	1.525
MWB10	1.364
MWB11	1.461
MWB13	1.555
MWB2	1.784
MWB7	1.437
MWB8	1.456

TABLE 6: PATH COEFFICIENT

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Age -> Mental Well being	0.133	0.132	0.055	2.409	0.016
Daily Spiritual Experience -> Mental Well being	0.820	0.835	0.03	27.576	0.000
Gender -> Mental Well being	0.059	0.06	0.059	0.999	0.318

TABLE 7: TOTAL EFFECT

	Original Sample (O)	Sample Mean (M)	T Statistics (|O/STDEV|)	P Values	2.50%	97.50%
Age -> Mental Well being	0.133	0.132	2.409	0.016	0.026	0.239
Daily Spiritual Experience -> Mental Well being	0.82	0.835	27.576	0	0.772	0.891
Gender -> Mental Well being	0.059	0.06	0.999	0.318	-0.072	0.165

From the table 6, it is evident that Age influences the Mental Well-being (P ≤ 0.05) and Daily Spiritual Experiences also effect the Mental Well-being (P ≤ 0.05). In the unprecedented situation of COVID 19 Pandemic, the respondents who are away from their native place and family support system tried to find peace through spiritual experiences. Literature also supports the finding stating that students are trying to find peace through connecting with the creator [35].

TABLE 8: R2

	R Square	R Square Adjusted
MWB	0.695	0.686

TABLE 9: MODEL FIT

	Saturated Model	**Estimated Model**
SRMR	0.10	0.10
d_ULS	1.327	1.327
d_G	0.518	0.518
Chi-Square	257.815	257.815
NFI	0.565	0.565

A rule of thumb is that the SRMR should be less than .05 for a good fit (Hu & Bentler, 1995) [22], whereas values .05 <SRMR≤ .10 may be interpreted as acceptable Schermelleh et al 2003 [23]. So, the present research on the basis of previous literature accepts the SRMR value to validate the goodness of fit.

COPING STRATEGIES TAKEN TO MANAGE FEAR AND ANXIETY

The respondents shared that although counselling support was offered by the government, but they used alternative ways to manage their life in India amidst the pandemic. The respondents shared that government support was not provided to the international students from Africa in terms of supply of commodities, facilitate their travel back to native place or any enquiry to understand the needs and challenges. Nevertheless, the respondents found peace and harmony with help of peer support and maintaining interaction with family members frequently through online platform. They received help from church, family and their own community. The below given figure depicts the coping strategies used by the respondents.

FIGURE 3 COPING MECHANISMS ADOPTED BY THE RESPONDENTS TO MANAGE COVID 19 SITUATION
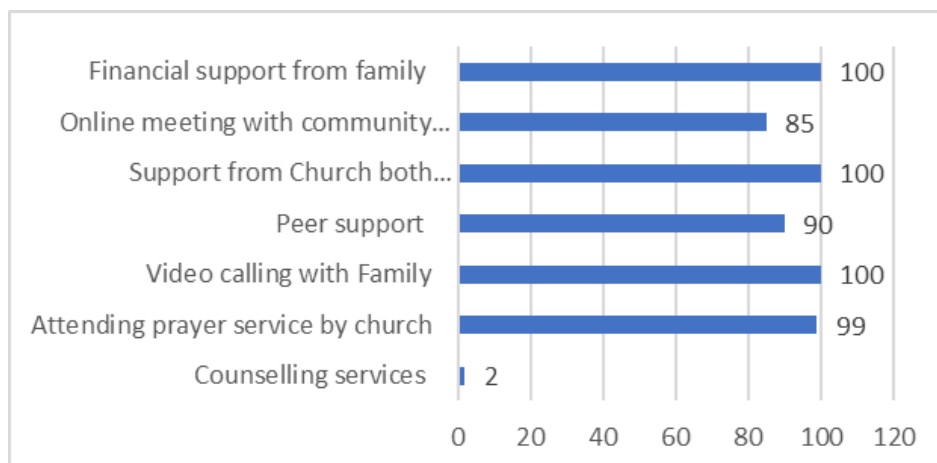
DISCUSSION

This research was carried out during the beginning of third wave alarm of delta variant in India and tried to explore how daily spiritual experience influence the mental well being of respondents who are far away from their family. The table 5 & 6 manifested that, since the P ≤ 0.05, Daily Spiritual experience is significantly corelated to mental well being and age is significantly corelated to mental well-being. Hence H1 and H2 are validated. In case of H3, the P >.05 the significance could not be proven. Finally, just as it was also found in the literature [24,25,26,27,28] that there is a relationship between spiritual well-being and mental health. Hence the present study in in harmony with the above literatures. Mental health, on the other hand, appears to be affected to a greater extent by spiritual well-being and to a lesser extent by gender. These data are confirmed by previous research which highlighted how spirituality and religious practices are a protective factor and closely connected to physical and mental health. [24,27,28]

In this regard, the consideration of spiritual needs is necessary to provide a holistic and people-centered intervention. [29] In a certain sense it is precisely at the moment of greatest difficulty that the need for support in spiritual terms becomes stronger, in the hope of finding comfort in one's faith and beliefs. Very often, however, we are faced with inadequate preparation in responding to this type of need [30]. In fact, the importance of training health professionals so that they possess the skills to identify and support the spiritual discomfort of patients is increasingly evident. [31] A distress which can lead to suffering, a state of anguish due to not being able to feel meaning in life in particular adverse moments, which in some way undermines personal identity. [32,33]

The study also explored the coping mechanisms adopted by the respondents amid the pandemic. Central Government of India had taken many initiatives to mitigate the mental health issues of general public. However, the subjects under the study did not avail those services as they had explored many other ways to lessen the fear factor (Figure No. 3). It evinces that most of them (N=100) found respite when they were constantly in touch with their family members through video call, survived from the financial support received from their own family and the aid received from church. Attending prayer service helped the respondents a lot to revive mental well being (N=99),

support from the peer group (N=85) and attending online prayer service offered by the church also facilitated internal peace and harmony (N=99) as reported by the respondents.

Based on the above results the research recommends the attention of government functionaries to help the international students to manage their life during crisis time. Internationalization of education which is one of the foci of NEP 2020 could be materialized effectively only by taking into account the need of foreign students. Initiatives taken at the best interest of the international students may pave way for many cross-country educational initiatives. The study also recommends to conduct an exploration on diverse areas to identify the needs and problems of students hail from other countries.

CONCLUSION

COVID 19 created a devastating condition in many parts of the world and the turmoil created affected millions. Amidst this situation all were confined to their own dwelling and disconnected with their families created discomfort, fear and stress not only because of the contagion but also due to the financial constraints and availability of commodities. Thus, the research concludes with the findings that daily spiritual experience did influence the mental well being of the respondents. Irrespective of the services rendered by various organizations, apparently individuals feel better mental well being in the strong bond with God Almighty. Age is also a significant factor which influences the mental well-being whereas gender is not playing a significant role. Addressing psychosocial and spiritual needs can really contribute to the improvement [34] in the quality of life and well-being of individuals, especially at this unprecedented time.

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ACCEPTABILITY AND WILLINGNESS TO PAY FOR INFLUENZA VACCINATION AMONG HEALTHCARE PROFESSIONALS IN VIETNAM

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ABSTRACT

BACKGROUND:

While Vietnam's Expanded Program on Immunization does not cover influenza vaccines, people must pay out-of-pocket for influenza vaccination. Healthcare professionals have a high risk of contracting influenza, but their vaccination rate is low.

OBJECTIVE:

To examine the willingness to pay (WTP) for influenza vaccination among healthcare professionals in Vietnam. It also recommends financing sources for influenza vaccination among healthcare professionals and determines possible measures to expand vaccine coverage.

METHOD:

We interviewed 130 healthcare professionals in a national hospital in Hanoi in July 2021. We used Andersen's behavioral Model (ABM) as an initial approach. The double-bounded dichotomous-choice questions were used to determine WTP for influenza vaccination among the target group. Collected responses were coded and analysed through IBM SPSS version 20 for descriptive, chi-square analyses.

RESULTS:

Most of the healthcare professionals who responded to this study were female with 75.4% of the total 130 respondents. The mean age of participants was 34.08 years old. The average maximum WTP for influenza vaccination services was 357.57 VND (USD 15.3). Most of the participants reported that individuals should pay a part of the cost, and four-fifths reported they believed that the government and medical insurance should subsidize the service (80.8% and 85.4%). The Chi-square test showed that there was a significant association between perceived severity and history of influenza vaccination with the WTP, $X^2(1, N=130) = 4.18, p = 0.04, X^2(1, N=130) = 7.81, p = 0.005$, respectively.

CONCLUSION:

The WTP for influenza vaccination among healthcare professionals was found relatively high. Suggesting that price is not a primary barrier. The government and medical insurance were believed to be the potential agencies for improving

vaccination uptake as these agencies were expected to be the subsidized actors. Other health interventions such as influenza literacy and communication methods are also needed to expand vaccine coverage.

KEYWORDS

INTRODUCTION

Influenza (flu) is a disease caused by the influenza virus. When infected with the influenza virus, people will develop fever, cough, sore throat, headache, muscle pain, sheer tiredness, and runny nose. [1] It transmits through droplets from ill people when they cough, sneeze, or talk, so the flu quickly spreads. Most people who get flu will recover within a few days to less than two weeks, but some will develop complications like sinus and ear infection, inflammation of the heart and brain. [1]

Influenza virus infections are one of morbidity and mortality burden worldwide. According to the World Health Organization, influenza epidemics cause about 3-5 million severe illness cases and about 290,000 to 650,000 respiratory deaths each year. [2] People of all age groups can infect with the influenza virus. However, some groups have a higher risk for developing severe complications when getting flu, such as children under five years old, adults 65 years and older, adults with chronic health conditions, pregnant women, and health care workers. [2] The highest mortality rates of flu were estimated in sub-Saharan Africa (2.8-16.5 per 100 000 individuals), south-east Asia (3.5-9.2 per 100,000 individuals) [3]. One national survey in Vietnam showed that 22 % of patients presenting with ILI were influenza-positive. [4] Among them, 9,3 % reported as hospitalized, of which 19% were influenza positive. [4]

The influenza vaccine is the most effective way of reducing the morbidity and mortality of flu. Vaccination is vital for high-risk groups that are easy to develop severe complications from influenza. Healthcare professionals are responsible for providing health care treatment and advice for patients. It means that they contact directly with their patients and be put in a high-risk environment for getting the influenza virus. However, this population's acceptance and vaccine uptake rate is still low. [5-8]

Some studies have examined factors affecting the acceptability and willingness-to-pay (WTP) for influenza vaccine in several subjects, including the woman of childbearing age in Vietnam. [9] the general population in China. [10] However, little is known about the acceptance of WTP for influenza vaccine among healthcare professionals. In 2011, the Ministry of Health (MOH) Vietnam legislated seasonal diagnosis and treatment guidelines. HCWs were identified as one of high risk of infection and recommended to be vaccinated annually. [11] However, Vietnam's expanded program on immunization (EPI) does not cover the influenza vaccine. Moreover, social health insurance also does not include vaccination services in the benefit packages. To vaccinate against flu, Vietnamese people pay USD 5,2-7,8 for local vaccines [12] and around USD11,9-14,4 for the imported vaccine. [13] On the other hand, the average cost of ILI treatment in Vietnam was USD 88.09 per case for all age groups. [14] We can see that vaccination programs could help reduce the economic burden of influenza illness. However, there is no studies that examined healthcare professionals' WTP for influenza vaccination in Vietnam.

Andersen's behavioural model of health services use (ABM) [15, 16] is applied in various studies on health service utilization. This model provides a framework for describing and understanding individuals' decisions to use health care services, including vaccination. [17] The dependent variable in this study, the willingness-to-pay for influenza vaccination, is considered a health care utilization, like other studies. [18, 19] The independent variables included three factors: predisposing, enable, and need factors. Predisposing factors include sociodemographic characteristics like age, gender, occupation, and education. Enabling factors refer to resources for accessing health services (such as health insurance, availability of service, etc.). Need factors are about people's perceived needs to access healthcare services.

Therefore, we conducted this research to determine the acceptability and WTP for influenza vaccination and factors associated with the willingness to pay for influenza vaccination among health care professionals. It also recommends financing sources for influenza vaccination among healthcare professionals and determines feasible measures to expand vaccine coverage.

METHODOLOGY

STUDY DESIGN AND AREA

We conducted a rapid assessment among healthcare professionals at the National Hospital for Tropical Diseases in Vietnam in July 2021. This hospital focuses on infectious disease treatment, such as influenza, COVID-19. Therefore, it is essential to maintain their health through an influenza vaccination program. So, understanding healthcare professionals' acceptability and willingness to pay for this vaccine to increase the vaccine uptake could be beneficial for social health protection in Vietnam.

TARGET POPULATION

The healthcare professionals currently working in the hospital, over 18 years old, cognitively healthy, were eligible for this study, and the exclusion criteria were refusing to participate. The healthcare professionals in this study were doctors, nurses, technicians, and pharmacists.

MEASURES AND INSTRUMENT

We developed a structured questionnaire as an instrument in this study. First, the questionnaire was written in English; then, it was revised and translated into Vietnamese by a language expert.

The final version of the questionnaire was divided into five sections:

1. The first sections included questions about socio-demographic information of participants such as age, gender, living area, education level, occupation, maternal status, and general knowledge about the influenza vaccine.

2. The second section asked participants about enabling factors such as their monthly income, awareness about influenza vaccination, and the sources of information and encouraging factors they received.

3. The third section was about needs factors, which included participants' self-ranking health status, perceived needs, the experience of influenza

vaccination, and the reason for getting or not getting the influenza vaccine.

4. The fourth section asked about the acceptance and WTP for influenza vaccination. We used double-bounded dichotomous-choice questions to ask how much the participants would pay for one flu shot. The initial price in our study was 200,000 VND (~USD 8,6, 2021 exchange rate from The State bank of Vietnam) which was adapted from another study in Vietnam [9]. The researcher asked the participant whether they were willing to pay 200,000 VND for one dose of influenza vaccine. Then, the double bid and half bids were then asked following the "yes" and "no" responses, respectively. Lastly, the participants will be asked an open-ended question about the maximum price they can pay for influenza vaccination.

5. The fifth section is about participants' thoughts on the responsibility of individuals, medical insurance, and government in terms of paying for influenza vaccination. They also answered about their expectations in financial support from the medical insurance and government.

PROCEDURES

Before data collection, the researcher asked permission to collect data from the National Hospital for Tropical disease. Then, the researcher went to the hospital and interviewed the eligible participants based on inclusion and exclusion criteria. The participants were randomly selected based on the list of healthcare professionals in this hospital.

STATISTICAL ANALYSIS

The data were coded and analyzed using IBM Statistical Packages for the Social Sciences (version 20).
Descriptive statistics were calculated to understand the participants' sociodemographic characteristics and the percentage of influenza vaccine uptake and WTP.
Chi-square test of independence was performed in our study to find factors affecting the WTP for influenza vaccination.

ETHICAL APPROVAL

The Institutional Review Board, Institute for Population and Social Research, Mahidol University approved the research protocol, with a certificate of approval number 2021/06-136 in July 2021. The researcher explained the objectives of the study with potential risks and benefits for the participants. All the participants of the respondents were also identified as confidential. Participants were interviewed at the hospital in a private area after giving written consent.

RESULTS

GENERAL CHARACTERISTICS OF PARTICIPANTS

The total response rate in this study was 76,5 % because there were 130 respondents out of 170 healthcare professionals who were interviewed. Therefore, the final sample size used for analysis was 130. The socio-demographic characteristics of participants were shown in Table1. More than three-quarters of the participants were female. The participants' age ranged from 22 to 63 with a mean age of 34.8 years old ($SD = 7.76$). There were two-third of the participants live in an urban area. The participants who had university degrees accounted for 46.9 %, followed by the college with 30.8 %. The largest part of participants was nurses, which was 42.3 %.

The dominant part of participants were married (76.9 %) and 59.2 % of families had four to five members. Most of the participants knew the priority group for influenza vaccination (90%), while 43.8 % of them knew vaccine price. The family which had an income from 15 to 20 million VND accounted for 65.4 %.

TABLE 1. SOCIODEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS (N=130)

Baseline Characteristics	n	%
Age group		
From 21 to 30 years old	49	37.7
From 31 to 40 years old	62	47.7
Over 41 years	19	14.6
Mean = 34.8, SD = 7.76, Min = 22, Max = 63		
Gender		
Male	32	24.6
Female	98	75.4
Living area		
Urban	91	70
Rural	39	30
Education		
College	40	30.8
University	61	46.9
Postgraduate	29	22.3
Occupation		
Doctor	45	34.6
Nurse	55	42.3
Other (Technician, Pharmacist)	30	23.1
Marital status		
Married	100	76.9
Other	30	23.1
Family member		
≤3	47	36.2
4-5	77	59.2
≥6	6	4.6

Baseline Characteristics	n	%
Mean = 3.71, SD = 1.023, Min = 1, Max = 8		
Knowing vaccine price		
Yes	57	43.8
No	73	56.2
Know priority group of influenza vaccination		
Yes	117	90
No	13	10
Monthly household income (VND)		
≤ 15.000.000	13	10.0
15-20.000.000	85	65.4
≥ 20.000.000	32	24.6
Mean = 20.57, SD = 7.486, Min = 8, Max = 50		

ACCEPTANCE OF INFLUENZA VACCINATION AMONG HEALTHCARE PROFESSIONALS

The participant's health status, perceived needs, influenza vaccine uptake, and the reasons for getting or not getting the influenza vaccine were presented in Table 2. The majority part of participants showed their acceptance of influenza vaccination (95.4 %) which mean that they will vaccinate against flu if the vaccine is free. The participants who perceived that they were susceptible to influenza virus and flu as a severe illness were 76.9 % and 63.8 %, respectively. While 67.7 % of them reported an influenza-like illness in the past, only 31.5 % were vaccinated influenza vaccine in 2020. The most common reason for getting an influenza vaccine was self-protection (35.7%), and the most common reason for not getting an influenza vaccine was influenza is not severe

TABLE 2. ACCEPTANCE, AWARENESS OF INFLUENZA VACCINATION AND THE REASONS FOR GETTING OR NOT GETTING INFLUENZA VACCINE (N=130)

	n	%
Self-ranking health status		
Excellent	18	13.8
Good	89	68.5
Fair	23	17.7
Poor	0	0
Perceived susceptibility		
Yes	100	76.9
No	30	23.1
Perceived Severity		
Yes	83	63.8
No	47	36.2
History of Influenza-like illness		
Yes	88	67.7

	n	%
No	42	32.3
History of Influenza vaccination		
Yes	41	31.5
No	89	68.5
Acceptability of influenza vaccination		
Yes	124	95.4
No	6	4.6
Reasons for vaccinating		
Self protection	40	35.7%
Protect family/colleagues	30	26.8%
Protect patients	13	11.6%
Afraid of contracting the influenza virus	18	16.1%
Experienced influenza	11	9.8%
Reasons for not vaccinating		
(multiple-choose items)		
Never get influenza	18	13.7%
Influenza is not serious	34	26.0%
Acquire immunity from work	33	25.2%
Natural infection provides better immunity	6	4.6%
Afraid of vaccine side effect	5	3.8%
The vaccine is not effective	4	3.1%
Lack of time	18	13.7%
Vaccine shortage	1	0.8%
Difficult to access	0	0
Other	12	9.2%

WILLINGNESS-TO-PAY FOR INFLUENZA VACCINATION

Table 3 shows the participant's WTP for influenza vaccination. Among 130 participants, 116 (89.2%) reported that they were willing to pay for the influenza vaccine. Over 80% of them were willing to pay for this vaccine at equal or higher than the initial price (200,000 VND). The mean and median of the maximum amount of WTP for influenza vaccination were 357.57VND (USD 15.3) and 275.000 (USD 11.8), respectively.

RECOMMEND FINANCING SOURCES FOR INFLUENZA VACCINATION

Almost all participants (92.3 %) thought that they should participate in paying for influenza vaccination. Otherwise, most of them also agreed that medical insurance (85.4 %) and government (80.8 %) are responsible for paying for influenza vaccination services. Over 90% of them want to receive financial support from medical insurance and the government. In which, there were 34.6 % want to receive fully subsidized.

FACTORS AFFECTING WTP FOR INFLUENZA VACCINATION

There was no association between socio-demographic factors such as age, gender, education, occupation, and household monthly income with the WTP. The table showed that there was a significant association between perceived severity and history of influenza vaccination with the WTP, $X2(1, N = 130) = 4.18$, $p = 0.04$ and $X^2(1, N = 130) = 7.81$, $p = 0.005$, respectively.

TABLE 3. THE WTP FOR INFLUENZA VACCINATION

	N	%
WTP		
Yes	116	89.2
No	14	10.8
Total	130	100
Maximum amount of WTP (VND)		
< 200.000	20	17.24
200.000-400.000	68	58.62
> 400.000	28	24.14
Total	116	
Mean = 357.57, Median = 275.000, SD = 246.877, Min = 50.000, Max = 1.000.000		

TABLE 4. RECOMMEND FINANCING SOURCES FOR INFLUENZA VACCINATION (N=130)

	n	%
Responsibility of individuals	120	92.3
Responsibility of medical insurance	111	85.4
Responsibility of government	105	80.8
Percentage of financial support		
100%	45	34.6
75%	19	14.6
50%	49	37.7
25%	6	4.6
0%	11	8.5

TABLE 5. ASSOCIATION BETWEEN WTP WITH INDEPENDENT VARIABLES

	WTP		Pearson Chi-Square	p-value
	Yes n (%)	No n (%)		
Age group			4.48	.11
From 21 to 30 years old	46 (93.9)	3 (6.1)		
From 31 to 40 years old	51 (82.3)	11 (17.7)		
Over 41 years	18 (94.7)	1 (5.3)		
Gender			.70	.41
Male	27 (84.4)	5 (15.6)		
Female	88 (89.8)	10 (10.2)		
Education			3.14	.21
College	36 (90)	4 (10)		
University	56 (91.8)	5 (8.2)		
Postgraduate	23 (79.3)	6 (20.7)		
Occupation			1.10	**.34**

	WTP		Pearson Chi-Square	p-value
Doctor	40 (88.9)	5 (11.1)		
Nurse	50 (90.9)	5 (9.1)		
Other (Technician, Pharmacist)	25 (83.3)	5 (16.7)		
Marital status			.91	**.52**
Married	87 (87)	13 (13)		
Other	28 (93.3)	2 (6.7)		
Monthly household income (VND)			2.22	.33
≤ 15.000.000	13 (100)	0		
15-20.000.000	75 (88.2)	10 (11.8)		
≥ 20.000.000	27 (84.4)	5 (15.6)		
Perceived susceptibility			1.01	.32
Yes	90 (90)	10 (10)		
No	25 (83.3)	5 (16.7)		
Perceived Severity			4.18	.04*
Yes	77 (92.8)	6 (7.2)		
No	38 (80.9)	9 (19.1)		
History of Influenza-like illness			.01*	.93
Yes	78 (88.6)	10 (11.4)		
No	37 (88.1)	5 (11.9)		
History of Influenza vaccination			7.81	.005*
Yes	41 (100)	0		
No	74 (83.1)	15 (16.9)		

*p < .05

DISCUSSION

Our study highlighted the low uptake, high acceptability, and a high amount of WTP for influenza vaccination among healthcare professionals in Vietnam, showing that the price is not the gatekeeper to influenza vaccination. It is expected that we can expand the influenza vaccination program in these subjects. We also discovered that perceived severity and the history of influenza vaccination might influence the WTP for that vaccine.

Our findings show a low percentage of influenza vaccine uptake among healthcare professionals in Vietnam (31.5%). This result was higher than other studies in Greece (28.7%) [6] and Turkey (23.1%) [7], but lower than that in the previous study in Vietnam (48%) [5] and Spain (49.7%) [8]. This finding can be explained by the differences in study population and policies related to vaccination programs among countries. Our study examined the influenza vaccine uptake among

healthcare professionals who take care of patients directly, while other studies' populations are general healthcare workers. The flu vaccine is not mandatory in Vietnam and is not included in the Expanded Program on immunization, so people have to pay fully for the vaccine. Otherwise, in some countries like the United States, the flu vaccine is recommended for all individuals from 6 months [20].

In our study, 90% of participants knew the priority group for influenza vaccine price, and 43.8% knew vaccine price. These findings are much higher than the results in one study among women of childbearing age (rural. It might be because of the participant's awareness related to influenza illness and vaccination. Nevertheless, the findings in our study also indicated that the two common reasons for not getting the influenza vaccine was influenza is not severe (26%) and acquiring immunity from work (25.2%). Therefore, a campaign and communication program need to be done to reduce misunderstandings about influenza illness.

The mean of WTP for one dose of influenza vaccine in this study was 357.57 VND (USD 15.3), higher than the current price of both local and imported influenza vaccines, suggesting that price is not a primary barrier. Therefore, it is feasible to expand the vaccine coverage in this population. Even though over 80% of healthcare professionals in this study were willing to pay for influenza with the price of 200,000 VND, the perception of subsidization from the government or health insurance also helps us understand why the uptake rate of the vaccine is low, 31.5%. %. As 86,9 % of participants indicated that the government or health insurance should pay at least half of the vaccine's price and almost half of them need more subsidization up to 75% of the vaccine's price. Therefore, if the government wants to have a vaccination uptake rate of more than 60 percent among health care professionals in Vietnam, subsidization of at least 75% should be secured.

The findings from our study have several implications. More studies need to be conducted on the acceptability and WTP for influenza vaccination in Vietnam. Regular training and educational program should be implemented to raise healthcare professional's awareness and practices towards flu vaccination. To expand the flu vaccine coverage in healthcare professionals, the government should enforce new policies that subsidize them.

Although, our study has some limitations. Firstly, we collected data in only one hospital; therefore, the findings are a weak generalization. Secondly, the cross-sectional design makes it difficult to explain the causality between the independent variables and the WTP. However, we enhanced the study's validity by randomly selecting the participants and training the researchers' team to high-quality data collection.

CONCLUSION

This study reveals low vaccine uptake, high acceptability, and a high amount of WTP for influenza vaccination among healthcare professionals in Vietnam. It suggests that price is not a primary barrier, and expanding the immunization program to healthcare professionals would be much appreciated. Four-fifths of participants expected the government and medical insurance subsidies, so financing support up to 75% of the vaccine's price from these sources could improve the vaccine uptake rate of a healthcare professional and public at large. In addition, the

training and educational program inside or outside the hospital can raise healthcare professionals' awareness about flu and change their practices related to influenza vaccination.

DECLARATION OF COMPETING OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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HEALTH LITERACY PROMOTION AND ITS INSTITUTIONAL ARRANGEMENTS: RETHINKING COLLABORATIVE HEALTH PROMOTION IN THAILAND

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ABSTRACT

This research explores institutional arrangements that govern health literacy promotion policies in Thailand since 2014. This study sets the main questions as *what are the main institutional arrangements that governed health literacy promotion policies in Thailand since 2014 and can these arrangements be viewed as collaborative health governance?* This paper argues that the military coup in 2014 transformed institutional-governing arrangements on health system management and health promotion greatly as many legal-political institutions and various social-political agencies were involved and brought together to promote health and health literacy. A so-called principle of 'collaborative governance' has been employed and implemented to promote health in Thailand recently, however, this study argues that the institutional constraints under authoritarian regime offer a 'fictitious-collaborative health governance' instead. Furthermore, deliberative processes on health literacy promotion regulated by many legal - institutional constraints had characteristics of 'pseudo-deliberation'. This work is qualitative research, and it analyzes and explains research results by looking through theoretical concepts of institutionalism and collaborative governance. This study argues that to reach the goal of health literate community and society, Thai health agencies and authorities should re-approach health and health literacy promotion from the bottom-up perspective. Also, overcoming fictitious collaborative health promotion and pseudo-deliberation are necessary. To do that, we need a long-term project of building up a 'critical health regime' based on critical education and anti-authoritarianism as major principles.

KEYWORDS

Health Literacy Promotion, Health Promotion, Institutional Arrangements, Collaborative Health Promotion, Thai Public Health

INTRODUCTION

Health literacy is defined by WHO as the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health. [1] Health literacy promotion has been one of the crucial aspects of health promotion in every country. Based on information in the last decade from the Health Information System Office (HISO), Thailand increases in health expenditure were from 147,837 million Baht in 1995 to 248,079 in 2005. [2] Health expenditure costs over the last few years have increased at around 4 percent of GDP as in 2017 but a health literacy promotion policy through multi-operations and collaborative works with various social actors could significantly reduce government budget total. [3]

Although the studies on health and health literacy promotions have been fruitful in Thailand, recent studies mainly focus on either development of health literacy measurement tool kits, level of health literacy subjects or roles of any given agencies promoting health education. [4] Existing studies in this tradition explained health literacy while only under the controlled conditions/factors of study. The most crucial weakness of works in this group is the exclusion of significant 'institutional frameworks' such as legal, social, political, and economic structures that could shape behaviour of people or state actions on health literacy promotion in various ways. Lacking in the current knowledge base about health literacy promotion in Thailand is the missing understanding about *institutional arrangements* that govern health literacy promotion policies in Thailand. Understanding institutional factors is helpful as we could achieve a bigger picture of health literacy promotion in Thailand. Rather than focusing on the implementation of health literacy survey, this study argues that grasping what the institutional constraints in public policy are helps us understand roles and power relations among various actors in health literacy promotion policy subsystems.

This research explores crucial institutional frameworks that govern health literacy promotion policies in Thailand since 2014. Dealing with this issue, this research sets the *central questions as what are the main institutional arrangements that govern health literacy promotion policies in Thailand since 2014 and can they be viewed as a collaborative health governance?* This paper argues that the military coup in 2014 greatly transformed institutional-governing arrangements about health system management and health promotion. Many legal-political institutions and various social-political agencies are involved and brought together to promote health. A so-called principle of 'collaborative governance' has been employed and implemented to promote health in Thailand recently but nevertheless, this study argues that the institutional constraints under authoritarian regime offer a 'fictitious-collaborative health governance' instead. Also, deliberative processes about health literacy promotion regulated by many legal- institutional constraints can be characterized as 'pseudo-deliberation'. This work analyzes and explains research results by examining them through the theoretical concepts of institutionalism and collaborative governance which we will describe these in the next section.

METHODOLOGY

This study focuses on legal and political institutional frameworks that govern public policies which promote health literacy. Therefore, we employ a documentary research method to collect data utilizing primary and secondary sources.[5] Primary sources include the constitution of the kingdom of Thailand, national strategies, and official plans regarding health and health literacy promotions, national health development plan, reports from the Department of Health, Ministry of Public Health, and other related legal entities. In addition, secondary sources include research reports, articles, pamphlets, online articles, and other documents regarding health and health literacy promotions.

Regarding the approaches to analysis, this study uses a theoretically driven content analysis. [6] We will analyze the study results and explain the roles of institutional arrangements that govern health literacy promotion policies in Thailand in the Discussion section by examining them through the concepts of institutionalism and collaborative governance.

INSTITUTIONALISM

An institutionalist approach offers important insights about factors that shape the behaviour of policy actors. [7] Institutionalism has been the dominant theoretical perspective in social and political sciences since the 1960s. However, for the areas of public health and health promotion, this institutional approach is relatively new.

Although the institutionalist tradition nowadays can be distinguished between new and old institutionalism, this study invites readers to reconsider the old institutionalism as a theoretical framework. [8] Traditional institutionalism can be described as a notion covering *the rules, procedures, and formal organisations of government* as factors governing people's political behaviour. [9] Social institutions like formal rules, laws, policies, and other formal organisations of government are institutional constraints that help governing policy subsystems. These institutions can be constraining, superimposing conditions of possibility for mobilization, access, and influence. They also limit some forms of action and facilitate others. [10] When considering the interconnection among subsystems of health literacy promotion, this institutionalist approach is helpful as it perceives regulations, rules, laws, and plans of the Thai state as institutional arrangements that direct and steer health literacy promotion. This approach illustrates formal relations of power among social-political actors in the health policy arena within the context of Thai authoritarian regime.

COLLABORATIVE GOVERNANCE

The term 'governance' has been one of the frequently used vocabulary words in contemporary policy studies and it is defined in various senses. [11] The term is often used with a preceding word such as good governance, network governance, global governance, muti-level governance, etc. Governance is a broad term which, at the most general level, usually refers to theories and issues of social coordination and the nature of all patterns of rule. It was also described as a system of rules shaping and regulating the actions of social and political actors; political steering of social relations based on cooperation. In addition, governance also refers to practices of governing. [12] Within various fashions of governance, collaborative governance is gaining popularity as a superior method of policy studies. [13] Broadly collaborative governance could be considered as any method of collective decision-making where public agencies and non-state stakeholders engage each other in a consensus-oriented deliberative process. [14]

Ansell and Gash defined a succinct definition of collaborative governance as:

> *A governing arrangement where one or more public agencies directly engage non-state stakeholders in a collective decision-making process that is formal, consensus-oriented, and deliberative and that aims to make or implement public policy or manage public programs or assets.* [15]

This definition involves six crucial characteristics including; 1) the forum which is initiated by public agencies or institutions, (2) participants in the forum include nonstate actors, (3) participants engage directly in decision making and are not merely "consulted" by public agencies, (4) the forum is formally organized and meets collectively, (5) the forum aims to make decisions by consensus, and (6) the focus of collaboration is on public policy or public management. [16] In addition, collaborative governance is grounded on the principles of trust building, having face-to-face dialogue, shared understanding in a policy community, and commitment to participate from social actors.

This work employs both an institutional approach and collaborative governance to help analyze institutional arrangements that regulate social relationships among policy actors in health literacy promotion.

RESULTS: INSTITUTIONAL ARRANGEMENTS ON HEALTH LITERACY PROMOTION SINCE 2014 MILITARY COUP

This study sets a major question as *what are the main institutional arrangements that govern health literacy promotion policies in Thailand since 2014?* We found that after the coup health literacy promotion has been one of many important issues that Thai public health authorities aim to pursue and there are many governing institutions that regulate institutional arrangements on health literacy promotion. The results showed in the table below.

TABLE 1: KEY INSTITUTIONAL ARRANGEMENTS AND GOVERNING INSTITUTIONS ON HEALTH LITERACY PROMOTIONS IN THAILAND SINCE 2014

Governing Institutions	Institutional Arrangements on Health Literacy	Regulations/Strategies
National Reform Council/National Reform Steering Assembly	Define health literacy as a national agenda Established a national committee on health literacy and health communication Aim to reach health literate organization and community Conducts health literacy surveys	
Constitution of the Kingdom of Thailand, 2017	Chapter V Duties of the State • Section 55 Chapter VI Directive principles of state policies • Section 71 Chapter XVI • Section 258	**Section 55** The State shall ensure that the people receive efficient public health services universally, ensure that the public has the basic knowledge in relation to health promotion and disease prevention, and shall promote and support the advancement of wisdom on Thai traditional medicine to maximise its benefits. **Section 71** The State should strengthen the family unit which is an important basic element of society, provide appropriate accommodation, promote and develop the enhancement of health in order to enable people to have good health and strong mind, as well as promote and develop excellence in sports and to maximise the benefit for the people. **Section 258** National reform in various areas shall be carried out to at least achieve the following results: g. Other Areas: (4) adjusting the health security system in order that the people are granted comparable rights and benefits from the management thereof and from access to quality and convenient service. (5) establishing a primary health care system in which there are family physicians to care for the people in an appropriate proportion.
Governing Institutions	Institutional Arrangements on Health Literacy	Regulations/Strategies

12th National Health Development Plan (2017 – 2021)	Strategy 1 Actively empowered human well-being for Thais • 4 Goals • 4 Measures	**Goal 1** Thai people at all ages are healthy and strong **Goal 2** Public policy engage with health promotion and reducing risks on health **Goal 3** Public communication regarding on risks reducing for health behaviour changing **Goal 4** Integration among institutions and health agencies for health promotion, disease prevention, and customer protection on health services **Measure 1** Building networks and alliances between social groups, local authorities, NGOs, civil society organisations, **Measure 2** Develop "Health in All Policy" **Measure 3** Promote "Health Literacy" **Measure 4** Improve systems that determinate health
National Strategy (2018 - 2037)	Aspects related to Public Health in Strategy 3 Development of Human Capital • Issue 4.5 Enhancing Well-Being among Thai people	**Issue 4.5** Enhancing Well-Being among Thai people **4.5.1** Promote Health Literacy by developing knowledge and health communication. Support all sectors to participate in health literacy promotion.
Office of Department of Health (DoH) 4.0 and Health Literacy, Ministry of Public Health	- Promotion and Prevention Excellence Strategic Plan - Health literate organization (Government, Civil Society, Private) - 66 Key Messages for HL	1. Survey national health literacy levels 2. Develop required knowledge on health literacy 3. Enhance human development 4. Develop health communication system 5. Support research and innovation 6. Support and engage in development of health literate organization, school, and community
Health Education Division, Department of Health Service Support, Ministry of Public Health	- Health literacy evaluation program and survey	

Thai Health Literacy Association (THLA)	- Cooperation with health agencies on health communication and key messages on health literacy - Provide policy recommendations on health literacy to the public	
Regulations of the Office of the Prime Minister on District Health System	- Establishment of the District Health Board (DHB)	Duties and responsibilities of the DHB 1. Set goas for quality of lives improvement in a district 2. Integration among state agencies in a district 3. Support collaboration between all sectors 4. Provide recommendation and being a consultant on quality of lives improvement in a district 5. Evaluate all works regarding quality of lives in a district

Source: Developed by the authors

DISCUSSION

This work set as a minor question for this study to examine if the institutional arrangements that govern health literacy policies in Thailand after the Coup of 2014 are true collaborative health governance. The authors argue that institutional arrangements that govern health literacy policies since 2014 are only collaborative governance in their appearance and actually are fictitious and deliberative processes written in various regulations which is pseudo-deliberation.

1. FICTITIOUS COLLABORATIVE GOVERNANCE

Thai state has been struggling in political crises in the last two decades. The country faced two military coups in 2006 and 2014. The coups brought several structural changes central to the two constitutions in 2007 and 2017. [17] Public health and health promotions since 2014 therefore had significant consequences. As the results of the study illustrated the Thai authorities attempt to bring collaboration and collaborative governance among government agencies and civil society actors. However, the authors argue that under such political and social regimes like in contemporary Thailand, the Thai authorities only offer a 'fictitious-collaborative health governance' because true collaborative governance is based on trust

building, face-to-face dialogue, shared understanding in a policy community, and commitment to participate from social actors.

What is interesting and should be discussed here is that basically the institutional constraints on health literacy promotion have been ordered in a top-down manner. Collaborative governance regarding health governance in Thailand was not driven by the creation of coordinating institutions like NGOs or other civil society institutions [18] Rather, collaborations in health literacy policies were established upon 'coercion' from various governmental, bureaucratic, and official boards set up since 2014 via many legal forms. Collaboration in this sense is, what we argued as fictitious. Indeed, it is a collaboration between several state actors under laws and orders rather than active participation from non-state actors like private and civil society social groups.

2. PSEUDO-DELIBERATION

Another important issue is about deliberation. Thai public health authorities have been regulated by various institutional arrangements that promote deliberative processes as guidelines for health literacy promotion. Deliberative policy formation and implementation require deliberative engagement among social actors at the

centre. [19] Deliberative decision-making is also a crucial aspect of deliberative public policy process. Nevertheless, we argue that in the case of Thailand, public policy processes are overwhelmed by the bureaucratic regime which basically is closely tied to the authoritarian regime. The coup in 2014 successfully regained resources and strengths for Thai bureaucratism. This bureaucratic-led regime offers, we argued, a pseudo-deliberative policy process. We contend that deliberative democracy and deliberative public policy could emerge within social conditions that underpin the practices of collaboration. [20] Nonetheless, the Thai state in the context of the post-2014 military coup and the ongoing military-led government afterward did not engage or create collective norms into society. Deliberations through authoritarian institutional arrangements created barriers to citizen engagement and democratic participation. [21] Therefore, it could be seen that health literacy promotion in Thailand since 2014 has been operating on what we called a 'pseudo-deliberation' basis.

3. RETHINKING COLLABORATIVE HEALTH PROMOTION

This study suggests that health agencies and authorities of the Thai state should rethink and reconsider their approach to promote health literacy. *Firstly,* health and health literacy promotions cannot be achieved through the top-down approach. It seems normal for Thai authorities to centralize planning and regulating from central authorities in Bangkok and deliver policy to implement in the district and local areas. Based on the results showed earlier, governing agencies regulate health literacy promotion on the one-size-fits-all basis. Instead, the approach the Thai health agencies should employ is the bottom-up health literacy promotion. Rather than ordering several state and non-state actors to act on promoting health literacy, it should initiate the participation of local communities under guidance from official health agencies. *Secondly,* health agencies should not over focus on health literacy survey. It is only a tool to help planning for long-term health literacy promotion. *Thirdly,* the fictitious collaboration should be overcome. Health literacy promotion is not a task to be conducted alone. It requires active engagement from all sectors; official health agencies, civil society organizations, business, local authorities, local communities, and households. Building a strong and sustainable network of collaboration demands political decentralization as a prerequisite. Collaborative health promotion, therefore, should have deliberative democracy as a precondition. *Lastly,* in the long-term, Thai health authorities should create a sustainable 'critical health regime'. A new regime

requires transforming existing patterns of social relations in terms of political, economic, and social aspects in each local community. In addition, a 'critical' understanding of health literacy and health related knowledge can be achieved only by providing 'critical' education with anti-authoritarianism as a point of departure. It could be concluded that all these factors are all interconnected, and it requires time to develop such a sustainable health regime.

CONCLUSIONS

Thai health authorities should rethink their health and health literacy policies promotion. Within such an authoritarian regime, institutional arrangements that govern health literacy promotion subsystems deliver health literacy policies in a top-down manner. Although these institutional constraints indicate policy actors to work deliberatively and collaboratively, this study argues that it is a fictitious collaboration and a pseudo-deliberation. Legal institutions, rules, and regulations regarding health promotions created under the junta government in post-2014 are only collaborative in their form but highly centralized and authoritative in their real content. The authors argued that to reach the goal of a health literate community and society, we should re-approach health and health literacy promotion from the bottom-up perspective. Also, overcoming fictitious collaborative health promotion and pseudo-deliberation are necessary. To do that, we need a long-term project of building up a 'critical health regime' based on critical education and anti-authoritarianism as major principles.

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RESEARCH ARTICLE

BENEFITS AND LIMITATIONS OF MEDICAL TOURISM DEVELOPMENT IN HONG KONG: LOCAL RESIDENTS' PERSPECTIVE

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ABSTRACT

OBJECTIVES

Promoting medical tourism has been discussed by various stakeholders of its destination. High-quality medical products and services is addressed, especially in the Asia Pacific region. This study aims to (1) explore major criteria to establish medical tourism in Hong Kong from the local residents' perspective and (2) examine the benefits and limitations in developing medical tourism in Hong Kong by the local residents' age groups.

DESIGN

Target samples were local residents with different age groups who had experienced receiving medical treatment or service in Hong Kong. The self-administered survey with 38 questions was created to explore the local residents' perceptions on various issues of medical tourism development in Hong Kong. Data was collected in April 2021 with the total response rate of 153 respondents. A descriptive analysis and ANOVA test were applied for objective testing.

RESULTS

To answer the objectives, the important criteria for medical tourism development in Hong Kong were physician expertise, infrastructure of hospitals, and healthcare quality. The least important criteria were the political and economic condition of that destination and language. The ANOVA results have shown significant differences on the benefits and limitations of developing medical tourism by age groups of local residents. Younger respondents perceived a benefit of medical tourism, rather than elderly respondents in terms of gaining more medical experience. Elderly respondents perceived the limitations of medical tourism development compared to younger respondents in the areas with lacking private sector interest and high cost.

CONCLUSION

There are numerous factors for consideration on establishing medical tourism destination in Hong Kong. Local residents perceive an opportunity for Hong Kong as a medical tourism destination. Although some limitations should be closely monitored, local residents would be confident with medical tourism development.

KEYWORDS

medical tourism development, major criteria, benefits, limitations, local residents, age

INTRODUCTION

Medical tourism is defined as organized travel beyond national borders to enhance and restore the tourists' health. [1] According to Birader and Ozturen (2019), medical tourism includes medical treatments and other services, such as relaxation activities. [2] Hong Kong is renowned as a shopping and food destination and mainland Chinese tourists are the main market. [3, 4] This situation has been maintained for many years [5] and it may no longer be attractive for repeat tourists. Hong Kong can promote its city as a medical destination because of its efficient medical care system. However, long waiting lists and waiting times are major constraints. [6] The medical tourism sector involves various stakeholders (e.g., tourism business providers, hospitals, the government, and community) [7], understanding the stakeholders' viewpoint on medical tourism development in Hong Kong is worth exploring. Thus, this study aims to (1) explore major criteria to establish medical tourism in Hong Kong from the residents' perspective, and (2) examine the benefits and limitations in developing medical tourism in Hong Kong by the residents' age groups.

LITERATURE REVIEW

MAJOR CRITERIA OF MEDICAL TOURISM

According to the proposed supply and demand model of medical tourism, demand factors include distribution channels for receiving sufficient information about medical tourism and cost of medical services. [8] Supply factors may refer to facilities and service offered by the host destination, such as infrastructure and facilities, promotional activities, service quality, medical visas, medical expertise, and language. [1, 7] Previous studies have shown that many Chinese tourists visited Hong Kong for medical treatment. [8] Most medical services focused on check-ups, basic healthcare services, and giving birth. [9]

BENEFITS AND LIMITATIONS OF MEDICAL TOURISM DEVELOPMENT

Several benefits have been explored for medical tourism development. These benefits would increase revenue generation, promote tourism competitiveness, explore job opportunities, improve health infrastructure, and enhance the residents' wellbeing and quality of life. [2, 7, 10, 11, 12] On the other hand, some limitations have been addressed. These limitations are high land costs, medical manpower shortages, and qualification, high local healthcare services demand, and language barriers. [13, 14, 15]

AGE GROUP AND MEDICAL TOURISM DEVELOPMENT

Different age groups tend to have different stances on medical tourism initiatives. Comparing among different age groups, teenagers are positive about medical tourism because it is beneficial to long-term growth of tourism and may generate large returns. [16, 17] Teenagers aged 18 to 26 tend to believe that there is insufficiency, low quality of medical facilities and services, and lack of government policies and laws are limitations. [17] Elderly above 65 years old have a negative stance due to great demand for local healthcare needs. [18] middle-aged and senior (above 65 years old) tourists are concerned about social and political environments and accreditation of specialists, which may influence their personal interest. [19] However, people aged 42-77 thinks that the language barrier is not a large concern because it can easily be addressed by providing training. [20]

METHODOLOGY

This study used a quantitative method. The target population were Hong Kong residents, and a convenience sampling approach was conducted to recruit the respondents. A self-administered questionnaire with Chinese and English versions was created, including three sections with 38 questions, adopted from Ebrahim and Ganguli, Heung et al., and Kim et al. [1, 8, 11] Section I discussed the major criteria for establishing medical tourism in Hong Kong. The second section mentioned the respondents' perceptions on the benefits and limitations of developing medical tourism in Hong Kong. A five-point Likert-type scale with end-anchors labeled 1 "very unimportant" and 5 "very important" was used for the first and second sections, respectively. The third section mentioned the respondents' demographic information such as age, gender, and education with a closed-ended question format.

The questionnaire was created in Google Forms and the data were collected from 153 respondents through an online survey and were distributed on social media, such as Instagram and Facebook, in April 2021. SPSS version 26 was a software used to analyze data. The descriptive technique was used to show the frequencies and percentages of demographic statistics, the mean and standard deviation of major criteria, and ANOVA for benefits and limitations by age groups of respondents.

RESULTS

Table 1 shows the demographic characteristics. From 153 respondents, 48.4% (n = 74) were male and 51.6% (n = 79) were female. In terms of age, 19.6% (n = 30) were 18 to 29 and 50 to 59 years old and 20.3% (n = 31) were 30 to 39, 40 to 49, and 60 years old or above. In terms of education, 72.5% (n = 111) had graduated in high school or received an associate's degree, and 27.5% (n = 42) had received a bachelor's degree.

TABLE 1: DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Attributes	N	%
Gender:		
Male	74	48.4
Female	79	51.6
Age:		
18-29	30	19.6
30-39	31	20.3
40-49	31	20.3
50-59	30	19.6
60 or above	31	20.3
Education:		
High school/Associates degree	111	72.5
Bachelor's degree	42	27.5

Table 2 explores the importance of criteria to establish the medical tourism in Hong Kong, among 13 criteria, the most important criteria were physician expertise (mean = 4.36, SD = 0.84), infrastructure of hospitals (mean = 4.35, SD = 0.78), and healthcare quality (mean = 4.30, SD = 0.75). The least important criteria were political condition of that destination (mean = 3.66, SD = 0.91), economic condition of that destination (mean = 3.70, SD = 0.85), and language (mean = 3.73, SD = 1.00).

TABLE 2: MAJOR CRITERIA TO ESTABLISH MEDICAL TOURISM IN HONG KONG

Criteria	Mean	Standard deviation
Economic condition of that destination	3.70	0.85
Political condition of that destination	3.66	0.91
Government regulations of that destination	3.88	1.07
Language	3.73	1.00
Internet	3.86	0.78
Price	3.78	0.96
Accreditation of doctors	4.21	0.87
Physician expertise	4.36	0.84
Healthcare quality	4.30	0.75
Infrastructure of hospitals	4.35	0.78
Marketing strategies	3.82	0.98
Government support	4.13	0.79
Cooperation among government, medical and tourism industry	4.07	0.83

Furthermore, the ANOVA results on the benefits and limitations of developing medical tourism by age showed significant differences, see Table 3. Among five benefits, only one benefit "gaining more medical experiences" was significant (F-value = 5.65, $p < 0.01$). Residents 18 to 29 years old (mean = 3.90), 30 to 39 years old (mean = 3.90), and 40 to 49 years old (mean = 3.87) were perceived more positive compared with residents ageing 60 years old or above (mean = 3.19). In contrast, no mean difference of other benefits by age was observed.

Moreover, among 14 limitations, mean differences of residents' perception of "lack of private sector interest" by age were observed (F-value = 6.82, $p < 0.01$). Residents 60 years old or above (mean = 3.77) were perceived more positive compared with residents 18 to 29 years old (mean = 3.00) and 30 to 39 years old (mean = 2.90). Residents at

50 to 59 years old (mean = 3.63) were perceived more positive compared with residents 30 to 39 years old (mean = 2.90). Mean differences of perception of "high cost" by age (F-value = 5.88, $p < 0.01$). Residents 60 years old or above (mean = 3.39) and 50 to 59 years old (mean = 3.30) were perceived more positive compared with residents 18 to 29 years old (mean = 2.37). Other limitations were also significant by the younger respondents perceived high limitations compared to the elderly respondents. These limitations were "lack of government support" (F-value = 5.19, $p < 0.01$), "shortage of nurses" (F-value = 4.49, $p < 0.01$), "lack of supportive facilities" (F-value = 3.54, $p < 0.01$), "great demand of healthcare needs for local" (F-value = 2.86, $p < 0.05$), and "lack scarcity for new hospital development" (F-value = 2.86, $p < 0.05$). The remaining six limitations were not significant ($p > 0.05$).

TABLE 3: ANOVA TESTS ON BENEFITS AND LIMITATIONS OF PERCEIVED DEVELOPING MEDICAL TOURISM BY AGE

Attributes	Mean by age					F-ratio	ANOVA Sig. value	Comparison
	18-29 (A)	30-39 (B)	40-49 (C)	50-59 (D)	60 or above (E)			
Benefits								
Enhance competitiveness of Hong Kong tourism	4.13	3.90	3.84	4.00	3.84	1.20	0.31	-
Large economic return	4.20	3.90	3.90	4.07	3.90	1.14	0.33	-
Provide more job opportunities	4.30	3.87	4.03	4.03	4.06	1.57	0.18	-
Beneficial to other industries	4.30	3.87	4.03	4.17	4.13	1.64	0.16	-
Gain more medical experiences	3.90	3.90	3.87	3.67	3.19	5.65	0.00*	A>E, B>E, C>E
Limitations								
Advertising restrictions of medical services	3.70	3.06	3.19	3.50	3.32	1.95	0.10	-
Restriction of certain treatments and surgeries	3.30	3.45	3.32	3.67	3.58	0.83	0.50	-
Lack of new policies	4.07	3.48	3.77	3.47	3.81	2.10	0.08	-
Language and communication barrier	2.23	2.58	2.65	2.70	2.48	1.05	0.37	-
Lack of an iconic type of organization that patient can easily recognize	3.03	3.13	3.13	2.97	2.77	0.47	0.75	-

Lack of private sector interest	3.00	2.90	3.26	3.63	3.77	6.82	0.00**	E>A, E>B, D>B
High cost	2.37	2.81	2.97	3.30	3.39	5.88	0.00**	D>A, E>A
Limited number of specialists	4.03	4.29	3.94	4.13	3.81	1.71	0.15	-
Shortage of nurses	3.93	4.42	3.81	4.20	3.68	4.49	0.00**	B>E
Lack of government support	4.37	4.26	3.87	3.83	3.61	5.19	0.00**	A>E, B>E
Great demand of healthcare needs for local	3.97	4.48	4.03	4.00	3.87	2.86	0.02*	B>E
Land scarcity for new hospital development	3.93	4.45	3.97	4.07	3.84	2.86	0.02*	B>E
Lack of supportive facilities	3.80	4.39	3.77	4.00	3.71	3.54	0.00**	B>E
Unsuitable physical environment during the medical recovery	3.77	3.90	3.74	4.00	3.61	0.86	0.48	-

*$p < 0.05$, **$p < 0.01$

DISCUSSION AND CONCLUSION

This study aims to assess the major criteria of medical tourism development in Hong Kong and explore the benefits and limitations of medical tourism development by different age groups of local residents. The major criteria to establish medical tourism in Hong Kong are physical expertise, infrastructure, and healthcare quality. These findings were consistent with several studies. [1, 11] Medical expertise would enhance the local residents' confidence and determine their perception on medical service providers. Hospital infrastructure involves the location of land and supported facilities, which may influence the local residents' perception. As healthcare quality is concerned, local residents searched for an international certification scheme to prove the qualification of medical staff and services. For instance, accredited medical items of the Joint Commission International (JCI) Scheme shows reliability and safety and enhance the branding of hospitals. Many tourists would explore this professional accreditation before making the decision of availing medical treatment and services.

This study compares the different age groups of local residents on benefits and limitations of medical tourism development in Hong Kong. Local residents perceived more limitations than benefits for developing medical

tourism in Hong Kong. Moreover, different age groups of local residents have different concerns of medical tourism development, which are based on their personal interest. For the benefits of medical tourism development, younger residents perceived more benefits on availing more medical experiences compared to elderly residents. Younger residents perceived that those different medical services can be provided to customers [21], which can improve professional skills and knowledge of medical staff and nurses.

For the limitations of medical tourism development, elderly residents have a stronger feeling about the lack of private sector interest and high costs, compared to the younger residents. Even if Hong Kong prefers catering to a wide-range market, it needs a large amount of capital for the construction of new hospitals and supporting facilities and recruitment of medical staff and training. High costs can be a concern, which is inconsistent with the study of Nilashi et al., in which it should be common problem among countries. [13] The younger residents stated the strong limitations compared to the elderly residents in terms of lack of government support, shortage of nurses, lack of support facilities, great demand of healthcare needs for local, and land scarcity for new hospital development. Younger residents may consider these issues as the long-term effect. Younger residents may not be in demand of medical

treatment and service at this stage, but in the future, they will be the target group as the medical treatment and service recipients. Insufficient medical resources of nurses, facilities, and new hospitals continue to exist and would influence the future medical tourism development in Hong Kong.

Regarding medical tourism development, various implications are proposed to promote the benefits and minimize the constraints of medical tourism development in Hong Kong. The Hong Kong government can act as a leader in medical development. For example, the government can enact a policy that may lessen the burden of healthcare staff shortage and enhance the medical quality in both public and private medical sectors. According to the Report of Strategic Review on Healthcare Manpower Planning and Professional Development of 2017, Hong Kong will be short of 1,600 nurses by 2030 at the current hiring rate. [22] The government could provide funding on adding more intakes of medical and

healthcare service programs to increase the medical staff and nurses. Further funding should be provided for the research and development of new medical and health service studies. For supporting facilities, the government could conduct more land allocation for medical uses. Incentives can be created to attract medical investments by providing attractive lease conditions, such as lowering land premiums. Fulfillment of the local residents' needs of medical treatment and service is essential. Maintaining a high quality of medical staff, treatments, and services could increase the impression of local residents.

Promoting Hong Kong as a medical tourism destination would require support from different stakeholders in various areas, such as the expansion of land used and hospitals and medical staff numbers with professional qualification. These issues will take time and must fulfill the needs of local residents. Once these medical services are fulfilled, local residents would be willing to explore and welcome international tourists to gain the same experiences of medical services in Hong Kong.

LIMITATIONS AND FUTURE RESEARCH

The limitations of this study were small sample sizes with 153 Hong Kong residents within the researchers' social connection and the limited period of data collection (i.e., two weeks in April 2021). These procedures limited the generalization of the findings. The increase in sample size and different periods of data collection would provide a comprehensive understanding of the local residents' perspective on medical tourism development and improve the result generalization. Only the group of local residents was tested in this study. The extension of other stakeholders, such as medical staff and government officials in the Health Department and Hong Kong Tourism Board, would show the new insight of this study.

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REVIEW ARTICLE

ARTIFICIAL INTELLIGENCE (ONLINE RESOURCE): A PANACEA FOR SMES IN HEALTHCARE

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ABSTRACT

This paper presents a review of the most recent and popular research papers on the use of artificial intelligence in the healthcare sector. SMEs consist of 60-65% of Indian medical device market. Many doctors are operating through private hospitals which come under the category of SMEs segment. Technology is proving to be a boon for all the sectors, artificial intelligence an emerging technology has the potential to change the fortune of SMEs in health care sector. In this paper there will be discussion on how artificial intelligence can help the healthcare sector in different ways. SMEs working in healthcare can take a learning from this paper and can utilize it for betterment.

KEYWORDS

INTRODUCTION

Recently healthcare industry is facing a lot of trauma and panic around the world. COVID-19 has shocked the healthcare industry. Healthcare professionals have encountered different types of attacks consist of physical assault by patients and relatives, service denial by medical staff, obstructions, cyber-attacks, and psychological threats to the doctors. COVID-19 is getting adverse as more than six lakhs of death reported in the USA, 4.2 lakhs death in India, 5.5 lakhs death in Brazil, 1.2 lakhs death in the UK, and nearly 1.2 lakh people lost lives in Italy. [1] The healthcare industry is in a fragile state, and doctors are

looking for practical solutions that can help them speed up the work. In this challenging situation [2], the adoption of technology can be a boon for the healthcare industry. [3, 4] Various departments in the healthcare industry facing different types of problems in dealing with patients. [5] There are already discussions about video consultations and other usages of technology to improve the procedures during COVID-19. [6, 7]

SMEs' role cannot be denied either in developed or developing nations. Many emerging nations, such as India, China, Malaysia, and Indonesia, want to upgrade themselves as developed nations. For categorization as developed nations, the emerging nations need to move

towards sustainable growth. The emerging nations need to improve the income gap between people, per capita income, employment, security, health conditions, and overall living conditions of the people. In short, a nation needs overall growth and economic development. The role of SMEs is much more important for developing and emerging nations in reducing poverty, improving the income gap, generating employment, and increasing the overall GDP of the nation. SMEs can be a game-changer if the government understands its responsibility to develop them. In the medical sector there are many SMEs looking for possible solution for their problem. Artificial intelligence can solve their problem and take them towards continuous growth.

In many developing nations, SMEs are in bad shape because they have not updated themselves. SMEs are facing financial burdens and competition with top firms. They need to contribute to the nation's growth and achieve economies of scale. The SMEs are expected to grow with limited sources and support. Further, their contribution is prolific to the nation. Online resources in the form of electronic commerce, social media, technology 4.0, ICT tools, etc., can help SMEs in achieving desired growth. Thereafter, SMEs can help a nation towards

sustainable growth and upgrading to the category of developed nations. Currently, the adoption of e-resources is in the nascent stage in India and many other developing nations.

This paper reviews the recent literature on "AI and the healthcare sector" and presents the findings. This study holds salient implications for practitioners and researchers as it elucidates the potentials of AI applications in the healthcare sector which become essentially significant as the tremors of the COVID-19 epidemic have ushered in a new era of healthcare issues around the world. The findings of this research can be helpful for the SMEs in the healthcare segment to improve their overall processing.

LITERATURE REVIEW

In this paper, fifteen different articles (top-cited) have been reviewed, which are based on the usage of AI in the healthcare industry. Many small and medium enterprises have already adopted technology 2.0 social media tools to improve their marketing and sustainability responses. [8, 9]

TABLE 1 – SUMMARY OF LITERATURE REVIEW- (AUTHORS' OWN COMPILATIONS)

	Authors	AI and healthcare
1	[10]	The authors argued that AI could solve the human resource crisis in the healthcare industry because it can help in fast diagnosis, quick decision making, and data analytics.
2	[11]	The authors have argued that AI cannot replace human resources altogether, but it can help majorly in four areas- patient administration, decision making, monitoring, and interventions.
3	[12]	The authors argued that healthcare professionals need something to help them in early detection and cure against the COVID-19 pandemic. AI-based technology can be used for early detection, analysis, screening, and tracking the COVID-19 patients.
4	[13]	Both AI and big data can help in three ways to counter the COVID-19 pandemic. In the shorter term, AI and big data can help identify and diagnose COVID-19 cases. In the medium term, these technologies can help identify therapeutic options, and in a long time, technologies can help share data and information with proper protocols.
5	[14]	The authors have argued that AI-based systems can help the healthcare industry in risk assessment at the individual level, hospital level, and national level. AI models can be applied to evaluate health risks on email, phone calls, and messages at the personal level.
6	[15]	There is a need to reduce human intervention in the treatment and medication of COVID-19 patients. AI and Machine learning can improve

		diagnosis, treatment, and cure. Better forecasting is possible with the practical usage of AI.
7	[16]	AI can help in multiple ways to deal with the COVID-19 pandemic. It is useful for tracking, knowledge sharing, prediction, social distancing, and medical chatbots. AI is also focusing on prevention strategies on COVID-19.
8	[17]	AI and other digital technologies can help prevent, diagnose, and treat COVID-19 disease. It can also help in surveillance.
9	[18]	AI-based algorithms helped the companies such as BlueDot and Metabiota in the early detection of the virus, and it also helps in the prevention of the same. With the usage of technology, detection and prevention of viruses are possible within a specified time.
10	[19]	AI can help the healthcare segment in predicting the spread of infectious diseases like COVID-19. It can help the healthcare segment is much more focused and disease-specific analysis and interventions. AI can control the risk of infectious disease
11	[20]	With AI usage, the healthcare industry is moving in a fast-forward direction as it is very much helpful in fast detection, diagnosis, and treatment. It helps in making effective and efficient decisions.
12	[21]	AI-based applications can help streamline the dental healthcare workforce; they can reduce healthcare expenses and eventually helps in predictive, preventive, and participation-based dentistry.
13	[22]	AI helps improve clinical care, therapies, efficiencies, and testing in the healthcare segment. It is also useful in building trust and engagement among the healthcare segment by practical usage of technology.
14	[23]	It helps minimize human cognitive functions by adding a prospect of automation in the healthcare industry. AI is useful in preventing all major diseases like cancer, neurology, and cardiology. Practitioners are using AI in NLP.
15	[24]	AI can help in early warnings, tracking, detection, diagnosis, prognosis, and social control, but there are certain deadlocks like lack of data or too much data. The practical usage of AI is still a problem.

Based on the above literature, it can be concluded that AI can be helpful for the effective working of the healthcare industry in one or more ways. Figure 1 presents the summarized crux of the above cited fifteen papers through a word cloud.

FIGURE I. WORD CLOUD USING THE TEXT OF FIFTEEN RESEARCH PAPERS USED IN THE STUDY

Source: Author's own compilation using wordsift.org

FINDINGS AND DISCUSSIONS

Based on the analysis of the top-cited research papers related to the theme of the study, the two themes created are the "positive implications of using AI in the health care sector" and the "limitations of AI in the healthcare sector". The subthemes under the first theme of "positive implications of using AI in the health care sector" are "fast-tracking, diagnosis, and treatment", "empower healthcare sector", "reduction in costs", "streamlining of work", and "fast information sharing and decision making". The sub-themes under the second theme, "limitations of AI in the healthcare sector", are "lack of emotions", "fear of unemployment in medical staff/workers", and "training and the right platform".

A. POSITIVE IMPLICATIONS OF USING AI IN THE HEALTH CARE SECTOR: SMES CAN LEARN

1) Fast-tracking, diagnosis, and treatment: During COVID-19, the whole medical industry faced the need for fast-tracking of disease, diagnosis, and treatment. Fast diagnosis and treatment are not only limited to COVID-19 disease elsewhere. Also, healthcare professionals need to detect different types of viruses spreading at a rapid pace. AI-based algorithms and techniques help in the fast detection of disease. [25] AI-based algorithms can collect information from a large amount of data and provide correct output. Like all other industries, the healthcare industry is also in the dearth of human resources. AI can overcome the shortage of human resources, but it cannot replace them. AI helps in effective initial screening, diagnosis and ultimately, the algorithms helped find a relationship between treatment technique and patient outcomes.

2) Empower the healthcare sector: AI can empower the healthcare industry because it will help in the reduction of human interaction. The human workforce is limited, especially in developing countries. The pandemics like COVID-19 have highlighted the shortage of medical professionals all around the world. AI can empower the healthcare industry by providing necessary skills in terms of technology in the present and future. The minimum doctor to the patient ratio recommended by World Health Organization is 1: 1000, but this ratio is not achieved in many countries. The shortage of doctors is observed. Countries like China and India are growing rapidly while infrastructure and healthcare facilities are very limited. AI is needed to empower healthcare from the base. Technology can help all the patients in accessing the medicine in the form of telemedicine. Using machine learning and statistical techniques, it is possible to analyze large data sets and notice the trends.

3) Reduction in costs: All industries and sectors want to achieve economies of scale. The healthcare industry is also on the same lines. Healthcare professionals and doctors are looking for new ways to reduce costs and increasing the speed of work. AI can help develop technology at a much lower price because efficiency increases, and diagnosis will be much more focused. AI-based health care allows doctors to judge out medical professionals about a meaningful pattern of data collection, and it reduces time, cost, and overall energy. Adopting AI is no more a choice; it is a must for the coming generations.

4) AI can streamline the work: The human resource shortage is visible in the healthcare industry. In such time, AI is useful in creating virtual nurses and medical assistants. Those nurses and medical assistants can monitor the activities and medication timetables. That fake intelligence-led medical nurses and assistants can help in solidifying the interconnection between patients and doctors. The necessary information can be provided to the doctors. AI modelling can be used to understand text and images. In daily life, medical professionals consume a lot of time in the documentation process, data entry, and sorting.

5) Fast information sharing and decision making: While the whole world is facing the COVID-19 problem, information sharing is quite relevant nowadays, at least in the medical domain. Doctors around the world are working to find a vaccine for the COVID-19 disease. The whole world is facing this pandemic, so information sharing is a must between doctors and medical practitioners. The AI-based platform can help in information sharing based on specific patient data. AI can also be used to track the patterns identified in a patient to determine the probability of success or failure of a specific medicine on the patient's body. The medical practitioners want to know the root causes of the problem and their solution to reduce potential medical risks. The decision-making is too fast by utilizing the AI-based process.

B. LIMITATIONS OF AI IN HEALTHCARE

1) Lack of emotions: Machines, programs, and algorithms do not work on emotions. Whether it is surgical robots or algorithms, they all work as per a specific program set. The systems are not logical in nature. They do not carry any emotions or sympathy towards patients. The human interaction always involves an emotional touch between the patient and medical staff, but that touch is missing in the machine. Medical staff is also flexible in their approach because there is trust-building between medical patients and staff members. Devices are not dependent on trust and relationship building. The most significant setback is that medical practitioners can change their approach when operations do not go as per plan. Occasionally, medical staff go beyond the rules to save a patient's life because of emotional connection. Machines can not violate the regulations, and they work as per set standard planning. Social and emotional intelligence is also necessary for effective working [26]. AI-based instruments can work with minor errors, but they can create problems for both patients and medical staff when there is a significant diversion.

2) Fear of unemployment in medical staff/workers: AI-based systems can create a fear of unemployment and job insecurity in the minds of those medical professionals who are aligned in analyses, diagnosis, etc. However, whether technology is an overall replacement of the human in the medical profession or will act as a value-added tool. There are chances that the machine can stick, or the algorithm may fail; in that situation, defective diagnosis may occur. AI-run system is based on information collected through various datasets. Suppose there is an error in uploading the data, then it can create problems in the overall structure and effective functioning. The lack of information leads to inaccurate diagnosis and decision-making in the system.

3) Training and the right platform: It are not easy to work on an AI-based platform without adequate training. The technology adoption is still in the initial phase, and it is needed to be refined. Medical practitioners need to find the right partners and invest carefully in implementing the right platforms to adopt AI. AI cannot be implemented in each type of venue. Good precision and planning are required before implementing such a solution, and the training of staff members is a must.

CONCLUSION

AI is an emerging and promising technology for detecting early coronavirus infections and monitoring the state of affected individuals. By building helpful algorithms, it can considerably improve treatment uniformity and decision-making. AI is beneficial in the treatment of COVID-19 afflicted patients and properly cost-effectively monitoring their health. SMEs in healthcare sector have limited finance, AI based algorithm are cost-effective in nature. It is also beneficial to facilitate viral research by analyzing the existing data. AI can aid in creating effective treatment regimens, preventative initiatives, and drug and vaccine development and thus empower the health care sector.

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RESEARCH ARTICLE

THE COVID-19 PANDEMIC: AN ANALYTICAL STUDY ON OPPORTUNITIES FOR CIRCULAR ECONOMY PRACTICES IN INDIA'S HEALTHCARE SECTOR

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ABSTRACT

COVID-19 pandemic has long-lasting impact in social, personal, and economic area globally. When we think of the economic recovery of India in the future, we face the challenge of moving forward more sustainably. An international NGO ARUP had published a worldwide report named 'Health.Care.Without.Harm'; mentioning that only healthcare sector itself is accountable for about 4.4 percent of universal net emissions. The present study, therefore, highlights the vulnerabilities in the linear economy and how the pandemic crisis challenges the linear economy and provide opportunity to uptake circular practices and sustainable development within India's healthcare economy. The paper outlines the recommendations on the circular economy by suggesting policy and market-driven solutions for the healthcare sector's sustainability.

KEYWORDS

Pandemic, COVID-19, Circular Economy, Healthcare sector, India

INTRODUCTION

COVID-19 is seen as a 'crisis like no other', the entire world economy is turning down. This is the era in which humanity's impact on nature has begun to impact on us in disastrous and unpredictable ways. This pandemic has made us realize that if we wish to avoid disasters we should invest in research, in basic public health, in production of vaccines and essential equipment for hospitals. And most important is to optimally utilize our natural resources as there cannot be imbalance with the specific demand and supply responsible for consumption of many available and important natural resources. Realizing the challenge of scarcity of resources in future, the world is forced to think about the new ways; to produce, distribute, purchase and consume giving us a unique linear economy model; a new way representing the current circular economy model. This concept offers a way to rethink production and consumption on a systematic level.

For ages our economy has been 'linear' in which raw materials are castoff to produce any product, make use of it and its waste like packaging is thrown away. Waste does not often recycle adequately and hence ends up in air, soil, and water environment of the planet which results in different kinds of pollution like air, water and soil resulting in the depletion of the natural resources, which in turn affects the human health. Hence, the foremost motive of a circular economy is to deliver the society in such a way that it least compromises the needs of future generation. Circular economy is evolving speedily, specially at present when humanity is facing various issues including environmental devastation, pandemic, and climate change.

A researcher [1] comprehensive research with an NGO named HCWH (Health Care Without Harm) based on worldwide comprehensive reports on healthcare found out that total emissions in healthcare sector are mostly equal to the gases produced in greenhouse by 514 coal fired based Power Plants annually. [1] Not only doctors, nurses and health facilities are responders to the impacts of climate change, but hospitals and healthcare systems make a major contribution to the climate crisis. Every nation's health sector release greenhouse gas either directly or indirectly.

During past three decades, the healthcare industry has become increasingly reliant on single-use disposable medical devices that include all equipment used in provision of medical care that does not primarily function through biological or chemical means. [2] This linear model of production and consumption effects human health the most as it contributes to global ecological destruction by depleting natural resources and generating excessive solid waste and harmful environmental emissions. Hence, it is essential to transform the healthcare sector to circular economy. [3]

LITERATURE REVIEW

MacNeill [2] has clearly explained the importance of a circular economy specifically in the healthcare sector of the US economy which still relies on linear supply chain manufacturing. Goyal [4] discussed the imbalance in demand and supply balance in consumption of natural resources due to the linear economic model as it affects the sustainability of the countries and therefore suggested the need for a circular economy model. Parashar [5] stated that plastic can be a protector if complemented by the

circular economy strategies in terms of recycling and recovery. Fiksel [3] argued that achieving resilience will require both enlightened government policies and successful initiatives by social and environmental innovators that demonstrate the capacity for adapting to these challenges. Ibn-Mohammed et als. [6] paper describes some sector-specific recommendations on solutions related to circular economy for its globally economic development in the post-COVID-19 era. Wuyts [7] discussed interaction between principles of CE (Circular Economy) along with its issues linked to the pandemic situation in its healthcare sector.

OBJECTIVES OF THE STUDY

1. To find vulnerabilities associated with the current linear economy structure of the healthcare sector in India.
2. To examine constraints to achieve circular healthcare economy in India.
3. To suggest policy and market-driven solutions to transform the health care sector into a circular economy in the country.

RESEARCH METHODOLOGY

This study is based upon secondary data. It uses analytical and descriptive technique to find difficulties in linear economy structure and the merits of circular economy in healthcare sector specially post COVID-19 through different research papers, articles, different reports published by an NGO (Health Care Without Harm), Circularity Gap Report 2020 and 2021, WHO, (World Health Organization), CPCB, (Central Pollution Control Board), etc. Data from various sources have been gleaned, analyzed and conclusions drawn.

1. Vulnerabilities associated with linear healthcare economy in India

In a traditional healthcare economy, we take natural resources from the environment, make the devices, use them in hospitals and then throw them away. It is also known as 'take-make-dispose' approach. And there are various reasons for pursuing the linear economy model:

- The perception that if we throw used devices, we reduce infection risk.
- It is difficult to re-use as it requires the collection, transportation, cleaning, testing and sometimes sterilization before re-use.

- Investment to re-use is more than the price of the device.

But the current economic pressures on healthcare have shown that the linear model is not sustainable as it simply costs too much and is bad for the environment. Several studies have compared about the equipment whether it's for single time use or reusable equipment and revealed that single-use disposables typically result in higher petrochemical use and global greenhouse gas emissions on a life-cycle basis. [8] In fact, cost-effectiveness studies further reveal that although costs of single use equipment acquisition are mostly lesser. But in case of multiple usage equipment, cost is evenly distributing for multiple usage

depicting its feature of the lifetime lesser cost because of reusables substantially; presenting it as a lower costly equipment than about the equipment of single-use disposables. [9]

According to Central Pollution Control Board, daily generation of bio medical waste in India has increased by twenty five percent (25%) in 2020 because of COVID-19. Prior this pandemic, the generation of regular bio-medical waste was 610 tons per day. But during this pandemic, the generation of waste increased to 765.5 tons per day (till December 2020) (see Figure 1)

FIGURE 1. BIO-MEDICAL WASTE GENERATION IN INDIA BEFORE COVID-19 AND DURING COVID-19
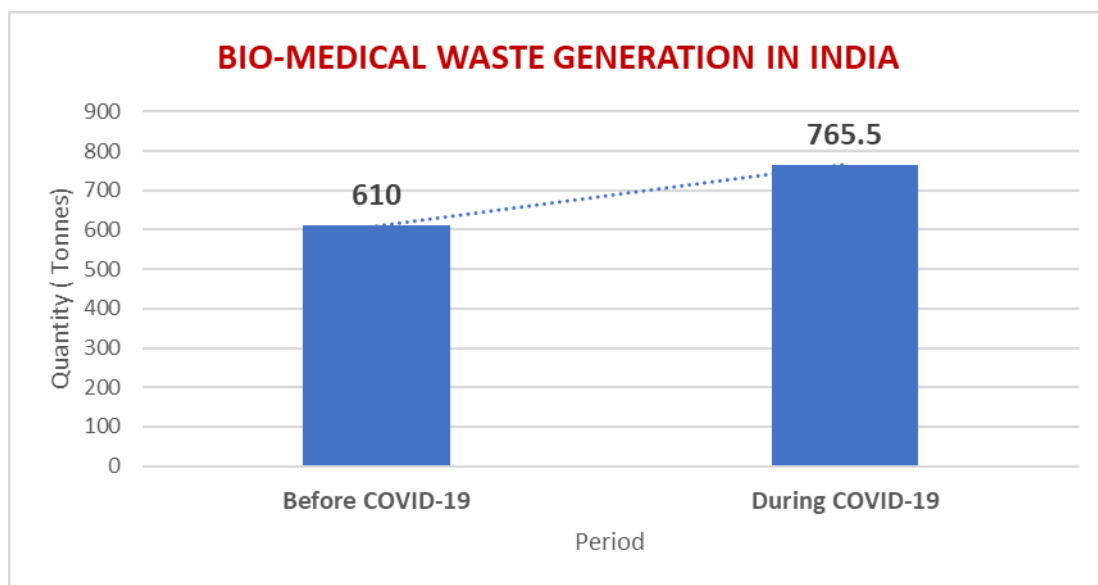
Source: Data compiled from CPCB Reports [10]

FIGURE 2. AVERAGE QUANTITY OF COVID-19 RELATED BIOMEDICAL WASTE GENERATION
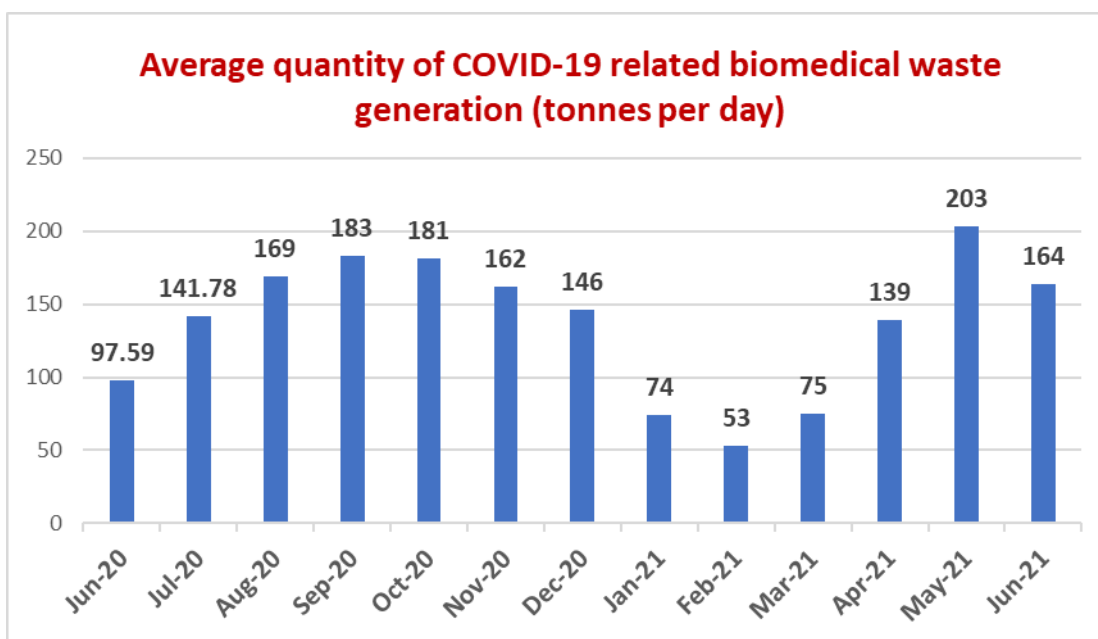
Source: Data compiled from different CPCB reports (Central Pollution Control Board)

As cumulative waste calculated from average waste per day shown in figure 2 and from data by the MoEF&CC (Ministry of Environment, Forest and Climate Change) represents the data about the generation of 56,898 tonnes of COVID-19 bio medical waste between June 2020 and June 2021 nationwide.

In May 2021, Central Pollution Control Board reported maximum COVID-19 waste generation; biomedical waste generated was 800 tonnes per day. Though as per the report submitted to the National Green Tribunal on January 14, 2021, CPCB stated that the treatment capacity of CBWTFs (Captive bio-medical waste treatment and disposal facilities) is 826 tonnes of biomedical waste per day which was later corrected and decreased to 754 tonnes a day and proved that the treatment facilities are efficient to handle a rise in COVID-19 waste that has witnessed couple of times from June 2020 to June 2021 as shown in the following table. Closer analysis of state wise treatment capacity of biomedical waste in India found that out of 35 UT/States 22 were having less capacity in comparison to the biomedical waste they were generating (see Table 1)

TABLE 1: STATES/UTS GENERATING MORE OR LESS WASTE THAN TREATMENT CAPACITY

States and Union Territories	Total biomedical waste generated (tonnes per day)	Percentage share of COVID-19 BMW in the total	Total treatment capacity (tonnes per day)
Andaman & Nicobar	0.7	2%	0.2
Andhra Pradesh	25	40%	25.7
Arunachal Pradesh	0.5	22%	1
Assam	9.3	6%	8.6
Bihar	35.9	3%	35.6
Chandigarh	5.8	33%	5.6
Chhattisgarh	6.5	42%	16.4
Daman & Diu	0.4	18%	0.3
Delhi	46.7	39%	37.2
Goa	1.9	23%	2
Gujarat	58.4	38%	50.5
Haryana	27.9	47%	21
Himachal Pradesh	5.7	40%	4.2
Jammu & Kashmir	8.4	30%	13.9
Jharkhand	7.8	7%	4.9
Karnataka	94.5	18%	72.6
Kerala	66.6	36%	89.5
Lakshadweep*	0.1	9%	72
Madhya Pradesh	25.2	29%	23.8
Maharashtra	81.3	23%	82.7
Manipur	1.1	12%	1.4
Meghalaya	1.5	17%	1.7

Mizoram	1	3%	0.9
Nagaland	0.7	11%	0.2
Odisha	24.6	27%	18.7
Puducherry	7.7	23%	4.9
Punjab	20.1	20%	18.8
Rajasthan	25.7	19%	25.7
Sikkim	0.5	3%	0.5
Tamil Nadu	71.8	19%	55.3
Telangana	25.4	20%	18.4
Tripura	1.42	1%	1.4
Uttarakhand	5.8	34%	6.6
Uttar Pradesh	68.4	23%	61.4
West Bengal	47.3	12%	43.1

Source: Data from Central Pollution Control Board [11]
*The data shows that Lakshadweep has a treatment capacity of 72 tons per day, but this is highly unlikely as the UT has no treatment plants.
Table prepared on the basis of biomedical waste generated in December 2020 and COVID-19 waste generation in May 2021. Ladakh data is unavailable

Moreover, there is problem of missed biomedical waste means waste that is not being reported on BWM App as most of the time we find that general public including waste workers throw this waste (surgical masks, gloves, PPE kits, Face shields etc.) without segregating them and they are mixed with general solid waste and contaminating whole environment. The improper management of contaminated PPEs and healthcare waste might have increased the spread of viral disease in the environment as the use of surgical face masks, PPEs, medical gloves and aprons have been recommended for essential healthcare service staff and face masks use has been mandated for citizens. During a pandemic when demand goes up for certain types of devices, supplies cannot be found. And then the vulnerabilities were visible in the linear supply model as the linear economy is convenient under normal conditions, but it is highly responsible for the climatic crises. Thus, it is necessary to consider separation, storage and collection for recycling and disposing of medical waste and face masks to reduce plastic waste and adopt alternative technology in the form of waste with a view to facilitating energy recovery like usage of biodegradable products.

2. Opportunities for circular healthcare economy in India

2021 is the year when a circular healthcare economy has become a vital conversation in India. The pandemic has led to a focus on the need to re-use some medical devices and stresses over the need for hospitals to critically review their supply chain. As coronavirus waste has become a new form of pollution as single-use personal protective equipment (PPE), masks and gloves and other coronavirus waste like hand sanitizer bottles are used and thrown away every single day. There is a clear pathway to supply chain solutions that simultaneously reduce costs and environmental impact. This economy that is restorative and regenerative by design is a circular economy. It builds and rebuilds overall system health, and is based on three principles:

- Optimum utilization of waste by reuse of used bio medical products.
- Revitalizing natural resources.
- Eradicate pollution.

This transformation from the linear economy to a circular economy will take time and there are several challenges for the healthcare sector. These include:

- Single-use device reprocessing challenges the single-use mindset in healthcare.
- Cost-benefit analysis should be performed to determine that re-use doesn't imply added costs.
- Safety measures should be taken to clean and re-use the selected supplies because of safety risks for patients.
- Economical and feasible remanufacturing process.
- To create collection re-use infrastructure, which includes containers to place used supplies, buying back of supplies into the inventory management system.
- Appropriate training to staff to follow collection and re-use instructions.

Reprocessing is the traditional circular economy solution. It may be the only circular healthcare economy model that can be accepted easily. Because of this, hospitals can drive additional savings and promote a more sustainable Indian healthcare system.

Due to climate change, adopting a circular economy is critical for all companies across the spectrum, but a circular economy drives greater jobs creation which is due to higher spending from lower prices and labor-intensive recycling activities. Moreover, through greater innovation and an emerging service-based economy, new roles are created in SMEs. In India, we already have a sharing and repair-ability culture, we just need to embrace it to meet our climate change objectives.

RECOMMENDATIONS AND CONCLUSION

During pandemic, we realized that the planet's health is our health. Thus, it is imperative to re-think the undertaken measures during COVID-19 to minimize the negative consequences in the future. The repair economy may be more practical than long supply chains delivering cheaper goods as it provides a way to maximize equipment's productivity, minimize waste and achieve sustainable standards. The government should introduce 'Right to Repair' for a Circular healthcare economy for environment sustainability by allowing medical equipment to flow through technological cycles of repair, reprocessing, and reuse. For this, products should be designed to be able to be repaired multiple times before they have to be recycled

and it requires innovation and research. Thus, a key feature of the circular economy is design for durability.

As shown in Table 1, an analysis of CPCB's reports of January and May 2021 suggests that treatment capacity of 22 out of 35 states and Union Territories to generate more bio-medical waste is inefficient. So, government should increase the treatment facility of inefficient states and UTs like Maharashtra, Tamil Nadu, Delhi, etc., and if it is not possible then circular economy plays an important role to solve the problem by creating the reusable products. Creation of reusable products also help in the sustainability of natural resources. Establishment of more recyclable units which will create more job opportunities as well.

Segregation has been a major concern in our country and burning of plastics also releases harmful gases which results in environmental pollution, that's why more biodegradable waste plastics should be used to make PPE kits, gloves, shoe covers, etc.

Hence, the need is to make healthcare sector green which requires:

- Change in perception of human beings, especially doctors and patients.
- Efficient planning and policymaking by the civil administration.
- Use of technology.
- Safeguard citizens' health and safety.

So, India should also adopt the strategy of reprocessing and repairs for eliminating hospital waste and improving environmental sustainability because we desperately need transformative and corrective solutions as change is a must. Healthcare workers, manufacturers and patients should work with the government to guarantee the right infrastructure, fiscal matters and long-term vision to empower change as there are various challenges like safety, security and adaptability that must be considered during the process of this circular economy revolution.

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A GROUND LEVEL STUDY OF HEALTH PROBLEMS OF DOMESTIC WORKERS DURING COVID 19 PANDEMIC

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ABSTRACT

The pandemic of COVID19 laid various adverse effects and made mark on domestic workers lives. Ground report shows evidences of drastic downfall in their income due to raised unemployment, increase in health expenditure, shortage of health care facilities etc. The second wave of COVID19 has created havoc in their life as their work leaves no savings for them. This article based on field study argues the health complexities that have arisen in domestic workers lives during pandemic. It has subjected struggles of domestic workers for health and medication facilities during and after pandemic. It also suggests the corrective measures that government can take to bring out these workers from these drudgeries and impact of circular economic concept to sustain their lives comfortable.

KEYWORDS

Covid 19, Pandemic, Health, Domestic workers, Circular Economy (CE)

INTRODUCTION

The implications of covid19 have been admitted throughout the economies. Recent years (2020-2021) brought extremely unbeatable challenges to everybody at different levels. It largely devastated marginalised and accessible section of our society. As lockdown was announced due to covid, it resulted in several casualties like job loss, shortage of food and basic necessities, educational inadequacy and most important downswing in health and income bringing this crisis ahead. The second wave swept numbers of lives, employment, savings and raised health emergencies. Also, it deprived nutritional deficiency among the families of domestic workers.

Although economic burdens and health complexities are not fresh evolved issues but yes, still critical matter of concern for domestic workers. All these inabilities belong to domestic workers formed an unbalanced structure during pandemic.

Recovery at socio-economic levels is quite far but matter of concern is diagnosis and recovery of physical-mental health of vulnerable section. Pandemic reduced the structured work opportunities that increased health expenditure and economic burdens of these workers. Instead of, workers those employed faced high-risk conditions because 'no work no compensation, cleared to them. Fear of retrenchment has been noticed among the

workers and health issues were almost common at both phases and mental health issues were not concerned at all and did not seek special treatment. Of course, other health issues (injuries, fever, cough, headache, etc.) considered as minor problem and treated as common by these workers and they took medicines causally from medical stores. Government's concern towards this vulnerable section made much benefits which fulfilled their starvation during lockdown I and II as well. Even though several steps have been taken by government for example free rationing, vaccination and sanitization despite there is a large number of this population stayed untouched to be benefitted.

LITERATURE REVIEW

[1] have mentioned in their research paper female domestic workers poses hectic schedule as they have to maintain work-life balance. More often they have to work more than one house along with their family responsibilities. But they lack behind caring themselves which led several mental and health complexities.

[2] research paper assessed the living conditions and physical health profile of these female domestic workers. It has been concerned lack of care and attentive measures towards physical and mental health created detritions in their life.

[3] in their research paper mentioned perils of lockdown. As casual employments and livelihood opportunities has been lost due to pandemic. They stated about unfavorable terms of COVID which endured by informal workers as loss of employment, starvation, health problems and other diseases too. Food and nutritional deficiency also increased at large extent at this time and forced bulk of diseases. The institute for policy studies and National domestic workers alliance [4] collectively presented a report on black immigrant domestic workers classified into personal economic impact and health & safety vulnerability. It disclosed in the report 70 percent domestic workers either fired from their jobs or got reduced wages, faced housing insecurity and having no safety net. Lack of personal protective equipment (PPE) and no medical insurance dragged these workers at a higher exposure to COVID.

[5] submitted their report to ILO stated about occupational safety and health practices at workplace in pandemic. They laid emphasis on promoting OSH measures for the safety and without risk to health of workers. The framework suggested return to work policies with risk assessment and control strategies. These practices considered to eliminate the exposure of infection at or outside workplace and classified into practices among employers (reduce work and contact), among workers (distancing, work with caution) and governments (safety kits and other helps).

[6] this research paper highlighted the pandemic and women's work. It has been stated covid-19 seemed an additional constraint for female workers. As these workers run or support their families but due to lockdown no work, no money and no savings made situation critical.

OBJECTIVES OF THE STUDY
1. To figure out the health complexities endured by domestic workers before and during lockdowns.
2. Discussion on government intervention and further corrective measures that could help in surviving long time after pandemic crisis.
3. To conclude the future prospective of domestic workers by application of circular economic tools.

RESEARCH METHODOLOGY

This research article is a blend of both primary and secondary data. Secondary data is used to get information about domestic workers, their problems and circular economy concepts etc. For this various research articles of different journals, newspaper reports, magazines, government websites and reports by ILO, NDWA were consulted. Primary data was collected by researcher themselves to check true state of the ground reality reports as found in various secondary data. The data was collected from urban areas of Ghaziabad (Uttar Pradesh) and convenient sampling method was used. Due to time, money and manpower constraint sample size was restricted to 50 only. Data was analyzed through different statistical tools and results were interpreted.

DISCUSSION AND FINDINGS

This survey was done by researchers themselves in the month of August-September (2021) from urban areas of Ghaziabad (Uttar Pradesh)

TABLE: 1-SAMPLE CHARACTERISTICS

Characteristics		(N=50) %
Gender	Female	80%
	Male	20%
	Total	100
Age (yrs)	18-35 (Female)	34%
	above 35 (Female)	46%
	18-35 (Male)	14%
	above 35 (Male)	6%
	Total	100
Marital status	Married	56%
	Unmarried	28%
	Other	16%
	Total	100
Education level	Illiterate	18%
	Primary	42%
	Secondary	24%
	Highschool	16%
	Total	100
Migration Status	Migrants	28%
	Non-Migrants	72%
	Total	100

Source - Researchers collected data through survey (Authors' own)

As result shows that out of the total numbers of domestic workers that were surveyed 80% were female domestic workers while 20%workers were male. Among female domestic workers 34% were at the age group of 18 to 35 years while 14% male were of same age group but the data reversed above the age of 35, only 6% domestic workers were male while 46% of female were working as domestic workers. It was found in the study that as the age grows male workers choose other profession than female workers. While females are more inclined to domestic work as this work suits to their skills and also helpful in their family work life balance. Marital status of domestic workers shows that 56% domestic workers were married, 28% were unmarried 16% other (widow, divorced etc.). As far as their education level is concerned 18% domestic workers were illiterate, 42% were educated at primary level, 24% at secondary level and 16% completed their high school. As migration was the major issue of lockdown when majority of workers moved to their original places but it was found in the study that only 28% domestic workers of these areas were migrants while 72% workers were non migrants or local residents. So far as

44% of these domestic workers are living in nuclear family while 66% live in joint family.

Regarding job status of domestic workers during lockdown I survey found that only 28% were employed, 56 % lost their jobs and 16% chose alternative tasks to raised earning as selling masks, sanitizers and worked on shops as part-time. (Figure-1)

FIGURE 1
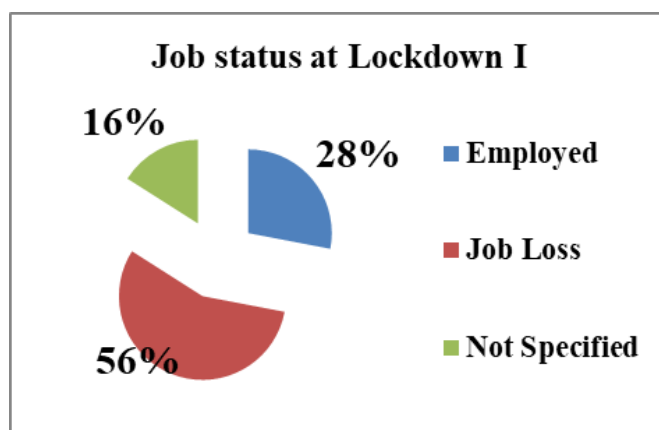
FIGURE 2

Source- Survey done by Researchers (Authors' own)
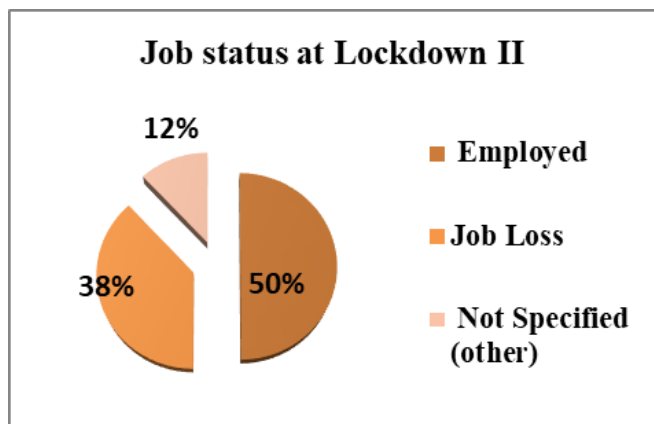
FIGURE 4

Source- Survey done by Researchers (Authors' own)

When this status was compared to Lockdown II survey found that as against lockdown I of 28% (Figure 1) in lockdown II 50% workers were employed, 38% lost their jobs as against 56% of lockdown I and only 12% were involved in other activities to earn from different sources (part-time jobs, selling vegetables and other things etc.) (Figure-2)

Regarding health complexities at lockdown I 40% faced certain health issues themselves (Figure-3) and 20% told that their family members having some health problems but not diagnosed, 30% did not required any medication for their health problems 10% faced maternity problems (4% miscarriage and 6% faced complications at child birth).Whereas, health emergencies during second phase of lockdown 30% faced health issues as comparative to 40% in lockdown I while 16% of their family members faced some health problems but not diagnosed, 50% did not required any medication (minor health issues) and 4% faced maternity problems(2% miscarriage and 2% childbirth complications).
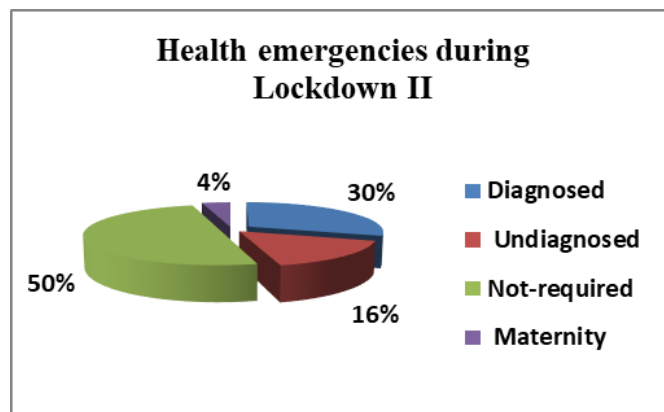
Then about the medication during lockdown I, among the diagnosed domestic workers (70% according to figure 3) 26% and 8% maternity cases (cumulative 34%) were treated in government hospital, while 16% were treated by private hospital (14% diagnosed workers and 2% maternity cases) but in emergency they stated, 12% took help of others (NGO, Health Workers, Welfare Clubs) whereas 8% did not seek further treatment. (Figure-5)
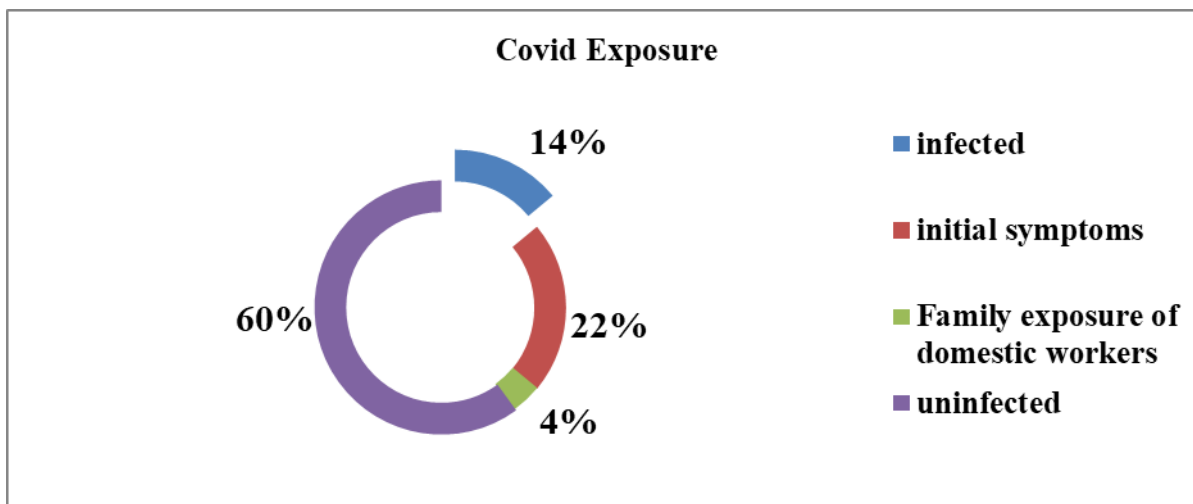
FIGURE 5
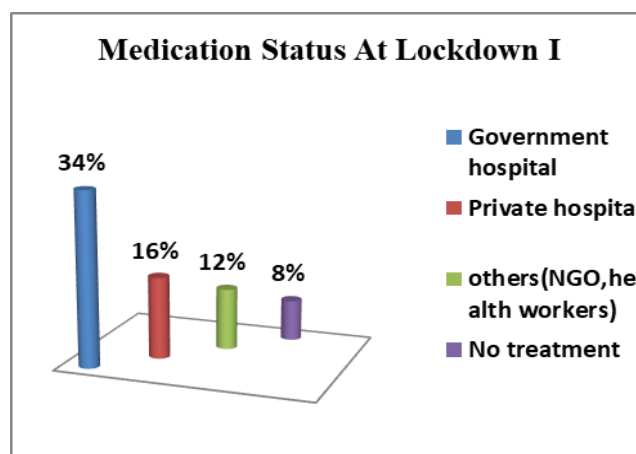
FIGURE 3
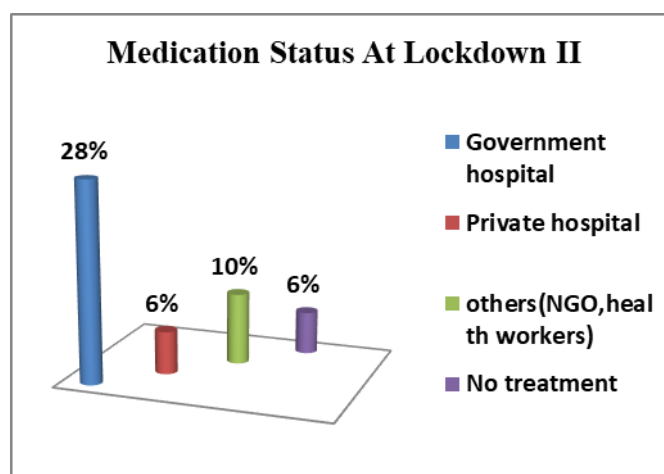
FIGURE 6

Source- Survey done by Researchers (Authors' own

Respectively medication during lockdown II among the 50% those were diagnosed (figure 3), 28% domestic workers (26% diagnostic workers and 2% maternity) took treatment from government hospital while 6% treated by private hospital (rest 4% diagnosed domestic workers and 2% maternity). It was found that 10% undiagnosed helped by others (NGO, health workers, Welfare Clubs etc.) while 6% amongst them did not seek any treatment. (Figure-6) This shows that whenever ill, these workers mostly go to government hospitals or charity hospitals or NGOs for their

treatment as they have no savings or surpluses to be treated in private hospitals.

Regarding COVID exposure of domestic workers It was found that 60% of them remain unaffected (Figure 7) only 14% domestic workers (male-10%, female-04%) infected while 22% faced minor symptoms (male14%, female 8%). Some families of domestic workers also faced some symptoms around 4%.

FIGURE:7 COVID EXPOSURE OF DOMESTIC WORKERS AND THEIR FAMILIES

Source- Survey done by Researchers (Authors' own)

FIGURE 8
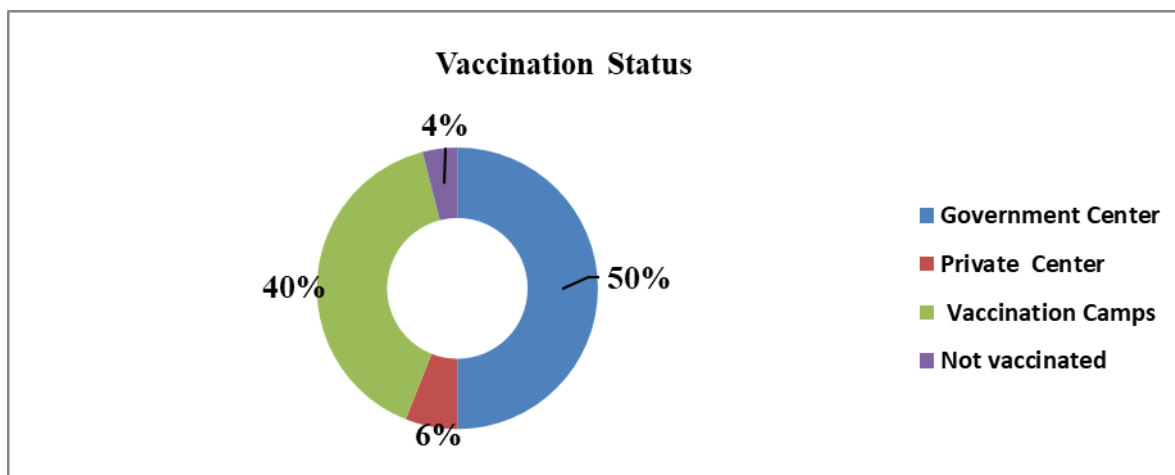
Source- Survey done by Researchers (Authors' own)

When asked about Covid vaccination survey found as domestic workers do not have enough cash for paid vaccine most likely 50% of workers got vaccination through government centres at free of cost, 40% likewise vaccinated through camps organized by others (community centres, NGOs etc.) also free, only 6% got vaccine from Private health centres which was paid dose and 4% not vaccinated yet. (Figure 8) Among the

vaccinated workers 40% got vaccine during first phase of lockdown, 48% vaccinated during second phase and 8% got vaccine after unlock II. Rate of vaccination dose I and II monitored as 80% of workers have taken their II dose of vaccine and 16% workers have taken their dose I of vaccine.

As government took initiative and practiced certain schemes to help vulnerable section of our society. These benefits acquired by domestic workers made their survival quite easier during and after pandemic. As result shows 60% domestic workers benefited with these schemes such- free rationing, vaccination, sanitization, masks distribution, cash (Rs.500) transferred to the female Jan-Dhan account holders etc. whereas 14% accounted not benefited due to not having ration card/Aadhar card or bank account and 26% did not specified and disclosed either they partially benefited or not (figure-9).

As requested by government to all the employers to help their employees during pandemic but survey found that only 24% domestic workers were helped by their employer such as food, cloth sanitizer, vaccination, monetary help etc. 50% of them denied for help from their employers and managed themselves, 10% helped from other sources (neighbors, relatives, friends etc.) and 16% found helped by NGO, welfare clubs/ organizations etc. (figure 10)

FIGURE: 9 STATUS OF GOVERNMENT BENEFITS ACCESSED BY DOMESTIC WORKERS
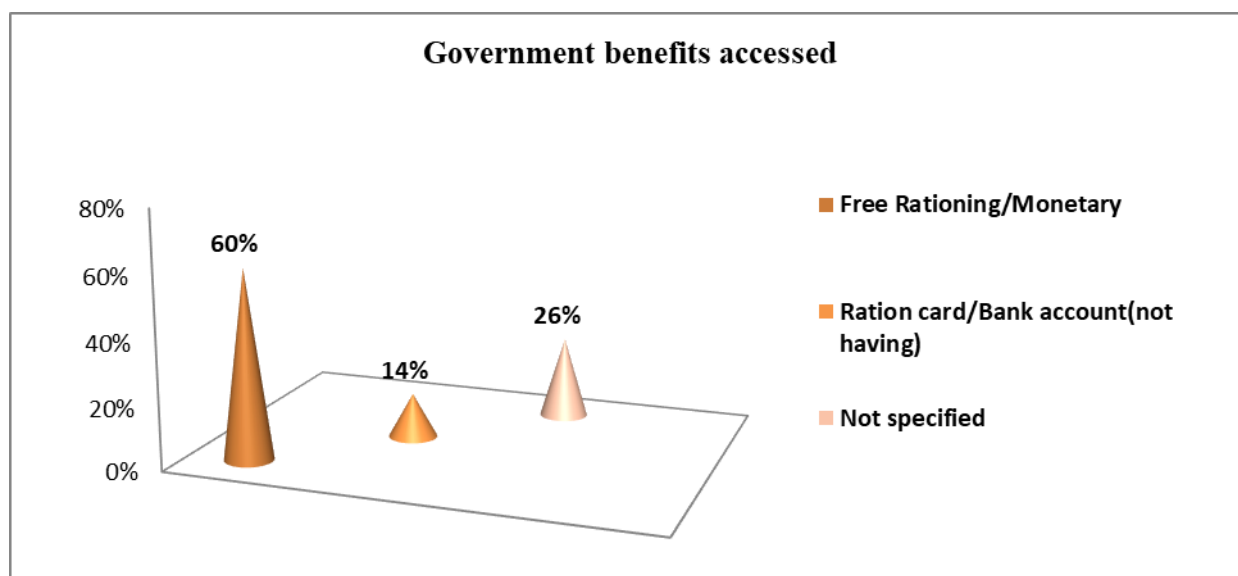
Source- Survey done by Researchers (Authors' own)

FIGURE 10: DOMESTIC WORKERS HELPED BY EMPLOYERS/OTHERS
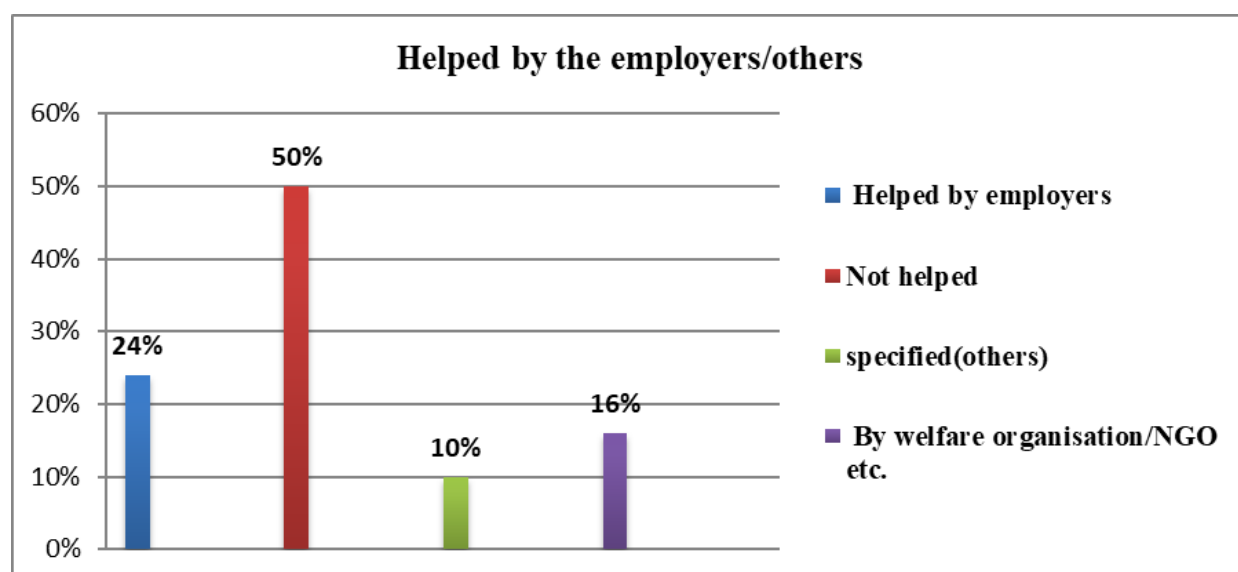
Source- Survey done by Researchers (Authors' own)

SUGGESTIONS AND RECOMMENDATIONS

It is evident from the study that female workers participation is much higher than male domestic workers in domestic services. As they find it most suitable with their age, skills and maintaining work life balance. It was found in the study that exposure to Covid was not much in domestic workers (as 60% of them were not infected at all and 22% just initial symptoms figure -7) and male workers were infected more than female as they go outside more than females. Also, about vaccination maximum (90%) took vaccine from government centres or camps but at the medication side it has been found that whenever ill these workers visit government hospitals or charitable one and only in case of emergency, they visit the private hospital. At the time of crisis weaker sections of society seek help and need support included domestic workers. Survey results found that some of the workers were helped by their employers as they were in need but surprisingly ratio was very less about one fourth of total (24% figure-10). And a large section 50% was denied for help by the side of employer. Reasons may very as per situation and they managed at their own. But the help of NGOs and humane people of society was more pronounced and worked as a cushion for these workers in the time of crisis. Though maximum (60%) were benefitted by government schemes such as free rationing, cash transfer, free vaccination, sanitization etc., but a certain section of workers denied benefits due to absence of certain formal documents such- Aadhar card, ration card, bank account etc. and results stated 26% did not revealed information either they were helped by these schemes / partially or not benefited.

On the basis of the findings of this field study it is suggested that

1. As domestic workers do not have savings or very less savings for crisis time so they should be provided help by the government, some relaxation should be given in case of formal documentation (if any worker is not having these formal documents) to provide relief to these workers and in this regard, powers can be given to DM/SDM or Gram Pradhan to help these workers (conditionally) at the time of crisis.

2. After the crisis whosoever is being helped without formal documentation, their formal documentation should be completed in every manner, so that in future they may not face this kind of problem and will be benefitted equally by government schemes

3. Moreover, these domestic workers should be brought under 'Digital Health Card' (started by government on 23 September 2021) and Ayushmaan Bharat Scheme to get medication help at the time of health problems and emergencies.

4. As it was found in the study that maximum domestic workers are female and their education as well as skill level is very poor so a special drive should be started to educate and train these workers so that they may upgrade their skills and after a certain age (when they are not able to do this work of moping and washing utensils) like male workers female workers may also switch over to some other trade or profession (like hygienic cooking, child rearing, massaging etc.) for their livelihood.

CONCLUSION

As pandemic remarked long lasting effect and gave an unbalanced ambience. Hence both caution and precaution became mandatory to be safe and protected. As pandemic is not over yet now and mankind is facing new challenges day by day so government should take action first to make formal documentation of all these workers. Secondly, should make their Digital Health Card on priority basis so that they can get medication and hospitalization facilities at the time of crisis and survive. No doubt, in India domestic workers are part of support system to middle class and upper-class society. Hence accountability must be shared to employers, workers and government as well. Then only risk can be assessed and minimized on time. It requires positive approach and immediate course of action at workplace and outside too. Apart from this government practices such as communication campaigns, guidelines and policies must be initiated to help these workers as has been recently done in MGNREGA Scheme in UP to provide these workers maternity and other benefits. No doubt, if above suggestions are taken into account, there can be much improvements in the lives of domestic workers.

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ACHSM Asia-Pacific Journal of Health Management shape

APPLICATION OF DISRUPTIVE TECHNOLOGIES ON ENVIRONMENTAL HEALTH: AN OVERVIEW OF ARTIFICIAL INTELLIGENCE, BLOCKCHAIN AND INTERNET OF THINGS

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ABSTRACT

Environmental monitoring technology is a critical component in assisting and ensuring environmental management success. The development patterns of disruptive technologies for environmental monitoring should be studied and anticipated in order to aid in the promotion of India's environmental monitoring and protection. The primary objective is to examine previous research on disruptive technology and its current environmental applications, as well as to determine the degree of connection between the chosen variables, using the Vos Viewer Software, which is being used in this study. A discussion of the existing environmental impacts associated with artificial intelligence (AI), blockchain, and the Internet of Things (IoT), as well as new advancements in these fields, is presented in this article. As a result of the research, the difficulties and possibilities presented by the stated technologies on the entire Indian environmental monitoring network have been highlighted that can be useful for researchers and government for future advancement in environmental health.

KEYWORDS

INTRODUCTION

Environmental data gathering has been simplified and enhanced via the use of information management, networking technologies, and technological advancements. As one example, cloud computing capacity for data storage now enables continuous data gathering through lightweight sensors. The knowledge collected, however, is often not used correctly. However, low-cost data storage and growing computer power (especially technical computing capability) may assist

create an extensive collection of environmental datasets with untapped potential. [1]

Investigations and study have suggested that modern technology should be included in the scope of climate change and that pan-Indian surveillance and monitoring methods be established to promote environmental protection. Academics, legislators, and environmental authorities all have access to analytical tools to develop ideas from open data, and these methods include evidence from various ecosystems of environmental data. [2]

In the future, these techniques may benefit from several new technologies, such as the Internet of Things, cloud computing, "Artificial Intelligence," "Blockchain," "Machine Learning," and "Deep Learning," among others. Many fields involving Comprehensive statistics, such as "influenza control" and "air quality monitoring," have benefited from these ground-breaking innovations, which have the potential to greatly facilitate the establishment of a pan-Indian surveillance mechanism, as demonstrated by their widespread application [3]. As environment is changing quickly and affecting wellbeing of people around the world, we must now adjust to this shift and cope with new demands on the environment monitoring system. [4]

It is the purpose of this article to explore new efforts to solve some of the issues using creative technologies. Prior literature is reviewed, as well as its application in the Indian environmental and health monitoring framework, and potential problems that may arise in the process of incorporating the proposed Pan-Indian Monitoring System components are discussed. The goal of the study is to offer a variety of descriptions of the current and future applications of these technologies in the environmental health. [5]
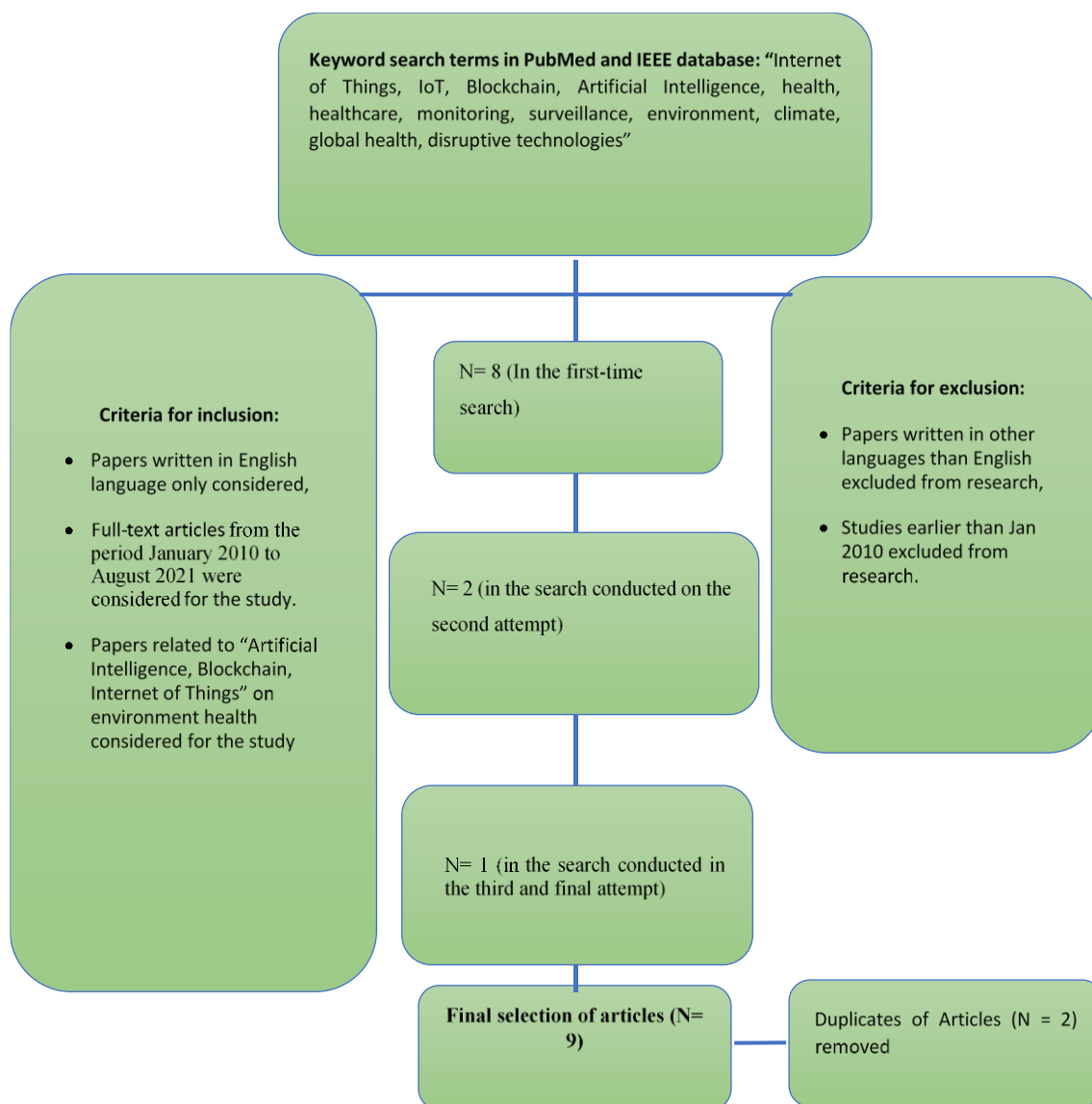
RESEARCH METHODOLOGY

The current research was carried out utilizing descriptive analysis. The researchers developed a schematic representation (see Figure 1) adopted from [6] to demonstrate method for choosing papers and to indicate the need for exploring the ways to ensure development of monitoring, surveillance, and environmental health related activities by integrating Artificial Intelligence, Blockchain, and Internet of Things. The current study followed the criteria for schematic representation as existing research striving for greater accuracy. [6] The stages for a systematic review are outlined in this context (as mentioned in table1):

TABLE 1: FORMULATION OF RESEARCH DESIGN

RESEARCH METHODS	
Research Question	In this study, we sought to answer the question, "How disruptive technologies based on Artificial Intelligence, Blockchain, and the Internet of Things would aid environmental health research?"
Articles searching	A collection of articles from academic databases (PubMed and IEEE).
Study design	A wide range of papers, including randomised controlled trials, cross-sectional, meta-analytic, and systematic review investigations, were analysed.
Sources of Data collection	The examination of earlier research on the use of several disruptive technologies in environmental health and the climate to gather data for the current study.
Variables Assessed	In the end, the articles are analysed and a number of indicators are obtained. In addition to: *"Internet of Things" "Blockchain", "Artificial Intelligence", "environmental health".*
The compilation, Results, and monitoring	In order to better understand environmental and health data, we look at the most recent breakthroughs and challenges in disruptive technology.

FIGURE 1- ARTICLE SELECTION PROCESS REPRESENTED IN FLOWCHART

Keyword search terms in PubMed and IEEE database: "Internet of Things, IoT, Blockchain, Artificial Intelligence, health, healthcare, monitoring, surveillance, environment, climate, global health, disruptive technologies"

N= 8 (In the first-time search)

Criteria for inclusion:

- Papers written in English language only considered,
- Full-text articles from the period January 2010 to August 2021 were considered for the study.
- Papers related to "Artificial Intelligence, Blockchain, Internet of Things" on environment health considered for the study

N= 2 (in the search conducted on the second attempt)

Criteria for exclusion:

- Papers written in other languages than English excluded from research,
- Studies earlier than Jan 2010 excluded from research.

N= 1 (in the search conducted in the third and final attempt)

Final selection of articles (N= 9)

Duplicates of Articles (N = 2) removed

RESULT

A close examination of many academic publications and government research, including "Internet of Things, Blockchain, and Artificial Intelligence" may generate enormous potential for environmental information promotion. This investigation used the Vos Viewer software version 1.6.15 to try to discover the degree of connection between the factors examined by the researchers in the chosen publications. As a first step, researchers mapped out the most commonly used terms in their publications using a keyword frequency database. (As shown in Figure 2), and a network representation of the most frequently used keywords in the chosen articles is shown in Figure 3.

The creation of clusters was discovered using a keyword mapping from the previous research. A clustering model was created and displayed 3 clusters, as shown in Table 2.

The research found that the most powerful terms generated in Vos Viewer software had a mapping to specific keywords with the greatest frequency (figure 4). The network visualization revealed how influential the most important terms collected from the chosen articles were connected to one another. Strong associations among terms including "artificial intelligence," "internet of things," "blockchain," and with "environmental health" were identified, with being the most significan

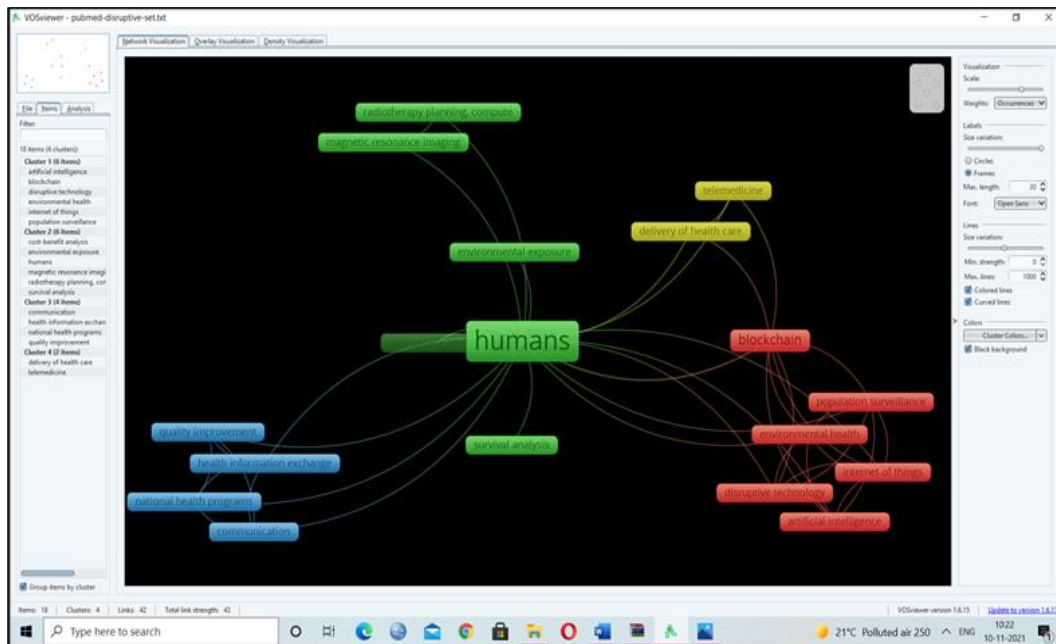**FIGURE 2: PLOTTING OF KEYWORD DISTRIBUTION IN SELECTED ARTICLES**

FIGURE 3- SELECTED ARTICLES PLOTTING AND DISTRIBUTION OF THE FREQUENT OCCURRED KEYWORDS AS A NETWORK
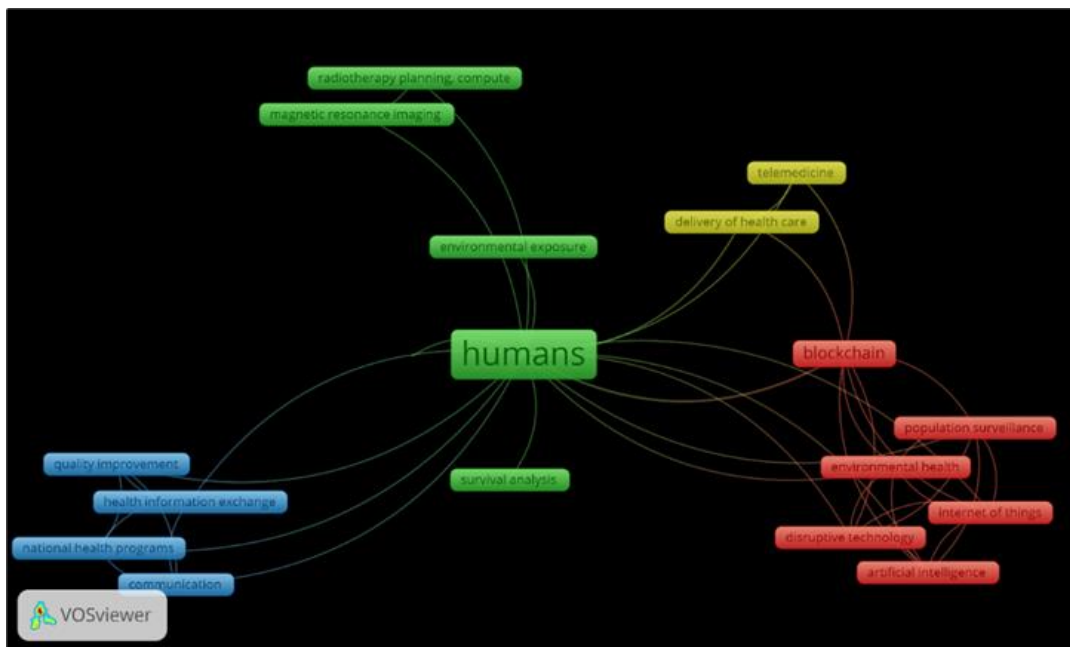
TABLE 2- CLUSTER CREATED USING VOS VIEWER SOFTWARE

S.NO.	NO. OF ITEMS IN CLUSTERS	FORMED CLUSTERS' DETAIL
1.	Cluster 1 (6 items)	- Artificial intelligence - Blockchain - Eisruptive technology - Environmental health - Internet of things - Population surveillance
2.	Cluster 2 (6 items)	- Cost-benefit analysis - Humans - Environmental health - Magnetic resonance imaging - Radiotherapy planning - Survival analysis
3.	Cluster 3 (4 items)	- Communication - Health information exchange - National health programs - Quality improvement
4.	Cluster 4 (2 items)	- Delivery of health care - Telemedicine

FIGURE 4- VISUALIZATION OF THE MAPPING OF THE MOST COMMON KEYWORDS IN SELECTED ARTICLES AS A NETWORK
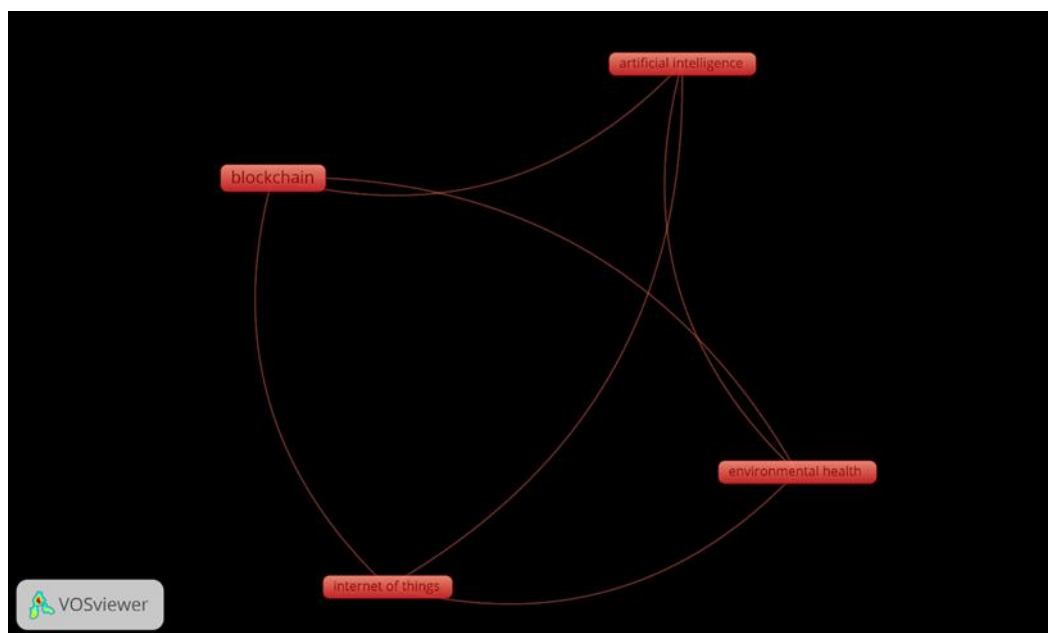
The research examined each disruptive technology in detail and determined how each will be used in environment studies as described below:

1. INTERNET OF THINGS

The IoT is a rapidly developing concept of networking that seeks to transform the contemporary world today. The goal of IoT is to integrate many intelligent devices and linked networks into one large network. [7],[8]

1.1. Internet of Things in the Environment

Significant weather conditions, such as drastic increases in temperature, forest fires, and storms causing rivers, have a significant effect on wellbeing. People rely on the environment, and these developments have a significant impact on their wellbeing through improved dissemination and circulation of diseases and air pollution. [9]

IoT surveillance of the atmosphere and wellbeing will further strengthen the present perception of their relationship and contribute to possible ways to minimize harmful effects. The newest use in the environment for IoT sensors involves mapping spatio-time information such as transport rates and pollutant sources and utilizing sensor gathered or consumer crowd-sourced data for epidemiological tracking. [10]

Sensors of air quality management are mainly used in outdoor or indoor tracking and personal monitoring. In addition to air quality, IoT technology also tracks and generates unhealthy radiation levels, noise, real-time water pollution charts, and temperature. [11]

2. BLOCKCHAIN

2.1. Blockchain in Environment

As in health, Blockchain can overcome problems of interoperability and data exchange, help facilitate decisions and maximize capital. Technology can also boost urgent environmental issues such as resources, climate change, natural hazards, degradation of ocean quality, and air pollution. A blockchain-enabled food monitoring

solution will improve transparency in the production phase and allow consumers' eco-safe choices. Companies like IBM are also in the early stage of Blockchain's application of powered food chain technology. [12]

The present research has mentioned the ability of Blockchain to permit peer-to-peer trading. The Blockchain could contribute to the implementation of peer-to-peer energy sharing schemes in environmental scenarios in which consumers will exchange energy amongst themselves. The integration of Blockchain and IoT sensors would help to render intensive care of air and water quality. The durability of the disruptive technology of Blockchain will assist natural catastrophes. [13]

3. ARTIFICIAL INTELLIGENCE

3.1. Artificial Intelligence in Environment

As climate change stems from human actions, environmental conditions that will affect our atmosphere and health care must be correctly forecasted. However, climate simulations are also somewhat different, mainly due to how data separated into distinct sections, the way processes and structures combine, and spatial and temporal scales as the broad spectrum. [14]

More specifically, AI often improves weather prediction and the forecast of severe weather incidents [5]. This is how they will apply new knowledge to cope with the environment's actual world complexity taking into consideration the nature of the weather and the seas and the atmosphere in their estimates. This increases weather and environment modelling performance, rendering forecasts for decision-makers more valuable. [15]

After doing the above assessment, the present study finds the below-mentioned review of articles to be critical to address the potential challenges and opportunities present in the study:

Technology has advanced at a breakneck pace throughout the years.

TABLE 3: INCLUSIVE ASSESSMENT OF RELEVANT ARTICLES FOR RECENT RESEARCH

S. NO.	TECHNOLOGY	STUDY AREA	RESEARCH OBJECTIVE	CHALLENGES	OPPORTUNITIES	REFERENCE
1.	Internet of Things	Environment	As technology advances, it is becoming even more critical that these IoT devices become autonomous to allow long-term environmental sensing activity.	With the Internet of Things becoming more omnipresent and applications becoming creative, independent devices' ability demands more creativity.	Energy injection methods may be used to include sensing devices that can function in several settings where natural energy supplies are not or are not large enough.	[16]
2.	Internet of Things	Environment	This thesis primarily aims at systemic research on indoor air pollution management technologies that are cutting-edge and built on the Internet of Things.	The development of useful IAQ tracking functionality must be based on given the emerging pandemic scenario.	Real-time living climate reporting supports public security and well-being	[2]
3.	Blockchain	Environment	To discover different implementations of cyber-physical systems that use blockchain.	The introduction of blockchains into the IoT field would satisfy the need for cryptographic authentication, affecting crucial improvements through various industries.	Smart grids, health networks, and industrial manufacturing systems are among the many applications that blockchain technology can support.	[17]
4	Blockchain	Environment	When it comes to environmental sustainability in a globalised society, what role does the blockchain play?	There may be environmental consequences from implementing blockchain technology, and managers need to be prepared.	The recognition of the importance of blockchain technologies in environmental sustainability offers policymakers the advice to stimulate the development of appropriate technical infrastructure that enables blockchain execution and	[18]

				environmental sustainability by making this technology easier to use and disseminate at both the public and private sectors		
5.	Artificial Intelligence	Environment	To discuss the most recent developments in Iontronic Sensor technology.	A technology that enhances the human sense of touch with the environment beyond skin-like sensation is desired in ambient experiences.	For the development of wearable routes and disposable applications, a good Iontronic Sensing principal signal-to-noise ratio in low-power electronics may be crucial.	[19]
6	Artificial Intelligence	Environment	Artificial Intelligence influence on the Sustainable Development Goals in the Society group examined.	For AI's rapid growth to be sustainable, it must be backed by regulatory knowledge and control of AI-based technology. Doing so might lead to a lack of transparency, safety, and ethical standards.	There must be an Artificial intelligence (AI) and its growing effect on a variety of industries on the accomplishment of the Sustainable Development Goals.	[20]

CONCLUSION

Various stakeholders from many different fields and disciplines are encouraged to join forces to broaden reporting and monitoring programmes on environmental effects on human safety in the interest of the well-being of people, according to the present study. Data management, safety, and security standards must be addressed before effective monitoring systems can be adopted, according to the conclusions of this study. There has been a dramatic increase in the general population's awareness and adaptability to new technologies and technological regimes.

Though the possibilities of IoT, blockchain, and AI all have the potential to accelerate the integration of environmental data, they all face certain drawbacks and difficulties when it comes to environmental monitoring, which should be prioritized. This research explored the current use of three emerging technologies — remote surveillance, surveillance, and a requirement for an enhanced computer architecture — to better address the needs of pilot and tracking operations. The focused efforts to assess a variety of scholarly publications and government reports, as well as the technological infrastructure's suggestions for management and operations, provide intriguing information for further study.

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REVIEW ARTICLE

IMPACT OF COVID-19 ON THE MENTAL HEALTH OF HEALTHCARE WORKERS: PREDISPOSING FACTORS, PREVALENCE AND SUPPORTIVE STRATEGIES

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ABSTRACT

The massive upsurge of hospitalizations and deaths in the wake of COVID-19 pandemic has placed an unprecedented strain on the psychological well-being of the healthcare workers (HCW) worldwide. The concern about being viewed as unfit for duty by employers or "mentally weak" was the primary reason given. In addition, a majority of HCWs insisted that improvements on the administrative front would have a better impact. An extensive literature review for this paper has been done through databases like Pubmed (Medline) and Google scholar to compile information from various sources. A study of the causative and exacerbating factors, corrective and preventative measures applied, and direct feedback from HCW reveals that much work is yet to be done to develop a satisfactory approach towards ensuring the mental wellbeing of one of the greatest assets in the fight against the pandemic.

KEYWORDS

Healthcare workers, Mental health, COVID - 19, Anxiety, Depression, Burnout, Insomnia

INTRODUCTION

Since early 2020, when the COVID-19 pandemic propagated by the SARS-COV-2 virus spread across the world, it has claimed millions of lives and injured the quality of life for millions more. Perhaps one of the more disproportionately affected professions has been that of healthcare workers (HCW), who have tirelessly worked to save lives and control the devastating effect of the virus. In the process, they work for hours on end without food or water due to restrictions associated with personal protective equipment (PPE). Many are unable to spend adequate time with their friends and family due to exhaustion and fear of infecting them. This can be exacerbated by institutional inefficiencies such as insufficient resources and manpower. Additionally, they witness death and bereavement on a large scale, perhaps more than any other profession has during these past 2

years. This is compounded by abuse and harassment from agitated relatives of the infected or deceased.

This paper explores the incidence of mental health issues in HCW worldwide because of the COVID-19 pandemic. It also discusses the predisposing factors in this regard, which is crucial for the development of initiatives that are preventive rather than corrective. Finally, it discusses the various interventions and HCW response to them.

PREDISPOSING FACTORS INFLUENCING DEVELOPMENT OF MENTAL HEALTH ISSUES

Numerous efforts have been made to better define the risk factors that make HCW more susceptible to developing adverse mental health and related effects in this scenario. There is also evidence to suggest that there may be a specific demographic that may be at a higher risk as well. While many have postulated that certain factors which translate to having greater personal responsibilities and a poorer support system make an individual more likely to fall prey to anxiety, depression, etc., there remains scope for further research in this area which would allow hospital administration and human resource personnel to better identify employees who are at risk and hence introduce more effective policies to combat it. In addition, it is worthwhile to take into consideration that employees who fall into more than one category simultaneously, for example, a sole breadwinner who also has an infected family member, can be in a position that exacerbates the degree of mental distress experienced. Studies have been done on the gender aspect of mental health issues faced by HCWs. Most of the studies indicated that women in the healthcare sector, especially those engaged in direct care of patients who have contracted COVID-19, are more likely to experience psychological distress than their male counterparts.

In a study involving both doctors and nurses, greater incidence of Post-Traumatic Stress Symptoms (PTSS) and symptoms indicative of depression were observed in HCW engaged in COVID-19 wards as compared to those working in other units. In addition, being female and not being in a relationship were seen to be predictive indicators for depressive symptoms, whereas being of female sex and of advanced age were predictors for PTSS. [15] This may indicate that women suffer more from the lack of a support system, especially as age increases. Further highlighting the role of gender as a risk factor, a survey of

350 respondents observed that symptoms of anxiety and depression requiring further evaluation, as well as probability of experiencing moderate or severe stress, were roughly two times higher in women. The risk was doubled in those women who were not staying in a permanent accommodation. [18] This, too, can be tied into the lack of a support system and increased exhaustion, both mental as well as physical.

A study that considered the effects of COVID-19 in tandem with similar virus outbreaks on the psychological state of mind revealed many similarities. It was found that being more junior both in age and in designation, being primary caretakers of dependents, and occurrence of an infection in the family predisposed to mental distress. The stigma in society against HCW who came in close contact with infected persons, lack of support, and an increased duration of quarantine also contributed in this regard. [13] This draws attention to the many parallels that can be drawn between various viral outbreaks, specifically, fear of getting infected or transmitting the infection to family, severe exhaustion and burnout, etc. In addition, it can also be argued that this stress can be exacerbated by inefficiencies on the administrative front. In the context of COVID-19, this can manifest as inadequate provision of personal protective equipment (PPE) or inadequate manpower. HCW may also feel the need to buy additional PPE if they feel that the PPE provided by the hospital is insufficient. During government-imposed lockdowns, they may also have been forced to arrange for their own transportation. This can add a financial strain on many HCW who are already undercompensated, especially in developing countries.

Nishimura et al [8] surveyed doctors and nurses in Japan to estimate the prevalence of burnout in HCW. They observed that in HCW involved in direct care of infected patients, the rate of burnout was 50%. In addition, those posted in the Intensive Care Unit (ICU) were more likely to experience burnout in contrast to those from General Medicine

A review of the existing literature further highlighted the role of demographic variables such as profession/specialization within healthcare, department in which the HCW was employed, as well as self-efficacy and reduced support outside of work, in giving rise to stress, disturbed sleeping patterns and anxiety. In addition, it was suggested that COVID-19 in itself may be considered as an individual stress factor in HCW, a proposition increasingly supported by statistical evidence. [13] Constantly varying shift durations,

24-hour shifts, changing from day shift to night shift, long commutes can all cause insomnia and poor quality of sleep when compounded with other stress-inducing factors. Many HCW also report exhaustion and skin discomfort, as well as more serious manifestations such as urinary tract infections, due to continuous wearing of PPE over many hours.

PREVALENCE OF MENTAL HEALTH ISSUES

FIGURE 1- SUMMARY OF FINDINGS (PREVALENCE OF MENTAL HEALTH ISSUES)

Study	Total Number of HCW surveyed	%Age reporting anxiety	%Age reporting depressive symptoms	%Age reporting insomnia/disturbed sleeping pattern	%Age reporting PTSS/PTSD	%Age reporting stress
[4]	97,333	22.1	21.7	-	21.5	-
[10]	33,062	23.2	22.8	38.9	-	-
[7]	NA	24	21	37	-	37
[11]	3083	26.6	23.8	-	-	-
[9]	194	32.5	37.6	50	-	-
[6]	8267	38.1	32.1	-	-	81.7
[12]	939	60.2	77.6	50.4	-	76.4
[20]	1685	33	29	-	14	-
[16]	NA	24.1	12.1	-	-	29.8
[18]	350	17.7	11.4	-	-	-

FIGURE 1- REVIEW OF EXISTING LITERATURE

AUTHOR (S)	FINDINGS
[16]	Discussed prevalence of mental health issues including anxiety, depression, stress, sleep disorders etc that were experienced by HCW. It was found that being employed in a geographical area with high infection rates, being a female worker, being younger in age, and being a nurse resulted in more severe psychological stress.
[12]	Observed that HCW are indeed at higher risk of acquiring mental health issues as compared to those individuals not working in the industry. They may also experience moral injury during their course of work. Reinforcement teams and regular contact to ensure wellbeing are initiatives that can promote a better outcome. Where possible, employees should be monitored and provided with well researched treatments once the risk of the pandemic starts to decrease in intensity. It is important for healthcare managers to address the psychological wellbeing of the employees. Clear instructions should be provided on what to expect in the line of COVID-19 duty.
[15]	Focused on the incidence of PTSS among HCW and discussed the possible predisposing factors. Found gender and age to correlate with probability of developing PTSS and gender and marital status to correlate with probability of developing depressive symptoms.

[19]	Postulated that self-help may be pursued as a viable option because it can be made available to HCW through a variety of platforms. In addition, it has also been observed that self-help is an effective intervention for a wide variety of psychological issues.
[13]	Correlated increased mental distress, including disturbed sleeping patterns, with department of employment, gender of the employee, age and line of work. Predisposing factors were found to include an unstable support system and self-efficacy.
[3]	Being caretakers responsible for the safety of dependent children, being more junior in designation, and having an infected family member were seen to increase the incidence of mental health issues. Longer quarantines and increased stigma in society also contributed in this regard. Availability of adequate PPE and sufficient rest alleviated these issues.
[17]	Discusses the negative impact on staff members and takes into consideration interventions at the individual level, at the team level and at the organizational level that can help provide support to the affected employees.
[1]	Analyzes the interventions implemented by a large-scale tertiary hospital in China to improve mental health of employees. Along with interventions such as guidance and counselling, the hospital responded to feedback after slow uptake and modified its approach to include adequate rest for HCW and training to handle uncooperative patients.
[10]	A systematic review aimed at estimating the prevalence of mental health issues in HCW insomnia, anxiety, and depression. By compiling the available data, it was found that nursing staff and female HCW were more susceptible.
[7]	Conducted a rapid systematic review and discussed the various support programs offered by institutes to HCW and HCW response to them. Found that many HCW are more interested in adequate resources such as PPE and enough time to rest and contact their family instead of professional psychological support.
[18]	A cross-sectional online survey in the country of India. It was found that female HCW were approximately twice as likely to develop moderate or high-level stress, anxiety and depressive symptoms that warranted further psychological evaluation. In addition, women who were housed at a temporary accommodation or a hostel had more chances of developing depressive symptoms or anxiety.

TREATMENT AND PREVENTION

Kisely et al [3] observed that multiple studies converged on provision of sufficient PPE, ensuring that staff is well rested, clear forms of communication, and external interventions as being correlated with reduced morbidity amongst HCW. In a survey encompassing physicians from multiple continents, reliance on family was shown to be the most preferred method for stress reduction by the respondents. [5] A majority of the HCWs surveyed by [14] viewed social support to be critical. These informal forms of help were seen to be more favored by HCW across multiple studies, supporting the argument that the presence of a robust support system and allocation of adequate time to communicate with friends and family is important. While it may be easier for HCW to communicate their feelings with those whom they trust, it may also be postulated that these interventions may discourage them from accessing professional help even if they are in need of it. Thus, in the long run, they may end up doing more damage than expected.

However, it has been observed that merely the provision of psychological interventions is inadequate to alleviate mental health issues faced by HCW. An in-depth study by Chen et al [1] in a large tertiary hospital in China found that

many HCW were hesitant to make use of the available resources such as hotlines and group activities intended to reduce stress.

Some of the reasons cited by them included not wanting their families to worry about them, and risk of getting infected not being an immediate worry. They instead reiterated their need for adequate rest and PPE provision. They faced a greater concern when dealing with uncooperative and critically ill patients, and instead requested training on how to handle emotional disturbances in these patients, since they do not feel adequately equipped to handle such situations.

Muller et al [7] found in a systematic review that hospitals and other care organizations such as psychiatric facilities introduced steps to combat mental health effects in HCW that relied heavily on symptoms experienced on a person-to-person basis. They included interventions on the level of the individual like mental health hotlines and other supportive strategies aimed at improving the situation at a personal level. Thus, a majority of them had one factor in common they all targeted the individual psychopathology. The researchers are of the opinion that this downplays the role of the institution in framing policies and regulations that may harm the mental health of the HCW. This can prevent the unearthing of major insufficiencies at the administrative level which, if addressed and rectified, would produce better outcomes.

CONCLUSION

This paper explores the possible causative factors for mental health issues in HCW, the prevalence according to multiple studies, and remedial steps that are being taken or that may be taken in order to alleviate the situation. HCW are one of our most crucial weapons in the fight against COVID-19 and it is imperative that this taskforce is not crippled in any way by the effects of psychological distress arising from the pandemic.

The first step in any clinical setting with a large number of employees can be a survey to estimate the extent of deleterious mental effects and the preferred way for reduction of stress. Keeping the possible risk factors in mind, special attention may be given to providing support to those employees who are showing signs of mental distress or who are at a greater risk of doing so. Professional consultation with psychological experts should be sought

and their suggestions implemented. Adequate time should be given for rest and relaxation between shifts. If necessary, alternative accommodation may be provided by the hospital to reduce risk of transmission of infection from HCW to their families. While initiatives such as support groups and mental health hotlines are important, exploration into the possible shortcomings at the institutional level should also be explored and corrected to the extent possible.

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RESEARCH ARTICLE

THE IMPACT OF TELEVISION ADVERTISEMENTS ON STUDENT DECISION-MAKING PROCESS FOR COLLEGE ADMISSION: AN EXPLORATORY STUDY IN INDIA

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ABSTRACT

COVID-19 drove universities throughout the world forcing Higher Education Institutions (HEIs) to go online or virtual. Admissions advertising and student recruitment were two of the sectors that were severely hit. Internet-based advertising has to entirely replace the old advertising environment. Although certain institutions were still able to conduct virtual tours, forums, and information sessions, the amount of involvement differed among colleges and universities. An exploratory study was conducted to investigate how effective Internet advertisements were in influencing students' admission decisions. During the academic year, 2020-21 at several institutions in India's western region, data were collected using the snowball sampling approach on 930 freshly enrolled students. The findings show that the efficacy of Internet ads for university admission is negatively correlated with the student's age group. Surprisingly, the study discovered that both rural and urban students were equally interested in online ads, and that family background had no impact on receptiveness to internet advertisements.

6.1. KEYWORDS

University Admissions; COVID-19; Internet Advertisements; Pandemic; Student Recruitments.

1. INTRODUCTION

The COVID-19 outbreak forced universities and other academic organisations to respond quickly to life-threatening conditions [1][2]. Most universities were compelled to shut down almost every element of their research and teaching operations as a result of it. [1] [3]

Although institutions were able to shift to virtual offerings in a very short period and assist students in completing their degree programmes online, universities and colleges struggled to admit and enrol new students. [4][5][6][7] Due to the lockdown scenario during the Covid-19 epidemic, university marketers' conventional strategies were disrupted. [8]

Because the Internet is a more engaging medium, it may have a significant influence on students' admissions decisions. [8–11] Online channels such as Facebook, Twitter, Instagram, YouTube, and email, to mention a few, are included in the word "internet". [12] [13] To reach out to potential students, schools and universities are increasingly employing Internet ads as part of their marketing plan. [7]

The influence of online advertising on students' admissions decision-making has been studied by academics. In emerging countries, the amount of internet advertising is rapidly increasing. [13–15] Marketers have put a lot of money into different digital channels that influence customer behaviour. [16] [17] Consumer media habits have shifted dramatically as a result of the digitization of communication channels. [18] As a result, it's crucial to understand how young potential students react to the different communication channels utilised by higher education marketers in India. [19] [20] An exploratory study was conducted to determine the influence of Internet advertisements on students' admissions decision-making process.

2. RESEARCH FRAMEWORK

In 1981, Chapman conducted a review of the literature on college selection and developed a model to "assist college administrators responsible for recruitment policy in identifying the pressures and influences they must consider in developing institutional recruiting policy, as well as to aid continued research in the area of student college choice". [21]

FIGURE 1 CHAPMAN, D. W. (1981). A MODEL OF STUDENT COLLEGE CHOICE [21]
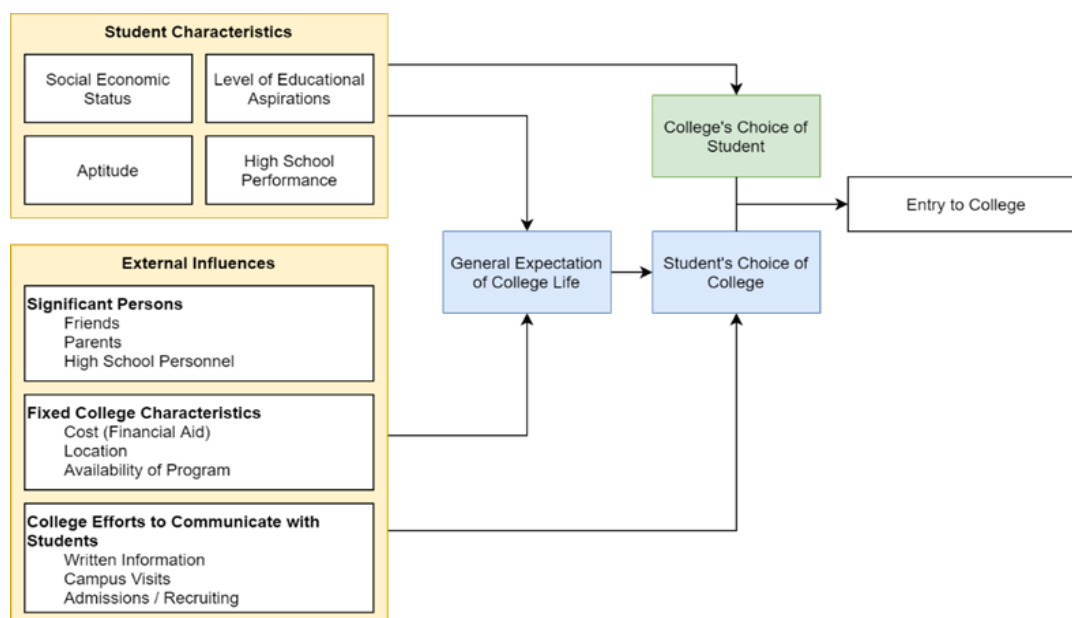
According to Chapman's approach, written communication, campus visits, and admissions and recruitment activities are all major external influencers, with the third being the college's attempts to connect with students. Below is the proposed model in this study:

FIGURE 2 PROPOSED RESEARCH MODEL
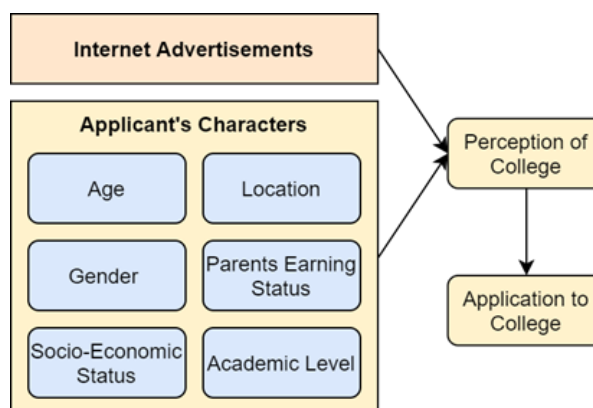
3. DATA AND SAMPLE

A convenience sample of 224 students was used to create and administer a structured questionnaire. The respondents were undergraduate and graduate students in India's western region. The survey was conducted entirely online. Only one response per student was taken into account. Due to incompleteness, partial replies were not included in the study, leaving 24 such responses. Finally, 200 responses were deemed to be suitable for further investigation.

4. MEASURES

The questionnaire had a total of 12 items, all of which were written in English. The items in the questionnaire were graded on a seven-point Likert scale that ranged from 1-Strongly Disagree to 7-Strongly Agree.

5. DATA ANALYSIS

The data was analysed using SPSS software. Cronbach's alpha value was used to assess the scales' internal consistency. Internal consistency reliability, which is assessed by alpha coefficient reliability or Cronbach Alpha, is used to assess the instrument's reliability. The Chi-Square test was used to evaluate the hypotheses.

6. RESEARCH CONTEXT

While extensive research has been done on the factors that impact students' educational goals and their decisions to enrol or not enrol in college, students' choice of school has received less attention. [4] [22] [23] The lack of research is due to several issues. During an era when college enrolments were soaring, college officials were unconcerned about particular consequences on students' college choices. [24–26] The emphasis in admissions was on selection rather than recruiting. [27] There hasn't been much theory to guide study into individual college selections. [28] [29] Researchers looked at undergraduate and postgraduate students who had recently applied for admission to several private universities for the academic year 2020-21.

6.1 SAMPLING

All domestic students who applied for admission to various graduate and undergraduate programmes in the academic year 2020-21 were included in the study. This study was done entirely in the English language. The study questionnaire responses were collected in the third quarter of 2020. The survey was distributed to 930 students, and 224 students answered, accounting for 24.08 per cent of the total. 200 replies (n=200) were found suitable for further study after a thorough inspection and data cleansing.

6.2 METHODOLOGY

The frequency and percentages were used to express the analysis of Qualitative Data Variables. The Chi-Square test was performed to determine the relationship between various demographic factors and the study goal, which is University Advertisements on the Internet. Significant p-values of less than 0.05 were evaluated.

7. RESULTS

7.1 PROFILE OF RESPONDENTS

		n	Percentage
Gender	Male	132	66.0%
	Female	68	34.0%
Socio Economic Status	Upper Class	4	2.0%
	Upper Middle Class	94	47.0%
	Middle Class	89	44.5%
	Lower Middle Class	13	6.5%
Original Residence	Rural India	24	12.0%
	Urban India	176	88.0%
Employment Status	Both (Parents) Employed	52	26.0%
	Single (Parent) Employed	148	74.0%

Academic Level	Postgraduate	6	3.0%
	Undergraduate	194	97.0%

Faculty	Commerce	31	15.5%
	Engineering	1	0.5%
	Law	1	0.5%
	Management	167	83.5%

7.2. STATISTICAL ANALYSIS OF THE IMPACT OF INTERNET ADVERTISEMENTS ON ADMISSIONS DECISION

		n	Percentage
Have you seen the Advertisement for the University you are currently studying in before taking Admissions	No	35	17.5%
	Yes	165	82.5%
How far the content of the Advertisement was effective towards admission decision	Not Appealing	2	1.2%
	Somewhat Appealing	6	3.6%
	Moderately Appealing	38	23.0%
	Highly Appealing	61	37.0%
	Extremely Appealing	58	35.2%
How far the design of the Advertisement was effective towards admission decision	Not Appealing	3	1.8%
	Somewhat Appealing	5	3.0%
	Moderately Appealing	40	24.2%
	Highly Appealing	64	38.8%
	Extremely Appealing	53	32.1%

7.3. HYPOTHESIS TESTING

Hypothesis No 1: H0 There is no association between the age group of the respondents and their tendency to pay attention to internet advertisements of the universities of their interest.

Age Group of the Respondents	Paid attention to internet advertisements of the universities of their interest		Total	p-value
	No	**Yes**		
≤ 18	15	116	131	
> 18	3	23	26	0.999
Total	18	139	157	

The p-value of 0.999 indicates that there is no association between the age group of the respondents and their tendency to pay attention to internet advertisements of the universities of their interest. Hence, the Null Hypothesis is accepted.

Hypothesis No 2: H0 There is no association between the Gender of the respondents and their tendency to pay attention to internet advertisements of the universities of their interest.

Gender of the Respondents	Paid attention to internet advertisements of the universities of their interest		Total	p-value
	No	**Yes**		
Male	7	87	94	
Female	11	52	63	0.073
Total	18	139	157	

The p-value of 0.073 indicates that there is no association between the Gender of the respondents concerning the tendency to pay attention to internet advertisements of the universities of their interest. Hence, the Null Hypothesis is accepted.

Hypothesis No 3: H0 There is no association between the Socio-Economic Status of the family of the respondents and their tendency to pay attention to internet advertisements of the universities of their interest.

Socio-Economic Status of the family of the respondents	Paid attention to internet advertisements of the universities of their interest		Total	p-value
	No	**Yes**		
Lower Middle Class	0	2	2	
Middle Class	10	60	70	
Upper Middle Class	7	67	74	0.754
Upper Class	1	10	11	
Total	18	139	157	

The p-value of 0.754 indicates that there is no association between the Socio-Economic Status of the family of the respondents concerning the tendency to pay attention to internet advertisements of the universities of their interest. Hence, the Null Hypothesis is accepted.

Hypothesis No 4: H0 There is no association between the Original Location of the respondents and their tendency to pay attention to internet advertisements of the universities of their interest.

Original Location of the Respondents	Paid attention to internet advertisements of the universities of their interest		Total	p-value
	No	**Yes**		
Rural India	0	19	19	
Urban India	18	120	138	0.131
Total	18	139	157	

The p-value of 0.131 indicates that there is no association between the Original Location of the respondents concerning the tendency to pay attention to internet advertisements of the universities of their interest. Hence, the Null Hypothesis is accepted.

Hypothesis No 5: H0 There is no association between the Earning Status of the Parents of the respondents and their tendency to pay attention to internet advertisements of the universities of their interest.

Earning Status of the Parents of the respondents	Paid attention to internet advertisements of the universities of their interest		Total	p-value
	No	**Yes**		
Both Parent Earning	2	38	40	
Single Parent Earning	16	101	117	0.163
Total	18	139	157	

The p-value of 0.040 indicates that there is an association between the Earning Status of the Parents of the respondents concerning the tendency to pay attention to internet advertisements of the universities of their interest. Hence, the Null Hypothesis cannot be accepted.

Hypothesis No 6: H0 There is no association between the Academic Level of the respondents and their tendency to pay attention to internet advertisements of the universities of their interest.

Academic Level of the respondents	Paid attention to internet advertisements of the universities of their interest		Total	p-value
	No	**Yes**		
Postgraduate	1	0	1	
Undergraduate	17	139	156	0.115
Total	18	139	157	

The p-value of 0.115 indicates that there is no association between the Academic Level of the respondents concerning the tendency to pay attention to internet advertisements of the universities of their interest. Hence, the Null Hypothesis is accepted.

Hypothesis No 7: H0 There is no association between the Academic Stream of the respondents and their tendency to pay attention to internet advertisements of the universities of their interest.

Academic Stream of the respondents	Paid attention to internet advertisements of the universities of their interest		Total	p-value
	No	**Yes**		
Commerce	1	26	27	
Engineering	0	1	1	0.295
Management	17	112	129	
Total	18	139	157	

The p-value of 0.295 indicates that there is no association between the Academic Level of the respondents concerning the tendency to pay attention to internet advertisements of the universities of their interest. Hence, the Null Hypothesis is accepted.

8. DISCUSSION AND CONCLUSIONS

After assessing all seven assumptions, researchers determined that the student's age had no effect on the effectiveness of Internet marketing for university enrolment. Graduate and postgraduate students had an interest in internet advertisements. As a result, while establishing higher education marketing strategy, bear in mind that whether you're advertising graduate-level or postgraduate-level material, your message will have the same impact.

Similarly, it was revealed that prospective students' gender, as well as their family's financial status, had no influence on their acceptance of internet advertising. Male and female students were equally interested in their ability to respond to internet advertisements. University adverts on the Internet were ecstatically received by families from the Lower Middle Class, Middle Class, Upper Middle Class, and Upper Class.

Researchers also looked into whether applicants' location in India (rural vs. urban) influenced their willingness to respond to university advertisements on the internet. Online advertisements piqued the interest of students in both rural and urban locations. Researchers also looked examined whether the financial status of the applicants' parents, whether both earn or one parent is the family's sole earner, had any influence on their receptivity to internet marketing.

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ARTIFICIAL INTELLIGENCE IN HEALTHCARE: 21ST CENTURY AGE OF RIFLES - A BIBLIOMETRIC ANALYSIS

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ABSTRACT

In the 21st century data, itself are information, product, and goods. The pandemic situation has given new eyes to the old invention to effectively bridge the gap between history, happenings, and technology as well as past and future. Health is requisite and every one of us would have placed our footstep one way or the another in the healthcare sector. The demand for healthcare professionals is also increasing in our country with an increasing population. To address the health need of society, this paper attempts to exhibit the studies captured on these two broad areas in the healthcare sector with a systematic literature review of bibliometric analysis. This paper will bring out the technological invention, its implications in the 21st century, relevance in the covid 19 pandemic situation, research, and facts explored in this area. Humans are the inventor and users of technology: the good we use the great will be the outcome: It all depends.

KEYWORDS

Artificial Intelligence, Technology, Bibliometric, Pandemic

BACKGROUND & INTRODUCTION

The 21st-century healthcare market is facing more or less unique challenges globally. Even the most advanced countries struggle to fit with the proper infrastructure to integrate diverse job functions in delivering quality care. India has a diverse population of 139cr people rank second among one-third of the world population as per Worldometers statistics. Worldometers is the free reference website by the American Library Association (ALA), the oldest and largest library association in the world.

Healthcare is one of the dynamic and challenging sectors, due to the following reasons: 1. Increasing population 2.24/7 service in the customer-centric business 3. Better Care: Shortage of health professionals and quality care: 4. Unstructured Medical Data 5. Accessibility of healthcare across India. There is a dire need for AI systems and public health interventions in the pandemic situation and future. [1] Addressing these concerns through the 21st century "Age of Rifle" is the "Artificial Intelligence." Rifle is a gun, used in war to win enemies. The authors justify "AI as the 21st

century age of rifles" which could win the challenges in healthcare. AI solutions in healthcare can augment these scarce resources and will scale it up. If applied in healthcare, AI has the tremendous potential to improve by leaps and bounds and better-quality care. To address the health need of society, Artificial Intelligence serves far better not only in reducing the mundane task but very accurate in medical imaging, preliminary diagnosis, discovering new medicines, AI-assisted surgeries, and virtual nursing assistants. This paper attempt to exhibit the studies captured on the broad areas in the healthcare sector with a systematic literature review of bibliometric analysis.

ARTIFICIAL INTELLIGENCES IN INDIAN HEALTH CARE

The World Health Organization stresses Universal health coverage to the population. Policy advice reports that the global healthcare spending expects to reach 10 trillion dollars by 2022, whereas the Indian hospital industry expects to increase to Rs. 8.6 trillion 132.84 billion dollars by 2022 at a compound annual growth rate of 16–17% as depicted by IBEF. Concerning this report, healthcare is top-notch, and to address the challenges and fulfill the requirements AI will be a great solution. [2]

AI is creating and will create an evolutionary world in the global healthcare system. AI expects to bring the possible outcome to the existing problems due to its limitless ability. In the last ten years, there has been vast extensive growth in the scientific literature field of AI in healthcare. Technology adoption is the robust challenge for all sectors. [3] The digital era sprouted the IT field for the AI systems to gear up so fast and vast; instead, it is not new. History says even in Aristotle syllogism in 300 BC [4], the concept of AI existed, traced way back to philosophy, fiction, and imagination [5], but not so clear and concrete.

MATERIALS AND METHODS

Bibliometric analysis is the evaluation of published scientific articles. [6] justifies and recommends bibliometric analysis as the most preferred tool for literature review. The idea of bibliometric analysis primarily studies the results of extant research on a specified area, including the most addressed theme or trends related to the topic. [7] It also depends on the study on the sample, the country, and the methodology used, etc. [8] The study design follows

research objective, research design, bibliometric data curtain, methodology and software used, analysis and results, interpretations and findings, and conclusion with future implications in the following sections.

SEARCH STRATEGY

We search the research papers from the "DIMENSION Database" systematically using the most relevant key search terms such as Artificial Intelligence, Healthcare, Covid 19 Boolean search terms such as Artificial Intelligence AND Healthcare, Artificial Intelligence, AND Implementation.

FIGURE 1: OVERVIEW OF DOCUMENTS CITATION FROM THE DATABASE


Source: DIMENSIONS Database

When the researcher hit the term Artificial Intelligence, across all the areas is 27.3M with an average citation of 13.49. Figure 1: For the critical term Artificial Intelligence AND Healthcare, the study hits found around 2.2M with an average citation of 8.72 of the paper stored in Dimension database. The database has documents related to the search from the year 1900 to 2021. With the number of

articles 1 to 43,108, the highest number of publications is in 2020, and the range increases from 2017 onwards.

SCREENING STRATEGY

The search strategy used for the study is depicted in the form of PRISMA flow diagram.

FIGURE 2: PRISMA FLOW DIAGRAM
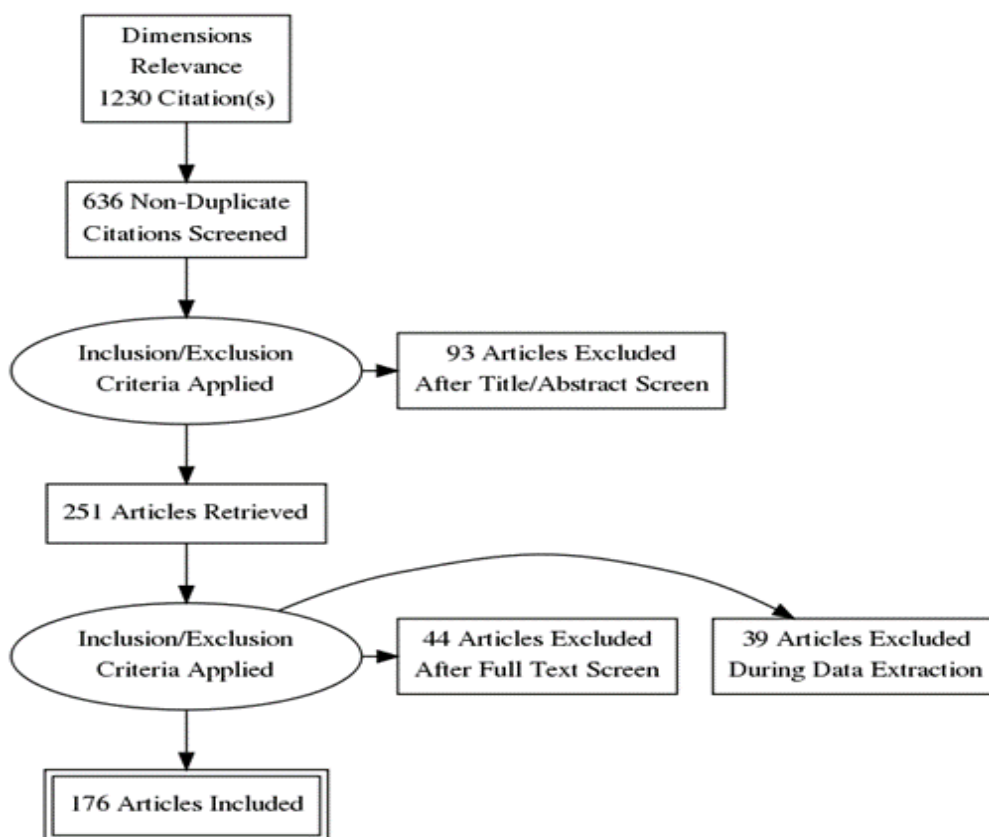
Source: Authors' own

SOFTWARE AND DATA ANALYSIS

The bibliometric analysis presented in the document is derived with the help of Vos viewer [9] and MS-Excel. With the help of indicators such as co-occurrences of keywords, trend topics in the area, most productive countries, citation network, authors coupling, country collaboration, the researchers developed a graphical mapping of the bibliographic material. Finally, 166 papers were identified

as the input file for the VOS viewer for further extraction of results. The output of the analysis done with its figures and interpretations using MS-Excel are discussed hereunder.

RESULTS AND DISCUSSION

PUBLICATION PATTERN

The number of publications in the domain carries a good trend. The papers published in the year 2020 possess a

greater citation compared to the consequent years. It is also observed that as per the papers collected from the database, there is a slight dip in the number of documents done in the year 2021. This may be because the focus is shifting towards machine learning, deep learning concepts, and advanced technologies.

COUNTRIES BIBLIOGRAPHIC COUPLING

The bibliometric coupling among the countries exhibits that the United States has the highest strength with (TLS: 2265), Australia (TLS:1632), and Canada (TLS:1309). The majority of the AI research occurs in collaboration with the United States, with 18 clusters 1. The coupling has 3 clusters, wherein India comes under cluster 2, collaborating with Canada, Japan, Sweden, China, and United Arab Emirates.[10] states that Canada will quickly be a leader in AI. The above visualization aligns with the discussion of [11] that the United States has the most active researching country in AI.

FIG 3: PUBLICATION PATTERN OVERTIME ON ARTIFICIAL INTELLIGENCE IN HEALTHCARE (SOURCE- AUTHORS' OWN)
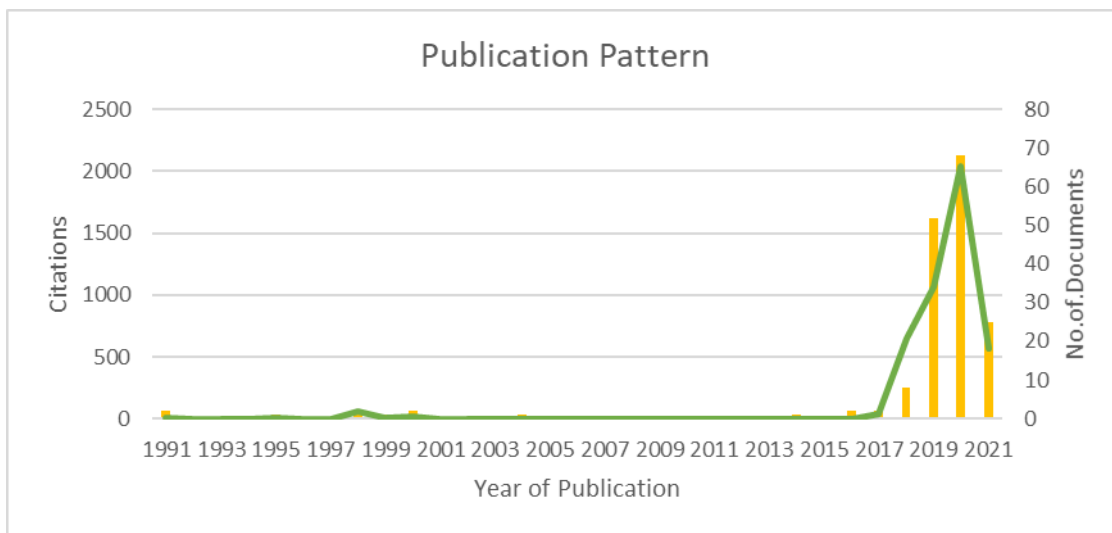

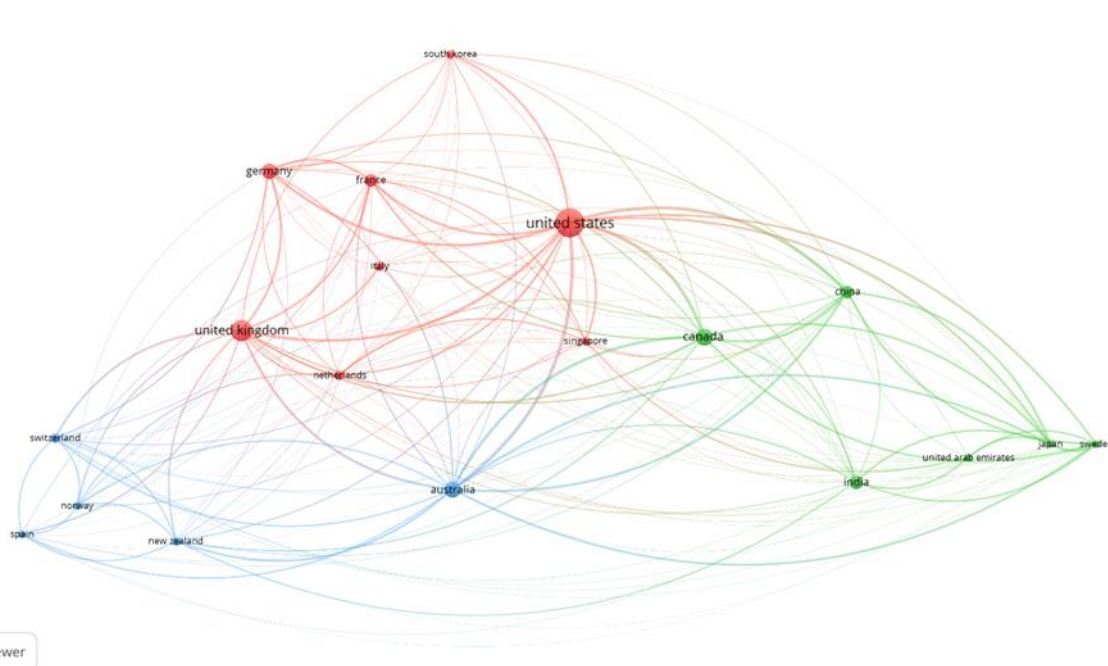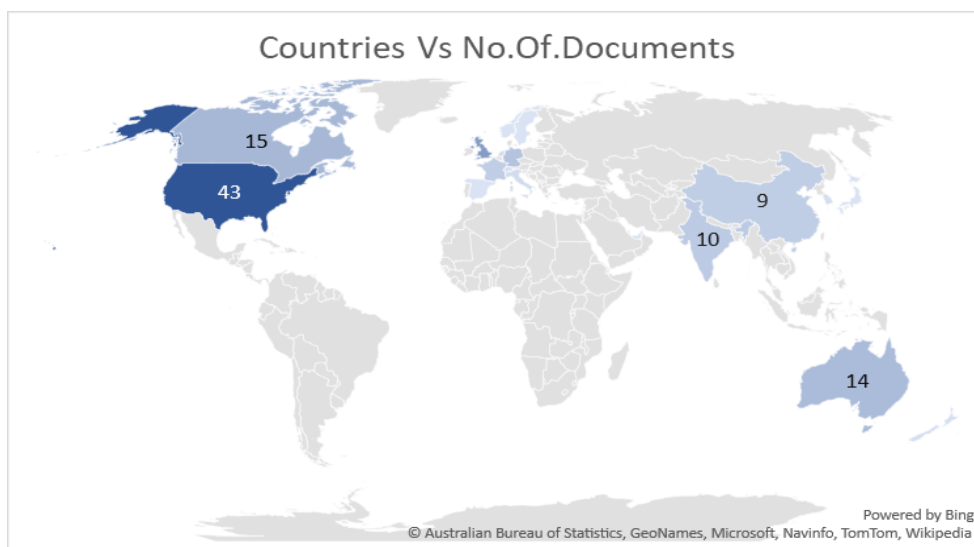**FIG 4: BIBLIOGRAPHIC COUPLING OF COUNTRIES (SOURCE- AUTHORS' OWN)**

FIGURE 5: COUNTRIES PUBLICATION

CO-CITATION DENSITY PLOT

The density Plot of Co-citation of cited authors in the database is presented here. The output delivered 5 clusters with a maximum threshold of 12 citations. A total of 83 documents were identified with the authors peng, lily having a maximum Total link strength of 1100 with 33 as the higher citation derived. For the clusters identified density visualization chart is presented

The authors tried to explore the relationship of co-authorship of authors and countries. The table presented here projects the seven top co-authorship as the type of analysis and the unit of analysis as authors, separate analysis with countries is done. For the co-authorship of authors, we apply a threshold value of 2:2. For co-authorship of countries, we apply a threshold of 3:2. It is observed that the authors Javid, Mohd is in the first rank

with a citation of 608 among the co-authorship. The top 7 countries with their citations and the total link strength are given. In the co-authorship relationship with countries, India holds rank 3 with a total link strength of 8. There is a greater need for the researcher to work collaboratively in the domain of AI in healthcare.

DOCUMENTS CITATION

Citation as the type of analysis and documents unit of analysis with a maximum threshold of a minimum number of citations of a paper, ten is fixed. The output overlay visualization of the Vos viewer is shown hereunder. Thirty-one documents are identified and presented under two clusters in the network visualization and spread among three years in the overlay visualization from 2018 to 2021.

**FIGURE 6: DENSITY PLOT FOR THE IDENTIFIED CLUSTERS FOR CO-CITATION OF THE CITED AUTHORS.**
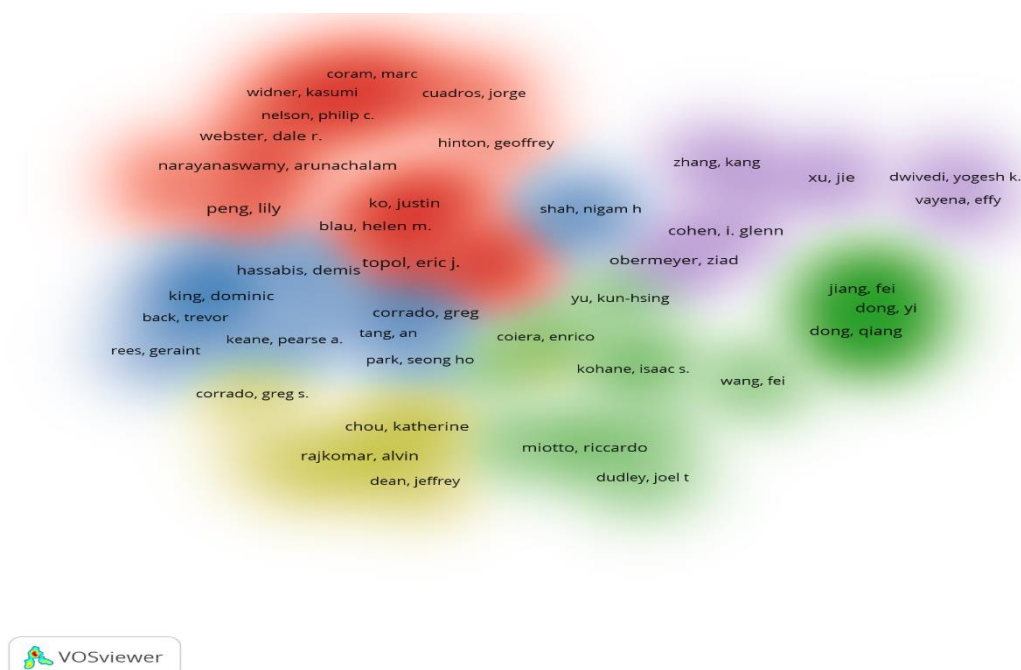
Source: Authors' own Co-authorship of authors & co-authorship of countries

TABLE 1: CO-AUTHORSHIP OF AUTHORS & CO-AUTHORSHIP OF COUNTRIES

S.NO	Author	Citations	S.NO	Country	Citation	TLS
1	javaid, mohd	608	1	United states	1223	16
2	vaishya, raju	608	2	United kingdom	865	18
3	haleem, abid	608	3	India	698	8
4	reddy, Sandeep	132	4	China	510	9
5	meskó, bertalan	99	5	Australia	280	19
6	kuziemsky, craig	62	6	Canada	217	11
7	coghlan, simon	59	7	Singapore	205	4

FIG 7: OVERLAY VISUALIZATION OF CITATION OF THE DOCUMENTS
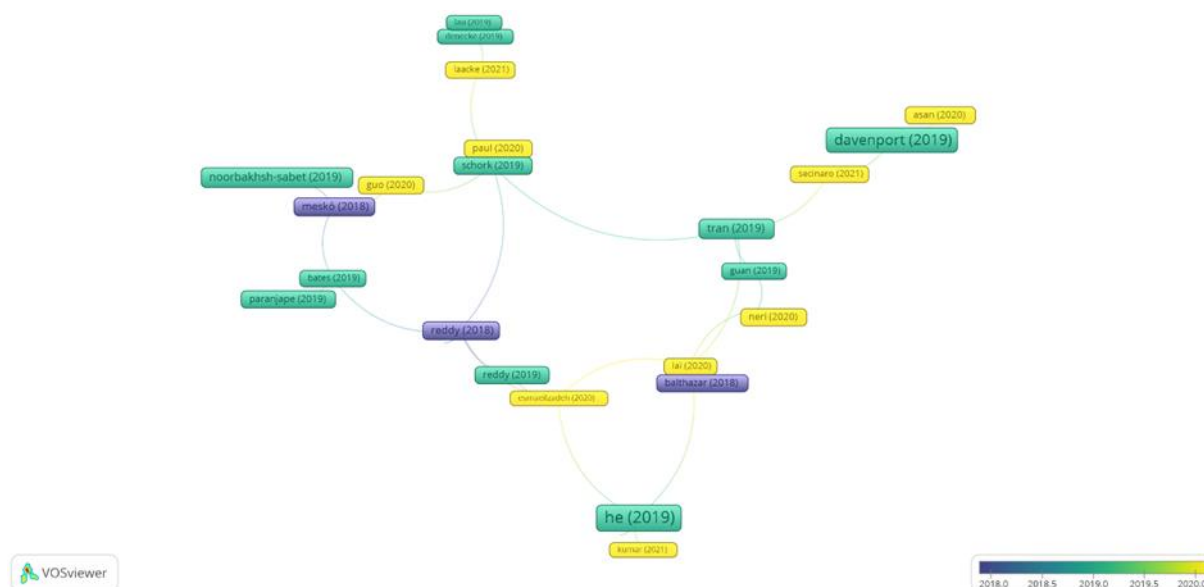
Source: Authors' own

A report by PwC states that the contribution of AI will be an addition of 15.7 dollars trillion to the world economy by 2030, the most significant impact in healthcare. In terms of policy implications, the study put forth three suggestions. 1. The wide application of AI is in Pre-diagnosis and maintaining EHR; growth will be for sure. The government can go for an IT-enabled Health care division to build strong foundations in medical research using AI Systems. 2. Developing countries like India can support funds for research to induce the application of AI in healthcare, and we are lagging behind many countries in the application part. Neighbor country collaboration may help for new inventions and applications in the field of AI systems. In line with [12][13], AI requires integration, multidisciplinary collaboration in the medical workflow process. 3. The service delivery divide between public and private hospitals needs to be considered for the better availability of services to the man living in the corner of the road. It is necessary to formulate global and national protocols for efficient use in and to ensure the growth and solidarity of AI applications and development in medical. AI systems provide an effective diagnosis quickly, so the future investment is appreciable [14]. Having specific architecture, consciousness of AI systems, and data privacy will be the concern challenges in this field [15].

TOP 10 CITED PAPERS ARGUMENTS ON ARTIFICIAL INTELLIGENCE

The 21st-century transformative technology in healthcare is Artificial Intelligence. [16] [17] [18] The complexity in the healthcare delivery lies because of the voluminous data generated during the process, which can address with the help of AI systems reasonably. A hyperbolic effect exists in the domain of AI. It is time to facilitate the arrival of AI and big data by working together collaboratively to get a concrete stand in the applicability of AI in medicine [19] to reap the benefits. Future research collaborating with the professionals, developers, legislators, and customers to address the explain ability status [20] and tackle the persisting challenges of AI in healthcare. The initial development stage may cost little, but benefits we can reap in the future. [21] Following that [22], One of the potential markets is healthcare, and extensive use of AI will optimize cost and enhance service quality.

In healthcare, AI is being used widely to increase the efficacy of the healthcare industry. [23] AI has the potential to transform administrative processes and patient care, one great interpretation of [24] study is that AI will not lead to human replacement on a large scale; instead, we can utilize it for better-quality patient care. A review article by Yu et al [25] presents that the clinical integration of medical AI varies at different developmental stages. There are areas like serum analyser where AI system performs reliably

than a human expert, few levels reasonable, few expert groups like so. The potential benefits of AI systems exist, and also it will not lead to job loss., on the other hand, prepare manpower for a varied job role to work with AI systems. Though AI in healthcare is gaining prominent attention, the implementation phase is rigid to get things out in a broader way; one such is the lack of standards regarding AI systems' efficacy and safety. [26]

CONCLUSIONS

Ever-increasing will be the demand for the healthcare sector and health professionals are facing hectic challenges. [27] The idea of AI is to enhance the user experience. The service Industry must predict and be aware of customer expectations. It adds significant value in understanding the customer and their trends. We need to take many steps to fix the gap in the Indian healthcare industry to adopt digital inventions. Healthcare lags other sectors in adopting technologies. Experts predict that AI will bring loads of benefits in every industry globally, wherein the healthcare industry will be a gamechanger. To achieve the goal of Universal health and to address the disease in the 21st century, research on AI and its implementation need to consider at the right time for a healthy, wealthy, and resourceful country.

LIMITATIONS AND FUTURE IMPLICATIONS

The nature of the study is the bibliometric review, as Sreedharan [28] mentioned original articles investigating AI systems were lacking in clinical studies. The researchers cover the outer surface of the healthcare sector research papers in AI. Future researchers can explore the implementation of AI systems concerning specific domains like cardiology, neurology, etc. Finally, future researchers can focus on identifying the gaps in the implementation phase of the AI systems compared to other countries. Health is the basic need for every human, and to make it available to everyone, in the 21st century, AI systems will be the Rifle of war.

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PROBLEMS OF BIG DATA ADOPTION IN THE HEALTHCARE INDUSTRIES

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ABSTRACT

Big data offers the knowledge required for healthcare providers to streamline customer service processes that customize healthcare and create best practices for communicating with clients or patients. A more detailed and customized experience can be offered to customers. But there are many challenges that healthcare organizations are facing. The research aims to study big data challenges in the healthcare sector. A literature review is performed to discover big data problems in healthcare. A questionnaire is utilized for the survey research in the hospitals. Target populations are the staff who are working in the hospitals. For analysis, exploratory factor analysis is being performed. All the challenges are grouped into five factors. All the parameters are satisfied for the study.

KEYWORDS

Big Data, Challenges, Healthcare, India, Management

INTRODUCTION

The healthcare sector is among the most extensive and mature sectors globally, producing much value. The focus of healthcare management has shifted from disease-centred to patient-centred models worldwide. [1] The growth of the healthcare delivery model based on values and the patient-centred care movement is guided by a philosophy of educating healthcare supremacy and lowering costs. In healthcare organizations, the volume and demand for big data (BD) are gradually increasing. It is critical to monitor and evaluate massive amounts of health data to provide effective patient-centred treatment. [2] Because of the variety and volume of data sources that have grown over the last two decades, outdated data processing implementations cannot analyse 'Big Data' (BD). New and creative BD tools and technologies are required to reach and exceed the potential of health data management.

Many healthcare organizations have made substantial efforts to combine vast data resources and advanced technology to address this constraint. Electronic health

records (EHRs) that use BD analytics for major disease assessments and epidemiological research performance can be considered breakthroughs in medical information management. [3] Despite attempts to develop successful BD systems, several health organizations have faced early failure since implementing these new systems. [3] BD is widely accepted to explain separate entities' management processes across sectors. Therefore, due to predictable and unpredictable obstacles, a substantial number of organizations had encountered early failures in the implementation of healthcare BD. Barriers to such programs may come from a number of sources, including organizations, physicians, patients, or governments. This study describes the challenges faced by the healthcare sectors in the adoption of BD in their systems.

LITERATURE REVIEW

1. BIG DATA

In recent years, the word "BD" has become increasingly common around the globe. Whether it concerns business or academia, almost every research field produces and analyzes BD for multiple purpose. [4] The BD definition includes velocity and variety in addition to volume. The rate at which data is collected is called velocity. It makes it accessible for further examination. The standard definition of BD has been these three V's. While other individuals have added many other Vs to this description,' veracity' remains the most agreed 4th V. [5]

The most challenging job with regard to this massive volume of knowledge that can be structured and unorganized is its management.[6] Conventional programming is unmanageable for BD, so we need advanced applications and programming to utilize quick and financially savvy excellent quality, registering assets for such assignments. Artificial consciousness and present-day combination calculations should be used to sort out this gigantic measure of information. To utilize neural organizations and other AI procedures to accomplish robotized dynamics.

2. BIG DATA IN HEALTHCARE

BD is a low-cost, high-volume, high-speed, and high-velocity data processing system that improves insight, decision-making, and process automation. BD was used in several sectors to replace the conventional database framework to allow the appropriate management and analysis of extensive databases [7] Healthcare BD, also

referred to as medical BD, plays a vital role in many hospitals and medical clinics' decision-making processes. Medical institutions build knowledge assets with high volume, velocity, value, and variety. Practical approaches should be used to analyses this type of data to improve decision-making. Medical BD comes in various styles and shapes; they're usually unstructured and complex, so they need a sound management system to make the most of them [8], using conventional data processing techniques or software. The BD method of data mining will collect practical knowledge from massive databases of large sizes. [9] Also, data mining association rules help data mining, creating rules in deciding its association between various items.

3. CHALLENGES OF BIG DATA IN HEALTHCARE

BD undoubtedly brings tremendous benefits for medical institutions if implemented correctly in the healthcare context, but its implementation involves many challenges from various sides.

3.1. Expertise barriers (EB): The absence of technical information can prompt the associations' inability to actualize technological developments. Practically all organizations endeavor to procure a severe level of specialized specialization and a low degree of specialized adaptability simultaneously. [10] Many expected and unforeseen difficulties have deterred clinics from creating BD clinical innovation because of a severe absence of technical information.

3.2. Operation Barriers (OB): This identifies with the issue of overspecialization and protection from authoritative change, especially those identified with creation and activity instead of innovative work [11]. This sort of obstruction is looked at by numerous associations, particularly when they have profoundly full capacities, bringing about a sensation of hesitance to change their exercises to actualize some advancement. In this manner, concerning information creation and the executives, the fame of BD is developing.

3.3. Resource barrier (RB): The essential factor for guaranteeing the early achievement of advancement execution might be many abundances. [12] Additionally, clinical BD frameworks' performance is expensive because of the absence of information normalization, the sheer volume of information, and the weakness of gadget networks.

3.4. Regulation barriers (RUB): Guidelines can happen in different structures, and in any event, one such guideline applies to most enterprises. Rules for organizations have been arranged into four primary sorts: self-guideline of industry (codes of corporate leaders and morals), government guidelines, guidelines of asset imposing business models, and brand name guidelines.[13] Even though it is difficult to make clinical BD without the limitation of rules, the plan and utilization of clinical BD have not been plainly and effectively characterized.

3.5. Market Access Barriers (MAB): Barriers to advertise section commonly apply to all obstructions that limit innovations from arriving at open buyers. When the overall advancement industry is phenomenal, these obstructions become less applicable [14]. Before being dispatched, the FDA should examine each clinical item under exacting quality and security the board guidelines. The snag to showcase access exists because the FDA requires an impressive consumption in R&D capital and preliminary clinical time.[15]

RESEARCH METHODOLOGY

The sample was chosen from every layer through the simple random sampling strategy as it permits populace congruity from the subpopulation [16] A 7.0 Likert scale had been used to examine different reactions that reach from 'strongly agree' to 'firmly concur'. The polls were shipped off 461 respondents. However, just 308 respondents returned usable surveys, substantial for investigation. To avoid a typical strategy, the examination group's inclination has played it safe during the pre-information assortment stage.[17] To check whether the collected data is basined or performed a single factor Harman test. The first factor of the EFA explains 32.588% of the variance, which is below the 50% level of recommendation [18] Table I shows the percentage of the demographics of respondents.

TABLE 1: DEMOGRAPHICS OF THE RESPONDENTS

Characteristics	Percentage
Gender of the respondents	
Male respondents	63
Female respondents	37
Current Position of the respondents	
Doctors in the hospitals	42
IT manager in the hospitals	37
Medical Officers in the hospitals	21

DATA ANALYSIS

1. RELIABILITY AND VALIDITY

1.1. Cronbach's Alpha

Cronbach's alpha (a) was used to perform the reliability test for each factor. Over the suggested worth of 0.70, the upsides or dimensional scales should be. As shown in Table II, the values are more significant than 0.70 of the threshold levels. [19]

1.2 Composite Reliability

Composite reliability (CR) was additionally estimated for every one of the parts. It is assessed for inside consistency dependability given its capacity to give better outcomes. The builds' CR esteems > 0.7 demonstrates that the composite dependability measures are solid [20], as displayed in Table II.

2. EXPLORATORY FACTOR ANALYSIS (EFA)

KMO an incentive for the flow research is 0.857. The importance esteem is 0.000, which is under 0.05, i.e., the likelihood esteem level worthy. The extraction technique utilized was principal axis factoring. [21] For the parts, the level of all-out difference was explained by segment 1 (36.115%), segment 2 (10.342%), segment 3 (8.768%), segment 4 (8.486%), and segments 5 (6.110). The combined all-out difference clarified by each of the three elements is 69.730%.

The Rotated Component Matrix is significant for deciphering the after effects of the examination. Turn helps gather the things, and each gathering contains multiple items in any event, which improves the design. Subsequently, this is the point of the objective of turn. In this examination, we have accomplished this point. Eighteen fundamental factors were assembled under five individual parts, as displayed in Table II.

TABLE II: VALUES OF A, VALUES OF CR, VALUES OF ROTATED COMPONENT MATRIX

Variable	Indicators	a	CR	Rotated Component Matrix
OB	OB1	0.847	0.889	.784
	OB2			.846
	OB3			.873
	OB4			.762
MAB	MAB1	0.860	0.893	.845
	MAB2			.846
	MAB3			.829
	MAB4			.767
EB	EB1	0.830	0.886	.842
	EB2			.773
	EB3			.778
	EB4			.853
RUB	RUB1	0.840	0.902	.844
	RUB2			.953
	RUB3			.803
RB	RB1	0.713	0.838	.839
	RB2			.881
	RB3			.654

DISCUSSION

BD in healthcare helps manage the massive volume of information created, like collecting patient records, etc. [13] But on the other hand, they face many challenges in the hospitals' adoption process. As this technology is new to everyone, they have lacked resource people. From the literature, we identified five challenges the BD faces in the adoption process. The first was an expertise barrier that refers to a lack of experience handling big data software. Employees do not have proper training, showing change resistance to adopting this technology. So, the top administration needs to decide on the training and motivate its adoption.

The second is the operation barriers facing privacy and IT infrastructure employees and top management face [12] Many hospitals do not have the proper IT infrastructure for adopting this technology. The third barrier, the resource barrier, refers to the project's cost arrangement problems. [15] The fourth barrier is regulation barriers, as the organizations need to follow the government guidelines to adopt the latest technology. Modifications and regulations

of laws and policies in the healthcare sector create difficulties in applying medical BD technologies.[14] The fifth barrier, market access barriers, refers to problems the market faces and the competitor side. Healthcare BD has also raised numerous challenges in accepting and implementing medical institutions.

CONCLUSION

This research aims to find out the problems faced in the healthcare sector for the adoption process of BD. From the literature, five challenges were identified. For analysis, exploratory factor analysis is used, which helped group the variables into five groups. The finding of the study was also supported from another research. There are some limitations to the study, and also this can be extended further. We can extend this research and develop a structural equation model for the analysis. This research can be extended to some other sectors also.

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