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Direction Opportunities and Insight



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MAKING PLANS AND SET GOALS FOR PROFESSIONAL ENHANCEMENT AND ACHIEVEMENT

Dr Neale Fong FCHSM

President of Australasian College of Health Service Management



Welcome to the last issue of the College's Asia Pacific Journal of Health Management for 2022. I hope you have a relaxing Festive Season with family and friends and on behalf of the Board wish you a happy and successful New Year.

It is a traditional time to take personal stock, make plans and set goals for professional and personal enhancement and achievement for the coming 12 months. For some, after the challenges of the past few years, it may be perfectly reasonable to make no stressful additional plans at all. For others, those same challenges may have meant you were too busy to pursue anything more than the occasional professional development and so 2023 may be the perfect time for achieving more.

The College aims to support your career; however you choose to grow professionally. No stress? We will have a huge variety of free webcasts and low-cost networking events not to mention this Journal and Monthly Library Bulletins to keep you up to date. Spend a bit more and get together with your colleagues at our One Day Leadership Conference (March 17th in Melbourne) or our Annual Congress (October 11-13 in Canberra).

- If you want to achieve something a bit more substantial this year: Are you an Associate Fellow who is not a Certified Health Manager? Consider the Certification Program in 2023 and commit to lifelong learning and recognition for this commitment.

- Perhaps one of our Facilitated Learning Groups might appeal – we have FLG's in Project Management and Clinician to Leaders coming up in early 2023.
- Associate Fellow with sufficient experience to undertake Fellowship? Fellowship is our capstone program and a significant career achievement – applications close February 20th.
- Perhaps some career support through our free to members Mentoring Program? Or for our more expert health leaders you could choose 2023 as the year to give back by offering to be a Mentor.

No matter what you choose for the year ahead, I wish you a happy, healthy and satisfying 2023.

Thank you for spending time catching up with the latest research in health leadership and management through the articles you will find here in this Journal, it is a key element in achieving what I hope is our shared goal of "Better Leadership. Healthier Communities."

Dr Neale Fong
College President

DIRECTION, OPPORTUNITIES AND INSIGHT

Dr Mark Avery

Editor-in-Chief, Asia Pacific Journal of Health Management

The final issue of the journal for the year enables the publication of articles that report on research and experience related to opportunities for innovation, quality, workforce, access and consumer understanding. In addition to system and services readiness in relation to the translation of research as well as operational readiness related to incidents and access surge.

In this issue contributions enable us to reflect on the issue of ambiguity in leading and managing health services. The lack of certainty or dependability of meaning of communications, action or knowledge from and about the short, medium and longer terms is a critical aspect of system readiness and responsiveness for the medium and longer terms.

Given impact on operations, service responsiveness and overall sustainability, the critical recognition of operating in and through ambiguity leads to the identification of the value of processes that can examine uncertainty, clarity and vagueness. These examinations need to be part of the way we look at the future of our clinical services, workforce planning, financial viability and consumer expectations.

Simplistic assumptions may be limiting in respect to these major building operational blocks for our organisations and system.

Leader and manager competencies around framing, in adopting a positive or negative approaches to problems and issues and sense making, in the construction of meaning and situation action requires access to information and experience.

Susan Taylor and colleagues examine contemporary use of telehealth in the surgical setting and project opportunities for this critical communication into the future. Ashley Jones and Paula Bowman look at the use of technology and system reorganisation for critical communication between

hospitals and medical practitioners through system reorganisation and sustained support for practitioners in the future of outpatient communications. Sheree Lloyd and colleagues articulate how rural health professionals can be further supported in enabling and encouraging innovation for transfer of new knowledge into operations.

The health workforce for the future is a critical and enduring responsibility in terms of planning and the future of health delivery. Najla Dar-Odeh and colleagues examine career satisfaction among health professionals in Jordan as a contribution to sustained availability of health professionals in health systems. Richard Olley articulated research regarding the factors that influence, support and direction for staff members in aged care facilities through the function and behaviours of their leaders. Thippeswamy et al examined the impact of views and concerns of parents and carers for next generation of dentists currently making career choices and undertaking training in the dental profession during the period of the current pandemic.

Steven Kamper and colleagues examined perceived research capacity and support to individuals and health organisations and identified existing motivation and engagement in research needs to be enabled through availability of time and other support related to undertaking research so as to bring change into services for the future.

There are several and significant opportunities in the use of the publications provided through this edition so as to deal with the issues of uncertainty, clarity and vagueness in leadership approach, engagement as well as future strategic and operational planning.

Mark Avery
Editor-in-Chief

THE USE OF TELEHEALTH IN AUSTRALIA DURING THE CORONAVIRUS (COVID-19) PANDEMIC FOR MEDICAL PRACTITIONERS: A RETROSPECTIVE EPIDEMIOLOGICAL ANALYSIS

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ABSTRACT

INTRODUCTION:

New Medicare Benefits Schedule (MBS) telehealth item codes were added in 2020 to allow Australians to gain access to medical services during COVID-19 lockdown restrictions. Previous studies have been conducted on the utilisation of specific MBS item codes however none have been conducted on all medical practitioner telehealth item codes.

OBJECTIVE:

This retrospective epidemiological analysis aims to determine the utilisation rate of newly introduced medical practitioner telehealth MBS item codes and compare them with the usage of existing in-person item codes

METHODS:

The utilisation of 319 MBS item codes were extracted from the Medicare Statistics Database between March 2020 to March 2021. Using count and population statistics a population adjusted rate was generated and a linear regression analysis undertaken.

RESULTS:

A total of 199,059,309 in-person and telehealth services (Male, n=84,007,935; 42.2%, Female, n=115,051,374; 57.8%) were utilised during the study period. 147,697,104 were in-person compared to 51,191,898 telehealth services. In-person usage decreased by 27.5% while telehealth increased by 358.8%. In-person utilisation increased by 32.4% as the year continued while the telehealth utilisation decreased by 40.7%. There was a non-significant increase in total in-person item code utilisation ($p=0.76$) and a non-significant decrease ($p=0.32$) in the total telehealth item codes used

CONCLUSION:

There was initially increased usage of telehealth especially during lockdown restrictions. However, when lockdowns eased, usage of telehealth decreased while in-person increased. Regardless, telehealth item codes continued to be used despite changes to eligibility criteria and lockdown restrictions easing. Hence, it appears that patients are accepting of telehealth as a healthcare delivery method.

KEYWORDS

telehealth; teleconsult; public health; Australia; Medicare Benefits Schedule; COVID-19

INTRODUCTION

Telehealth has been defined as delivering various aspects of health information, prevention, monitoring, and medical care through the use of technology-based virtual platforms. [1] Telehealth is used to deliver healthcare remotely to patients with obstacles such as distance or frailty, obtain a second opinion from a specialist, provide education, improve efficiency of hospital departments and triage patient referrals. [2-5] Telehealth has been beneficial during the coronavirus (COVID-19) pandemic as government mandated lockdowns created movement restrictions creating difficulties to access healthcare in-person. [6] Telehealth allowed remote delivery of care while reducing contact reducing virus transmission. Additionally, it was used to triage patients to determine emergency care eligibility protecting both vulnerable patients and HCPs. [2, 7] While telehealth has been widely adopted, there has been some resistance due to perceived difficulties in diagnostic capabilities, data security as well as high cost and time investment being required. [5, 8] Clinicians and patients may also find telehealth difficult to use due to a lack of knowledge and education. [9, 10]

Telehealth in Australia is provided through the Medicare Benefits Schedule (MBS) in the public health sector and by private health insurers in the private sector.¹¹ Currently in Australia, telehealth is mainly delivered through the public health system.¹² First introduced into the MBS in 2011, the use of telehealth rapidly grew during the COVID-19 pandemic to facilitate provision of telehealth during government mandated restrictions.¹³ HCPs provide health care services to patients and charge the corresponding item code. The cost of this code is paid by the patient which is fully or partially refunded by the Department of Human Services. In response to the pandemic, new telehealth item codes were added to the MBS so medical practitioners could bill appropriately. The criteria to allow medical practitioners to provide telehealth was also relaxed as previously only patients in vulnerable groups could access telehealth. [14] This allowed all Australians to access telehealth. The utilisation of these item codes are published onto the Medicare Statistics Database (MSD)

which is open-access data. [15] This data is a national aggregate, hence, it is de-identified. This data can be used to compare the usage of telehealth item codes against the face-to-face codes to determine the adoption of telehealth.

It is widely recognised that telehealth usage surged during the COVID-19 pandemic. However, there has been little research conducted in Australia examining the trends over the course of the pandemic and how this varies by geography and demographics. Previous studies have been conducted only analysing trends for the newly introduced GP telehealth codes for a period of 3 months from March 2020 to May 2020. [16] Understanding the variation and trends could help shape future policies regarding the funding of telehealth post-pandemic.

AIMS

This retrospective epidemiological analysis aims to determine the utilisation rate of newly introduced medical practitioner telehealth MBS item codes and compare them with the usage of existing in-person item codes in Australia.

METHODS

The study is reported according to the STROBE guidelines. [17]

ETHICS APPROVAL

The data was gathered from the open-access Medicare Statistics Database. Therefore, no ethics approval was required.

MBS ITEM CODES

The Australian Department of Health outlined new telehealth/telephone item codes adjacent to equivalent existing in-person item codes allowing for a direct comparison. [18] The data originated from services provided by medical practitioners.

A total of 319 MBS item codes were examined. The item codes outlined in the MBS factsheet were split into 4 subgroups and hence our study followed the same system.

[14] The categories of codes and number of codes under each category is listed below;

1. General practitioners (GP)
 - In-person: 30
 - Telehealth/Telephone: 56
2. Other medical practitioners
 - In-person: 33
 - Telehealth/Telephone: 62
3. Specialists - Specialists, consultant physician, psychiatrist, paediatrician, geriatrician, public health physician, neurosurgeon and anaesthetist plus obstetricians, GPs, midwives, nurses or Aboriginal and Torres Strait Island health practitioner attendances for out of hospital attendances
 - In-person: 44
 - Telehealth/Telephone: 88
4. Dental practitioner in the practice of oral and maxillofacial surgery attendances (OMFS)
 - In-person: 2
 - Telehealth/Telephone: 4

STUDY PERIOD

A study period of March 2020 to March 2021 was chosen. This study period was chosen as a large number of new MBS telehealth item codes were introduced in March 2020 in response to the COVID-19 pandemic. Prior to this date, only a small number of codes were present in the MBS. A study period of one year was chosen as that was the available data when this research was conducted.

STUDY POPULATION

The study population was Australian residents who are eligible for the MBS. This includes Australian or New Zealand citizens, permanent resident visa holders, or applicants for a permanent resident visa excluding a parent visa.¹⁹ According to the Australian Bureau of Statistics, at the end of March 2021 the Australian population, therefore those eligible for Medicare, was 25,704,340. [20]

STATISTICAL ANALYSIS

Medicare item usage reports were generated from the MSD. Demographics were separated to show usage per state, age in 10-year intervals, and sex. Using count and population statistics, a population adjusted-rate of item code utilisation was generated (count per 100,000). These data were imported into GraphPad Prism 9.00 for Windows (GraphPad Software, CA, USA). The count and the rate were plotted against time and a linear regression analysis

undertaken. After linear regression a slope per 100,000 was generated. Additionally, to assess correlation, goodness of fit (R^2), Pearson's r (Range=-1 to 1) and a two-tailed P value was generated. Statistical significance was $p < 0.05$. The statistical analysis was completed for the Australian population, each individual state and the different subgroups.

RESULTS

DEMOGRAPHICS

A total of 199,059,309 in-person and telehealth services (male, $n=84,007,935$; 42.2%, female, $n=115,051,374$; 57.8%) were utilised during the study period. 147,697,104 were in-person compared to 51,191,898 telehealth services. Victoria had the highest utilisation of telehealth (37.1%) while New South Wales had the highest utilisation of in-person services (27.7%). Victoria had the highest telehealth utilisation rate (2890 per 100,000) and New South Wales had the highest in-person utilisation rate (6197 per 100,000).

When analysing demographics of the population who utilised these MBS item codes, there was a discrepancy of 164,635 (0.08%) item codes. We are uncertain where this discrepancy arose. Regarding age groups, 55-64 had the highest utilisation of telehealth services (14.3%) whilst age 65-74 had the highest utilisation of in-person services (16.2%). Females had the highest proportion of total item code utilisation (57.8%), in-person (56.5%) and telehealth (61.6%) item code utilisation.

COUNT

Total

Between March 2020 to April 2020, a sharp decline in the in-person usage is observed with a corresponding increase in the telehealth usage (Figure 1). In-person usage decreased by 27.5% while telehealth increased by 358.8%. In-person utilisation increased by 32.4% as the year continued while the telehealth utilisation decreased by 40.7%. All states except Victoria followed a similar trend (Figure 2). Victoria had decreased in-person usage (30.8%) from March 2020 to August 2020 with a corresponding increase in telehealth (540.2%) during the same period. In-person usage then increased by 30.5% from August 2020 to March 2021 with a decrease of 43.1% in telehealth utilisation (Figure 2).

FIGURE 1: GRAPH OF TOTAL ITEM USAGE VERSUS TIME FOR IN-PERSON AND TELEHEALTH

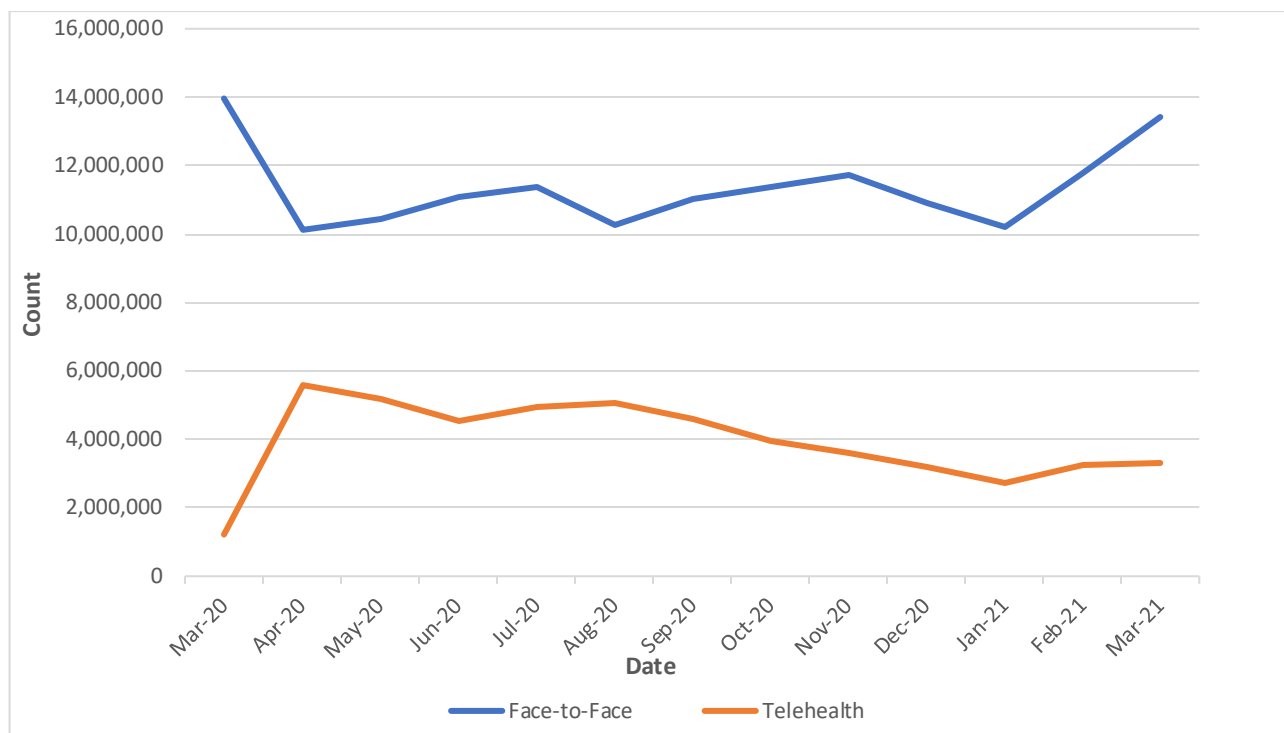
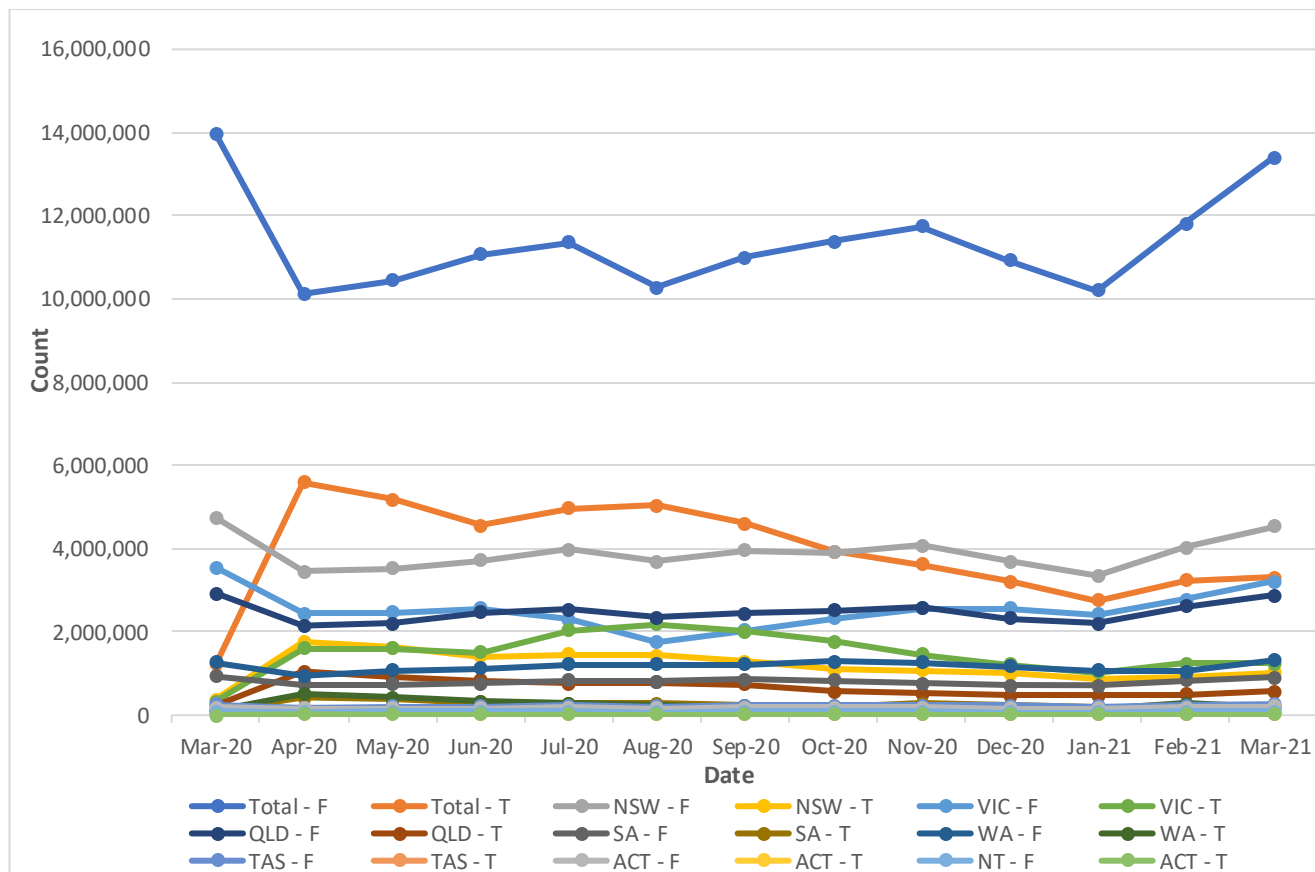


FIGURE 2: GRAPH OF TOTAL COUNT OF IN-PERSON AND TELEHEALTH ITEM CODES BY STATE



POPULATION ADJUSTED RATE

From the linear regression analysis on the population adjusted rate, there was a non-significant increase in total in-person item code utilisation ($p=0.76$) and a non-significant decrease ($p=0.32$) in the total telehealth item codes used (Table 1). All states and territories had non-statistically significant increased in-person utilisation. New South Wales (NSW), Victoria (VIC), Queensland (QLD), South Australia (SA), Western Australia (WA), Australian Capital Territory (ACT) and Northern Territory (NT) had non-significant decreased telehealth utilisation while Tasmania had a statistically significant decrease ($p=0.03$) (Table 1).

GP

Telehealth GP service utilisation had a 351.5% increase from March 2020 to April 2020 with a corresponding 24.4% in-person decrease (Figure 3). From April 2020 to March 2021 there was a 22.9% in-person increase and a 38.8% decrease in telehealth utilisation. Linear regression analysis demonstrated that in-person services had a non-significant decrease ($p=0.90$) in GP in-person service usage (Table 1). NSW, VIC, SA and NT had non-significant decreased utilisation while QLD, WA, TAS and ACT had non-significant increases. Australia wide there was a non-significant decrease in telehealth utilisation ($p=0.35$). NSW, VIC, QLD, SA, WA, ACT and NT had non-significant decreases as well. Tasmania had a statistically significant decrease in telehealth GP utilisation ($p=0.03$) (Table 1).

OMFS

In-person OMFS services were utilised 60.2% less from March 2020 to April 2020 after which usage increased by 195.4% (Figure 3). Telehealth item codes for OMFS were only introduced in May 2021. There was a 443.1% increase in usage from May 2020 to September 2020 followed by a 40.4% decrease from September 2020 to March 2021. Linear regression analysis shows that Australia wide there was a non-significant increase in in-person utilisation ($p=0.422$) (Table 1). NSW, VIC, QLD, SA, WA had non-significant increases in in-person utilisation. TAS and ACT had minimal in-person usage and hence the slope was 0 (Table 1). Therefore, no significant difference in usage was observed. Australia wide, there was a non-significant increase in telehealth service utilisation ($p=0.51$). NSW, QLD, SA, ACT had non-significant decreased telehealth

utilisation. VIC, WA and NT had non-significant increased telehealth usage while TAS had a statistically significant increase (Table 1).

Other health practitioners

In-person item codes for other health practitioners had 29.3% decreased utilisation from March 2020 to April 2020 after which there was a 13.7% increase (Figure 3). Telehealth item codes had 455.4% increased utilisation from March 2020 to April 2020 after which usage declined 39.2%. In VIC specifically, utilisation increased by 635.2% from March 2020 until August 2020 after which there was a decrease of 39.2%. Linear regression analysis of the population adjusted rate demonstrates that in Australia there was a non-significant decrease in in-person item code utilisation ($p=0.12$) (Table 1). NSW, VIC, QLD, WA and ACT also had non-significant decreases in in-person other health practitioner item code utilisation. SA had a statistically significant decrease in other health practitioner in-person services ($p = 0.02$) while TAS ($p = 0.00$) and NT ($p = 0.00$) had statistically significant increased usage. There was a non-significant decrease in the utilisation rates of other health practitioner telehealth services in Australia ($p = 0.503$) and in all states (Table 1).

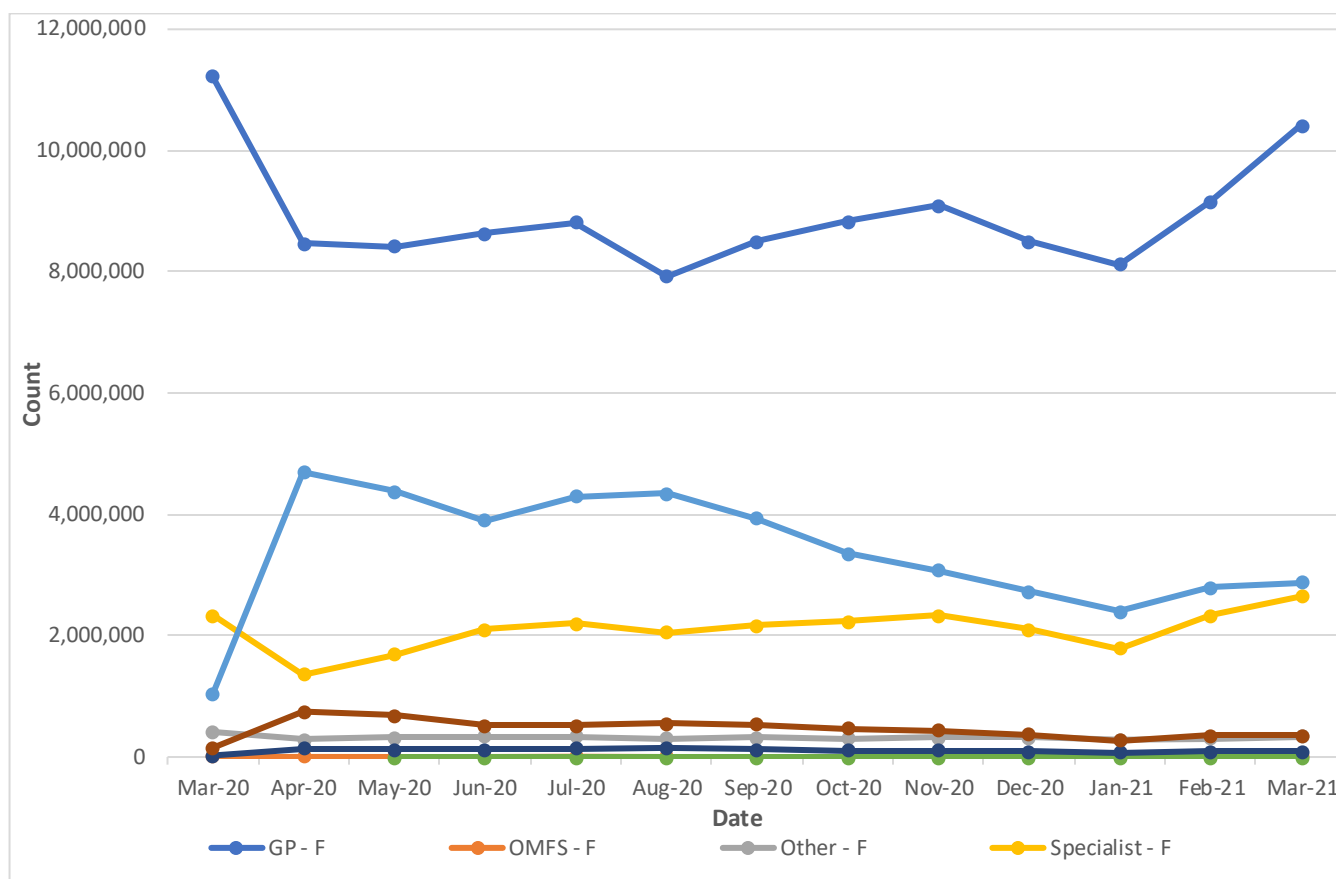
Specialists

Specialist in-person item code utilisation in Australia decreased by 41.9% from March 2020 to April 2020 (Figure 3). Usage then increased by 95.4% from April 2020 to March 2021. Telehealth specialist item code utilisation increased by 392.8% from March 2020 to April 2020 followed by a 52.9% decrease from April 2020 to March 2021. Usage of specialist telehealth item codes in VIC differed from the rest of Australia. In VIC usage increased from March 2020 to April 2020 by 351.3% followed by a 19.2% decrease from April 2020 to June 2020. Usage then increased by 41.6% between June 2020 and August 2020 followed by a 46.5% decrease from August 2020 to March 2021 (Figure 3). Linear regression analysis of the population adjusted rate demonstrates that there was a non-significant increase in utilisation of in-person services in Australia ($p = 0.09$) and in individual states (Table 1). Telehealth utilisation had a non-significant decrease in Australia ($p = 0.16$) and in individual states (Table 1).

TABLE 1: LINEAR REGRESSION ANALYSIS OF POPULATION-ADJUSTED RATE OF MBS ITEM CODE UTILISATION

		NSW	VIC	QLD	SA	WA	TAS	ACT	NT	Total
In-person (Total)	Slope	0.80	0.69	1.54	0.40	2.06	4.36	2.18	-0.75	1.12
	R ² / r	0.00/0.06	0.00/0.04	0.02/0.13	0.00/0.04	0.04/0.20	0.14/0.37	0.06/0.24	0.01/-0.09	0.01/0.09
	P value	0.84	0.90	0.67	0.90	0.52	0.22	0.43	0.76	0.76
		Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig
Telehealth (Total)	Slope	-3.88	-0.81	-4.66	-5.15	-5.20	-10.56	-5.40	-0.60	-3.61
	R ² / r	0.11/ -0.34	0.00/ -0.04	0.18/ -0.42	0.16/ -0.40	0.22/ -0.47	0.35/ -0.59	0.28/ -0.53	0.02/ -0.14	0.09/ -0.30
	P value	0.26	0.89	0.15	0.18	0.11	0.03	0.06	0.64	0.32
		Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Sig	Not Sig	Not Sig	Not Sig
In-person (GP)	Slope	-0.92	-0.74	0.21	-1.21	0.77	2.88	1.25	-1.76	-0.37
	R ² / r	0.01/-0.10	0.00/-0.05	0.00/0.02	0.02/-0.15	0.01/0.10	0.11/0.34	0.03/0.18	0.06/-0.24	0.00/-0.04
	P value	0.75	0.87	0.94	0.62	0.75	0.26	0.55	0.43	0.90
		Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig
Telehealth (GP)	Slope	-2.92	-0.39	-4.00	-4.05	-4.41	-9.63	-4.63	-0.59	-2.87
	R ² / r	0.09/-0.31	0.00/-0.03	0.17/-0.41	0.14/-0.38	0.22/-0.46	0.36/-0.60	0.29/-0.54	0.02/-0.15	0.08/-0.28
	P value	0.31	0.94	0.16	0.20	0.11	0.03	0.06	0.63	0.35
		Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Sig	Not Sig	Not Sig	Not Sig
In-person (OMFS)	Slope	0.004	0.003	0.003	0.005	0.004	0.005	0.000	0.000	0.003
	R ² / r	0.07/ 0.26	0.12/ 0.34	0.15/ 0.39	0.09/ 0.31	0.07/ 0.26	0.030/ 0.17	1.000/ NA	1.000/ NA	0.060/ 0.24
	P value	0.39	0.25	0.19	0.310	0.39	0.57	-	-	0.42
		Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	-	-	Not Sig
Telehealth (OMFS)	Slope	-0.00005	0.0008	-0.0002	-0.0007	0.0005	0.002	-0.00004	0.000075	0.0002
	R ² / r	0.06/ -0.25	0.09/ 0.31	0.02/ -0.13	0.25/ -0.50	0.16/ 0.40	0.68/ 0.82	0.004/ -0.06	0.04/ 0.20	0.05/ 0.23
	P value	0.46	0.36	0.69	0.12	0.23	0.002	0.86	0.56	0.51
		Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Sig	Not Sig	Not Sig	Not Sig
In-person (Other Health Practitioner)	Slope	-0.15	-0.26	-0.04	-0.21	-0.13	0.23	-0.18	0.58	-0.14
	R ² / r	0.19/ -0.44	0.19/ -0.43	0.01/ -0.11	0.39/ -0.62	0.22/ -0.47	0.59/ 0.77	0.26/ -0.51	0.75/ 0.87	0.20/ -0.45
	P value	0.13	0.14	0.72	0.02	0.10	0.00	0.08	0.00	0.12
		Not Sig	Not Sig	Not Sig	Sig	Not Sig	Sig	Not Sig	Sig	Not Sig
Telehealth (Other Health Practitioner)	Slope	-0.08	-0.003	-0.09	-0.14	-0.14	-0.08	-0.08	0.02	-0.07
	R ² / r	0.07/ -0.27	0.00/ -0.01	0.13/ -0.36	0.12/ -0.34	0.27/ -0.52	0.13/ -0.36	0.12/ -0.34	0.16/ 0.40	0.04/ -0.20
	P value	0.38	0.99	0.23	0.25	0.07	0.23	0.25	0.18	0.50
		Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig
In-person (Specialist)	Slope	1.86	1.68	1.36	1.81	1.42	1.25	1.11	0.42	1.63
	R ² / r	0.20/ 0.45	0.22/ 0.47	0.21/ 0.46	0.25/ 0.50	0.24/ 0.49	0.15/ 0.39	0.18/ 0.42	0.19/ 0.43	0.24/ 0.49
	P value	0.13	0.10	0.12	0.08	0.09	0.19	0.15	0.14	0.09
		Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig
Telehealth (Specialist)	Slope	-0.88	-0.43	-0.56	-0.96	-0.64	-0.86	-0.69	-0.03	-0.67
	R ² / r	0.24/ -0.49	0.03/ -0.16	0.24/ -0.49	0.25/ -0.50	0.23/ -0.48	0.30/ -0.55	0.28/ -0.53	0.02/ -0.14	0.17/ -0.41
	P value	0.09	0.59	0.09	0.08	0.10	0.05	0.06	0.65	0.16
		Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig	Not Sig

FIGURE 3: GRAPH OF TOTAL COUNT OF IN-PERSON AND TELEHEALTH ITEM CODES BY CATEGORY



DISCUSSION

This was the first study that analysed the usage of all medical practitioner telehealth MBS item codes in Australia. In general, there was increased telehealth item code utilisation from March 2020 to April 2020 with decreased in-person item code utilisation during the same period. Telehealth item code usage then decreased while in-person increased from April 2020 to March 2021. During the study period, there was a non-significant increase in in-person utilisation and a non-significant decrease in telehealth utilisation.

The decreased usage of in-person services during March 2020 to April 2020 correlates to the period when movement restrictions were first imposed across Australia. [21] Although people could still travel to obtain goods and services for health or medical purposes, there likely would have been hesitancy to travel due to the risk of contracting COVID-19.²² Hence, patients may have used telehealth to safely access healthcare to minimise this risk. This could explain why there was increased usage of telehealth item codes during this period. This increased usage of telehealth

during the pandemic was observed throughout Australia with one tertiary hospital having a 2255% increase in telehealth utilisation within 6 weeks. Worldwide, telehealth usage also increased.²³ Once lockdowns began to ease it seems that patients were more likely to visit their healthcare practitioner in-person as in-person usage increased from April 2020 to March 2021 and telehealth usage decreased during the same period. In Victoria specifically, telehealth had increased utilisation from March 2020 to August 2020 while in-person utilisation decreased during the same period. This was likely due to the increased period and frequency in which Victoria faced restrictions compared to the other states. [21] Tasmania was the only state that had a statistically significant decrease in telehealth usage and this may be due to the relatively low numbers of COVID-19 that Tasmania experienced.²⁴ Previous studies analysing telehealth item code usage in Australia have noted that there was a statistically significant increased usage of telehealth mental health services with video conferencing accounting for the majority of the services rendered. However, telephone consults still represented approximately one third of the telehealth appointments delivered.^[25]

The increased telehealth usage could also be attributed to patient preference. Previous studies have found that patients do prefer telehealth with one study showing a 94-100% satisfaction rate. [26, 27] Additionally, the Australian Health Consumer Sentiment Survey reported that the Australian population had a high satisfaction rate for telehealth indicating that patients were accepting of telehealth as a healthcare delivery method. Over half of the survey participants perceived the quality of telehealth to be similar to face-to-face and an additional 17.1% believed telehealth was actually better.²⁸ The preference for telehealth could be due to increased accessibility especially for those living in rural or remote communities as well as telehealth reducing the risk of transmission of COVID-19 during the pandemic. [29, 30] However, the literature does note that telehealth may be perceived to be impersonal as the clinician is not physically present and complaints have been made that clinicians spend more time looking at screens than their patients. [31, 32] Further studies will be required to further analyse this within the Australian population.

However, it was interesting to note that during the study period, the usage of face-to-face item codes did not see a large increase or decrease relative to telehealth item codes, though there was slight fluctuation. This could have been due to the fact that even though movement was restricted, patients would still be able to access health care in-person if they required.³³ Additionally, patients were only eligible for telehealth through their regular medical practitioner whom they had visited face-to-face within the previous 12 months.¹⁴ This would mean that if patients wished to access telehealth services, they would require a face-to-face visit first which could explain the continued usage of face-to-face item codes during the study period. In April 2020, telehealth services no longer required bulk billing for patients who were not concession card holders, children or vulnerable patients to COVID-19. Additional changes were made in October 2020 as these criteria were completely removed and telehealth no longer required bulk billing for any patients.¹⁴ This could affect the perceptions of patients as they may perceive a telehealth appointment to be of less value compared to face-to-face appointments. This could possibly attribute to the continued usage of face-to-face item codes during the pandemic as well.

There are several limitations in this study. The data from MSD is aggregate data. This means that we are unable to

distinguish between services provided by doctors in public or private hospitals or between services that qualify for cover under the Department of Veterans' affairs or through Work Cover of the Transport Accident commission. Regardless, this study also provided the most to date description on the utilization of telehealth across different areas of healthcare. Additionally, the experience levels of the providers are not listed and the location of the patients is not disclosed to protect their privacy. This makes it difficult to analyse the pattern of usage based on these traits. While this data was previously available through a 10% random sample, issues arose with the privacy and hence it was removed following recommendations from a Senate Select Committee.³⁴ The data provided on the MSD does not differentiate between different types of providers within the categories. For example, the specialist category does not distinguish between consultant physicians, psychiatrists, paediatricians, or geriatricians, hence comparisons between specific specialists within the category were not possible. This is a gap that may be explored in future studies. The OMFS MBS item code used in this study was a separate category of OMFS to allow OMFS who only had a single dental qualification to access the MBS item codes. Since November 2004, no further clinicians were approved to use codes in this category and were instead instructed to use codes in other categories.³⁵ Hence the OMFS used in this study was only a selective group of OMFS who were approved to use these codes prior to November 1 2004, and not a true representation of current OMFS. However, the utilisation of the OMFS clinicians would be included in other codes and hence OMFS usage patterns were captured. Therefore, the effect of this limitation is not significant.

As the telehealth item codes were only introduced in 2020, only 12 months of data was available when this study was conducted meaning a long-term analysis was unable to be undertaken. Nevertheless, this longitudinal study is comprehensive due to the short timeframe in which the codes were introduced. This study examined telehealth delivered through the MBS in the public system. Telehealth is also provided by HCPs through private healthcare, the rebates for which are provided by private health insurers,¹¹ however we were unable to get access to this data. Therefore, only telehealth provided in the public health system were analysed for this study. Since most telehealth in Australia is provided through the public health sector through Medicare, [12] we do not expect this limitation will have a significant effect on our results.

Future studies should focus on gathering MBS data for a longer period to identify long term utilisation patterns and increase generalisability. Furthermore, if private health insurance data regarding telehealth can be obtained, it would enable a more wholistic analysis for greater generalisation.

CONCLUSION

Telehealth was more freely accessible during the COVID-19 pandemic in response to lockdown restrictions. Prior to 13 March 2020 telehealth was only accessible to those living in remote and regional areas and for those living in regions affected by natural disasters. There was increased utilisation of telehealth during the pandemic with a large increase between March 2020 and April 2020 followed by a decline in usage from April 2020 to March 2021. However, despite changes to telehealth eligibility criteria, telehealth item codes continued to be used even when lockdowns were eased. This indicates that patients are accepting of telehealth as a healthcare delivery method. Telehealth has become an integral part of our healthcare system allowing for greater access to medical services. The Australian government has provided additional funding for ongoing MBS telehealth services and hence telehealth will continue to play a large role in the future. Further studies should be conducted to analyse utilisation patterns of telehealth in the MBS so that funding can be effectively allocated to maximise the benefit. This study has analysed utilisation patterns for one year however longer-term studies are required to analyse the longer-term trends of telehealth usage in Australia.

References

1. Mechanic OJ, Persaud Y, Kimball AB. Telehealth Systems. 2020. [cited 04.09.2020]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK459384/>
2. Kayyali R, Hesso I, Mahdi A, Hamzat O, Adu A, Nabhani Gebara S. Telehealth: misconceptions and experiences of healthcare professionals in England. *Int J Pharm Pract* 2017;25:203-209.
3. Wood EW, Strauss RA, Janus C, Carrico CK. The Use of Telemedicine in Oral and Maxillofacial Surgery. *J Oral Maxillofac Surg* 2016;74:719-728.
4. Lima MS, Tonial FG, Basei E, Brew MC, Grossmann E, Haddad AE, Rivaldo EG, Vargas IA, Bavaresco CS. Effectiveness of the Distance Learning Strategy Applied to Orthodontics Education: A Systematic Literature Review. *Telemed J E Health* 2019;25:1134-1143.
5. Estai M, Kruger E, Tennant M. Perceptions of Australian dental practitioners about using telemedicine in dental practice. *Br Dent J* 2016;220:25-29.
6. Hunt G. Australians embrace telehealth to save lives during COVID-19. Department of Health, 2020.
7. Smith AC, Thomas E, Snoswell CL, Haydon H, Mehrotra A, Clemensen J, Caffery LJ. Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19). *J Telemed Telecare* 2020;26:309-313.
8. Fisk M, Livingstone A, Pit SW. Telehealth in the Context of COVID-19: Changing Perspectives in Australia, the United Kingdom, and the United States. *J Med Internet Res* 2020;22:e19264.
9. Green T, Hartley N, Gillespie N. Service Provider's Experiences of Service Separation: The Case of Telehealth. *J Serv Res* 2016;19:477-494.
10. Ekeland AG, Bowes A, Flottorp S. Effectiveness of telemedicine: a systematic review of reviews. *Int J Med Inform* 2010;79:736-771.
11. Private Healthcare Australia. Australian Health Funds Announce Tele-Physiotherapy Consultations. Online, 2020.
12. Taylor A, Caffery LJ, Gesesew HA, King A, Bassal AR, Ford K, Kealey J, Maeder A, McGuirk M, Parkes D, Ward PR. How Australian Health Care Services Adapted to Telehealth During the COVID-19 Pandemic: A Survey of Telehealth Professionals. *Front Public Health* 2021;9:648009.
13. The Royal Australian College of General Practitioners. Telehealth Factsheet. East Melbourne, VIC: RACGP, 2014.
14. Department of Health. COVID-19 Temporary MBS Telehealth Services. 2020. [cited 07.03.2021]. Available from: [http://www.mbsonline.gov.au/internet/mbsonline/publishing.nsf/Content/0C514FB8C9FBBEC7CA25852E00223AFE/\\$File/Factsheet-COVID-19-Bulk-billed-MBS%20telehealth-Services-Overarching-17.09.2020.pdf](http://www.mbsonline.gov.au/internet/mbsonline/publishing.nsf/Content/0C514FB8C9FBBEC7CA25852E00223AFE/$File/Factsheet-COVID-19-Bulk-billed-MBS%20telehealth-Services-Overarching-17.09.2020.pdf)
15. Department of Parliamentary Services. Medicare: a quick guide. 2016. [cited 05.09.2021]. Available from: https://parlinfo.aph.gov.au/parlInfo/download/library/prspub/4687808/upload_binary/4687808.pdf;fileType=application/pdf
16. Snoswell CL, Caffery LJ, Haydon HM, Thomas EE, Smith AC. Telehealth uptake in general practice as a result of

- the coronavirus (COVID-19) pandemic. *Aust Health Rev* 2020;44:737-740.
17. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *J Clin Epidemiol* 2008;61:344-349.
 18. Department of Health. Amended MBS mental health and wellbeing telehealth items. In: Department of Health, ed. Canberra, ACT: Australian Government Department of Health, 2020.
 19. Australian Bureau of Statistics. 1700.0 - Microdata: Multi-Agency Data Integration Project, Australia. 2018. [cited 07.03.2021]. Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/1700.0main+features120Australia>
 20. Australian Bureau of Statistics. National, state and territory population. 2021. [cited 16.09.2021]. Available from: <https://www.abs.gov.au/statistics/people/population/national-state-and-territory-population/mar-2021>
 21. Storen R, Corrigan N. COVID-19: a chronology of state and territory government announcements (up until 30 June 2020). 2020. [cited 08.09.2021]. Available from: COVID-19: a chronology of state and territory government announcements (up until 30 June 2020)
 22. van Diemen A. Stay at Home Directions, Public Health and Wellbeing Act 2008 (VIC) Section 200. Online: Deputy Chief Health Officer (Communicable Disease), 2020.
 23. Monaghesh E, Hajizadeh A. The role of telehealth during COVID-19 outbreak: a systematic review based on current evidence. *BMC Public Health* 2020;20:1193.
 24. 24. Tasmanian Government. Tasmanian Statistics. 2020. [cited 10.09.21]. Available from: <https://www.coronavirus.tas.gov.au/facts/tasmanian-statistics>
 25. Snoswell CL, Arnautovska U, Haydon HM, Siskind D, Smith AC. Increase in telemental health services on the Medicare Benefits Schedule after the start of the coronavirus pandemic: data from 2019 to 2021. *Aust Health Rev* 2022.
 26. Polinski JM, Barker T, Gagliano N, Sussman A, Brennan TA, Shrank WH. Patients' Satisfaction with and Preference for Telehealth Visits. *J Gen Intern Med* 2016;31:269-275.
 27. Nguyen M, Waller M, Pandya A, Portnoy J. A Review of Patient and Provider Satisfaction with Telemedicine. *Curr Allergy Asthma Rep* 2020;20:72.
 28. Zurynski Y, Elias L, Dammerly G, Smith CL, Halim N, Ansell J, Gillespie J, Caffery LJ, Vintangcol K, Wells L, Braithwaire J. The Voice of Australian Health Consumers. 2021. Available from https://healthsystemsustainability.com.au/wp-content/uploads/2022/03/PCHSS_ConsumerSentimentSurveyReport_FINAL3.pdf
 29. Bradford NK, Caffery LJ, Smith AC. Telehealth services in rural and remote Australia: a systematic review of models of care and factors influencing success and sustainability. *Rural Remote Health* 2016;16:3808.
 30. Zimmermann M, Nkenke E. Approaches to the management of patients in oral and maxillofacial surgery during COVID-19 pandemic. *J Craniomaxillofac Surg* 2020;48:521-526.
 31. Kichloo A, Albosta M, Dettloff K, Wani F, El-Amir Z, Singh J, Aljadah M, Chakinala RC, Kanugula AK, Solanki S, Chugh S. Telemedicine, the current COVID-19 pandemic and the future: a narrative review and perspectives moving forward in the USA. *Fam Med Community Health* 2020;8.
 32. Scott Kruse C, Karem P, Shifflett K, Vegi L, Ravi K, Brooks M. Evaluating barriers to adopting telemedicine worldwide: A systematic review. *J Telemed Telecare* 2018;24:4-12.
 33. Andrews D. Statement From the Premier. Online: Victoria State Government, 2020.
 34. 34. Commonwealth of Australia. Sixth Interim Report (Big health data: Australia's big potential). 2016. [cited 10.09.2021]. Available from: https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Health/Health/Sixth%20Interim%20Report
 35. Department of Health. Medicare Benefits Schedule - Note ON.1.2. 2004. [cited 10.09.2021]. Available from: [http://www9.health.gov.au/mbs/fullDisplay.cfm?type=note&q=ON.1.2&qf=noteID#:~:text=Category%204%20%2D%20ORAL%20AND%20MAXILLOFACIAL%20SERVICES&text=Since%202000%2C%20practitioners%20performing%20oral,their%20FRACDS\(OMS\)%20exam](http://www9.health.gov.au/mbs/fullDisplay.cfm?type=note&q=ON.1.2&qf=noteID#:~:text=Category%204%20%2D%20ORAL%20AND%20MAXILLOFACIAL%20SERVICES&text=Since%202000%2C%20practitioners%20performing%20oral,their%20FRACDS(OMS)%20exam)

List of Abbreviations

ACT – Australian Capital Territory
 COVID-19 – Coronavirus Disease 2019
 GP – General Practitioner
 HCP – Health Care Professionals
 NSW – New South Wales
 OMFS – Oral and Maxillofacial Surgeon
 QLD – Queensland
 MBS – Medicare Benefits Schedule
 MSD – Medicare Statistics Database
 NT – Northern Territory
 QLD – Queensland
 SA – South Australia
 TAS – Tasmania
 VIC – Victoria
 WA – Western Australia

WHAT 'SPARKS' INNOVATION IN RURAL HEALTH SETTINGS: A CASE STUDY

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ABSTRACT

OBJECTIVE

To determine how innovation occurs and identify the factors that support innovation in a rural hospital in New South Wales, Australia.

DESIGN

Situated within a larger case study, this research collected qualitative data using semi-structured interviews.

SETTING

Inner regional hospital, located in a city, providing a broad range of acute and primary health services to a rural community.

PARTICIPANTS

Hospital executives, department managers, consultant and staff specialist surgeons, physicians, nursing, nursing managers and allied health staff were recruited after a phone, personal or email approach.

MAIN OUTCOME MEASURE

Qualitative interviews (n=25) conducted in a rural hospital.

RESULTS

Fourteen innovations were identified. Factors supporting innovation were when individuals who were valued by team members had the ability to make within team innovations with ease; clinicians with ideas for improvement led innovation; external agencies- the Clinical Excellence Commission and the Agency for Clinical Innovation provided expertise, ideas, and motivation for innovation. Limiting factors included time for innovation, creative thinking, planning, and implementation. Funding, the bureaucracy and multiple points of consultation to make changes were also identified.

CONCLUSIONS

Innovation occurred despite the absence of factors theory suggests are required. In rural settings, there are limited staff and resources leading to scarcity with no additional capacity in the system and innovation is a necessity. Further innovation could be unleashed if small amounts of resourcing and time were provided to staff with innovative ideas to improve services, change processes or introduce new ways of working.

KEYWORDS

rural health, innovation, organisational factors, interviews, qualitative, case study.

INTRODUCTION

Innovative models of care, policies, programs, and technological innovations have generated benefits for health service providers, patients, carers, and funders of Australian health services. In Australia, an innovative workforce and care delivery models, treatments and technologies are enabling faster recovery and lead to increased efficiency and supported health care organisations to manage large volumes of patients [1]. In Canada, the United Kingdom, Germany, Australia and globally, shifts in population demographics, costs and fragmentation in health care delivery models are driving innovation and health reform [2].

Rural hospitals manage challenges in providing health services and their communities are often socio-economically disadvantaged with poorer health outcomes [3–6]. There are recognised obstacles to accessing health services in the right place, at the right time [6, 7]. Innovation can make improvements in both metropolitan and rural settings, and the literature describes the determinants that are needed for innovation to flourish in health care organisations [8–10]. Common determinants include leadership, resourcing, infrastructure, and cultural and contextual factors. Models of care and technologies that work well in urban systems may not be applicable to the rural setting because of variations in health need and service delivery capability. The access to staff, resources, organisational structures, and other restraints are unique to each health setting. Organisations have their own 'uniquely patterned' culture linked to the context and nature of tasks being performed [11]. In rural health settings the governance, management, level of autonomy, models of care, workforce issues (given recruitment/retention difficulties), infrastructure and culture results in heterogeneous organisations that both enable and constrain health care, practice and change in different ways [5].

Innovation to improve health outcomes and that are suited to the rural context are needed. Nurturing organisational cultures that support the adoption of innovative practices,

enable creativity, and seek to achieve performance at a standard to meet the expectations of funders, the community and clinicians is as important in rural health settings as in metropolitan locations. Technological and other innovations have potential to improve health, attract and retain health workers and medical clinicians, and strengthen access in rural and remote locations [2].

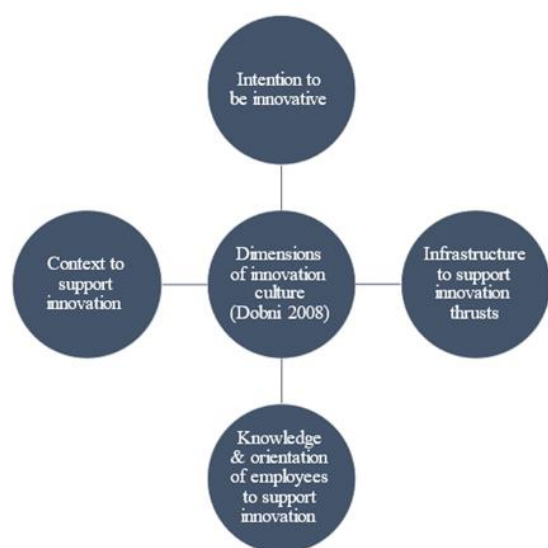
This study contributes to our understanding of how innovation occurs in a rural hospital and the factors that may impede or facilitate the adoption of innovation.

Ethical approvals were granted by the Local Health District Research Ethics Committee (LNR 176/17/NCC/127 & LNR SSA/17/NCC/129) and Queensland University of Technology (1800000117).

METHODS

A detailed inquiry of the rural hospital was conducted using a case study approach [12–14]. Data was obtained from semi-structured interviews conducted in 2018 (see additional file 3 for questions posed). Questions for the interviews were derived from the work of Dobni [15] who identified four dimensions associated with innovation culture and shown in Figure 1.

FIGURE 1 DOBNI'S 2008 DIMENSIONS OF INNOVATION CULTURE [15]



The 32 item COREQ checklist for transparency of qualitative research documented research elements such as study methods, context of the study, findings, analysis and interpretations [16].

SETTING

A base-hospital (Australian hospital serving a large rural area) providing care to over 12,500 in-patients, performing more than 3,000 surgical procedures and treating 24,000 Emergency Department attendances annually. The study site delivers surgery, medicine, paediatrics, anaesthetics, orthopaedic surgery, emergency medicine, intensive care, and obstetrics and gynaecology services.

At the time of the study there were no medical registrars or residents located on wards. Specialist emergency department clinicians supported career and junior medical officers in the Emergency Department. The largest group of clinicians were nurses, and the workforce is ageing. Gaps are filled by locum staff when leave or vacancies occur.

The study hospital was selected for convenience – other hospitals may have been willing to participate but were not approached. The case study organisation offered a comprehensive range of health services typical for a rural hospital of this size.

PARTICIPANTS AND SAMPLING

A purposive sampling technique recruited informants from all disciplines, including executives, administration,

medical, nursing, and allied health clinicians. Individuals were invited to participate in a 30–45-minute interview. The executive team, departmental managers, nurse unit managers were identified for inclusion, risks explained, and all agreed to participate in the study.

DATA ANALYSIS

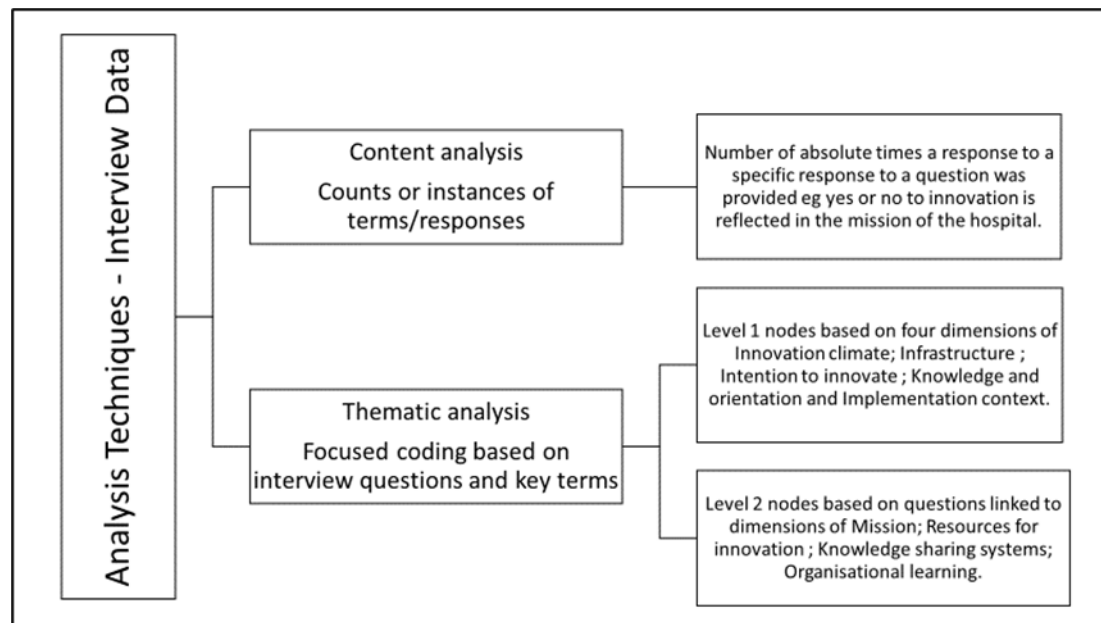
The Framework Method by Gale and colleagues guided the qualitative data management and analysis of the research [17]. Interviews were transcribed verbatim by a skilled transcription service. Transcripts were deidentified, printed, read, and checked by the researcher then uploaded to a computer-assisted qualitative data analysis software package, NVIVO v11. This allowed the researcher to gain a broad understanding of the narrative data collected.

Using NVIVO, each interview was coded at the top node to the constructs of innovation culture: the intention to be innovative (mission and culture), infrastructure to support innovation thrusts (knowledge systems, time and resources for innovation), knowledge and orientation of employees to support innovation (organisational learning, creativity and empowerment, patient value/orientation) and the implementation context to support innovation (ability to change systems/processes and metrics for innovation), as described by Dobni (2008). Further codes were applied and related to the specific questions asked of informants e.g., whether there was a mission for innovation. The approach for coding is shown in Figure 2.

FIGURE 2 NODES AND CODES USED FOR QUALITATIVE ANALYSIS

Level 1 nodes	Context to support innovation	Infrastructure to support innovation	Intention to be innovative	Knowledge and orientation to innovation
Level 2 codes	Ease of modification of systems Metrics to measure innovation effectiveness Quick turnaround of ideas into useable services Contextual factors enablers and barriers Contextual factors other	Time and resources for innovation Knowledge sharing systems in place	Underlying culture directed to innovation Innovative ideas valued Organisational mission reflects innovation Support for new ideas Individuals valued	Expectation to develop skills directed towards innovation Organisational learning linked to overall strategy for improvement and innovation Reward for learning Patient orientation

FIGURE 1 ANALYSIS TECHNIQUES QUALITATIVE DATA COLLECTED DURING INTERVIEWS



RESULTS

Results are divided into three sections: 1. Participant demographics; 2. Innovations identified; and 3. Enabling and limiting factors for innovation by informants in the case study site.

PARTICIPANT DEMOGRAPHICS

Twenty-five interviews were transcribed for analysis. Sample size relative to organisational size and demographic characteristics assured a range of disciplines and diverse perspectives were captured, and to achieve data saturation. Table 1 shows professional backgrounds and management responsibilities of informants.

INNOVATIONS IDENTIFIED

Fourteen innovations were described during interviews. These innovations had been implemented by, or the informant involved with. Eleven innovations (78%) had been sustained since implementation. Innovations were classified by the type of innovation (i.e. product or service, process, organisational, marketing, administrative; [21, 22] and shown in Figure 4 below.

Innovations to services, processes and the adoption of new technologies were documented. Some initiated by the Ministry of Health had been adapted for the case study organisation and implemented with high impact. The *Hospital In The Home* model developed by staff in this

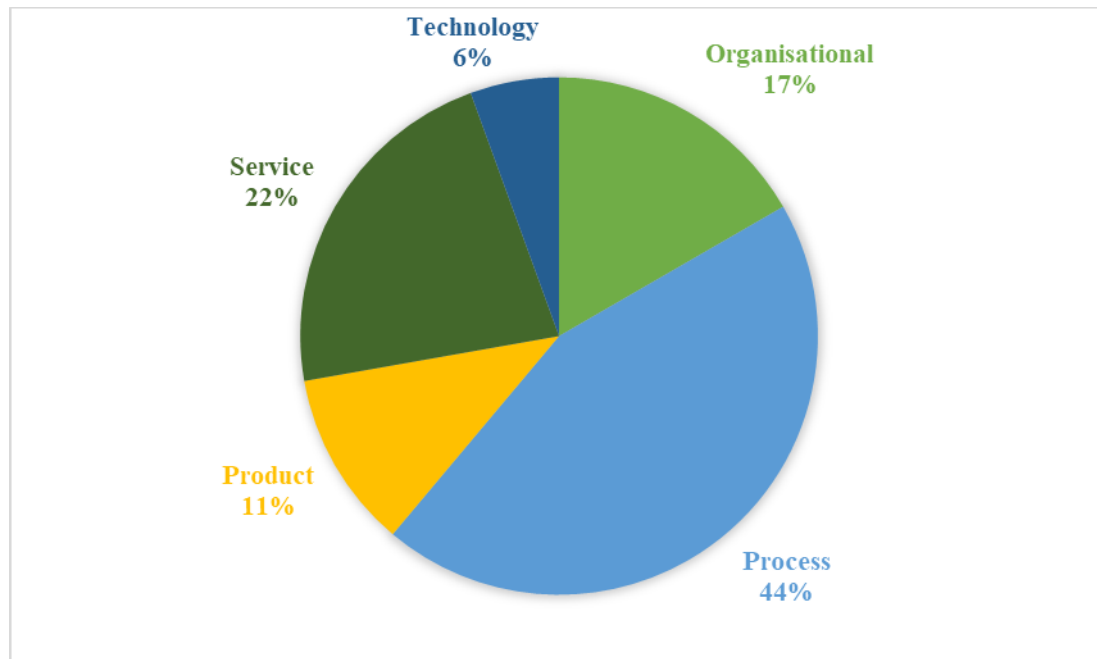
hospital was an example. *Hospital in the Home* was configured as an acute service operating seven days a week and adopted to reduce length of stay and increase bed capacity. Local enhancements were direct interactions and interfacing with nursing homes, surgeons, physicians, and general practices. The hospital-based service is nurse led with a broad scope of practice and requires acute nursing skills and ability to communicate across hospital and community-based teams. The model developed uses a 'pull' strategy to identify suitable patients in acute care wards. The nurse works closely with emergency department clinicians to divert admissions. A simple model of referral and assessment of suitability is used by general practice and for patients in residential aged care facilities. This contrasts with the model for *Hospital in the Home*, based in the community, used in other settings in the Local Health District, a 'push' model receiving referrals from the acute inpatient wards. This community-based service tends to treat less acute patients and does not operate a seven-day-a-week service.

Other innovations were same day knee replacements with 'prehabilitation', introduction of the safety cross system and patient empowerment program. Clinicians who initiated and implemented innovations provided examples of websites, graphic designers, research evaluations of their innovations and printing of materials that they had funded. Development was frequently performed in their own time.

TABLE 1 PROFESSIONAL BACKGROUNDS AND CHARACTERISTICS OF PARTICIPANTS INTERVIEWED

Professional background	No management responsibilities	Management responsibilities	Total (% of participants)
Administration	2 (8%)	1 (4%)	3 (12%)
Medical Officer	5 (20%)	2 (8%)	7 (28%)
Nursing or midwifery	5 (20%)	6 (24%)	11 (44%)
Allied Health professional		4 (16%)	4 (16%)
Total	12 (48%)	13 (52%)	(100%)

FIGURE 4 TYPES OF INNOVATIONS DESCRIBED BY INFORMANTS IN THE CASE STUDY SITE



FACTORS THAT ENABLED AND LIMITED INNOVATION IN THE CASE STUDY SITE

The findings that relate to the four dimensions of innovation culture are explored in turn. Enabling and limiting factors to innovation are presented. Longer example quotes from informants are presented in Table 3.

Intention to be innovative

Enabling Factor: Individuals felt valued within their clinical teams and departments supporting within team innovations

Twenty-two of the twenty-five (22/25) informants felt valued within their clinical teams and departments and by their direct managers. If innovative ideas were able to be implemented within the team, then implementation could proceed with relative ease.

Interviewees were asked whether they believed that innovation was an underlying culture and not a word. The response to this question was mixed. Eight interviewees

clearly stated that they thought it was just a word. Other responses ranged from those who believed that innovation occurred within the organisation but was not deeply entrenched in the culture to those who saw the organisation heading in a direction where innovation was deeply embedded.

Informants who thought that innovation was just a word felt strongly that innovation could be further embedded in the organisation 'I don't think so, yet. No, hm. I know there's a lot of quality type competitions that are invested in encouraging people to do well and create new things..... I don't know that it's actually the everyday culture, now' (Nurse 5)

Limiting Factor: Organisational mission not linked to innovation nor embedded in culture

The hospital did not have a mission statement that mentioned innovation. When asked to explain how innovation was reflected in the mission of the hospital, most interviewed struggled to recall the hospital's mission

reflected by a medical clinician *'in a proper organisation, every single individual should be able to drop that off their tongue in an instant.'* (Medical 10). Despite this, most felt that there was a culture within the organisation where improvement was valued. Both clinicians and managers conveyed this opinion. Interview participants related that as a base hospital in a rural setting, the key focus was delivering services to the community.

Context to support innovation

Limiting factor: Absence of metrics to evaluate and measure effectiveness of innovation initiatives and difficulty modifying systems and processes quickly

Fourteen of the 25 people interviewed related they were not aware of explicit metrics to measure the effectiveness of innovation initiatives. It was noted that when innovation occurred, key performance indicators could be reviewed pre- and post-implementation. Informally, the Local Health District quality awards recognise quality improvements.

Systems, processes, and models of care could not be easily modified, and it was difficult to make changes quickly and with speed. Funding, staff, and physical space were identified as barriers. The 'system' and the bureaucracy were deterrents to innovation as approval processes could be long and complicated. *'The system itself is actually geared to working slowly. There're many layers within the system and it's sometimes hard to navigate and actually understand how to navigate through those various layers.'* (Allied Health 16) and *'It's quite unusual to be able to do it quickly.'* (Medical 9).

Enabling factor: Clinicians with ideas provided leadership for innovation

Within clinical teams and departments innovations could be made. Successful change was supported and promoted by clinical champions willing to drive the innovation and work around barriers identified and reflected by a medical officer (Participant 7), *'I'm very aware that I'm trying to improve patient care and improve the structures around that and the teamwork and things'* and *'we've built up a lot of trust over the years and they (nursing staff) can see where these ideas are coming from, that it is about improving patient care and they can see it working and feel proud that it's coming from their small department'* and *'there are occasions when something compelling comes along and it's carried across the line by champions. But most of the time when it's funding*

dependent it is an exceedingly slow process' (Medical 9). These individuals know the channels to gain support for their ideas and how to advance them at organisational, district and State Executive levels.

Limiting factor: Infrastructure to support innovation

Eight interviewees mentioned time for creativity was a limiting factor as clinical work takes priority. There was no allocated time or budget for innovation. *'I would say funding. I'd say that would be one of the challenges. Probably time. Timeframes. Maybe even actual space'* (Nurse 18). High clinical workloads in rural health settings impact time for non-clinical activities. *'Workload is the biggest hindrance to change. They (clinicians) just haven't got time to think about it and implement it and do it on a consistent basis'* (Medical 28). Without time for reflection and thinking the opportunities for generating new ideas, gaining support, and implementing innovation was constrained.

Limiting Factor: Knowledge and orientation of employees to support innovation

Knowledge sharing was a source of frustration and challenge. Clinicians expressed that information overload and the lack of a single source of accessible truth for policies, procedures, and evidence for best practice a barrier to knowledge acquisition *'Yeah, that's right. You sort of get – but you get policy overload and policy fatigue, because every week you're getting new ones coming out'* (Allied Health 20) and *'they're wordy and bureaucratic. No one reads protocols at the moment, they're absolutely ridiculous. The current method for disseminating new knowledge is just hopeless'* (Medical 7).

Fewer than half (9 of the 25 informants) conveyed that the organisation connected learning approaches with improvement. The remainder stated that the connection between learning and identified areas for improvement, innovation and learning was not clear. Continual learning was supported but focussed on mandatory training. Medical clinicians conveyed that ongoing education was included in their employment contract providing sufficient opportunities. Nursing, allied health and other disciplines attended mandatory training or training offered within NSW health. Informants were motivated to learn by personal satisfaction and requirements to assure ongoing professional development. *'I wouldn't say it's rewarded. I think for yourself internally you feel rewarded'*. (Nurse 25)

The ability to attend training that might be directed towards innovation or change management skills was not readily accessible. Within this hospital, there was no overall learning strategy towards change and improvement or an innovation agenda.

Informants conveyed that a focus on patients, families and carers was important. Some believed that this focus was front and centre of patient management and planning considerations, while others felt that this was an area where more emphasis could be placed.

DISCUSSION

Innovation was driven by clinicians' motivated to provide better care and adopted despite the absence of antecedents for innovation as described in the theory (e.g. leadership for innovation, mission and vision for innovation, infrastructure for innovation) [15, 23].

Organisations will adopt innovations more readily if they are large (in size), are functionally differentiated into small autonomous departments, reflect maturity and have high-quality data systems, strong leadership with a clear vision towards innovation, resources to channel into innovation and decentralised decision-making processes [9, 23]. Seminal work by Greenhalgh and colleagues [9, 23] produced a framework on the antecedents for innovation collated from the literature, drawing on an extensive body of research. Organisational and contextual factors that have a positive and significant impact upon innovation adoption and sustainability include administrative overheads, functional differentiation, managerial attitudes to change, professional knowledge of employees, 'slack resources' (resources beyond minimal requirements to maintain operations), specialisation and technical capacity (technical resources and potential) (Damanpour, 1991, as cited in [9, 23].

Innovation in the rural hospital studied occurred without many of these identified factors. The hospital studied was small (not large), suggesting that size was not a barrier to innovation in this rural site. There was little specialised differentiation or departmentalisation. Nursing and medical clinicians often have both clinical and managerial responsibilities and there is no 'slack' in resourcing of administrative or clinical staff.

Ideas originating from clinical needs and led by champions in rural health settings are crucial to drive change, innovation adoption. The vision of leaders, strong managerial relations, clear goals and priorities, high-quality knowledge systems, organisational culture and context for change are important determinants of innovation [9, 15, 23–25].

Innovative ideas were valued in the case study site innovation could be advanced by strengthening organisational signals that demonstrate an intention to be innovative. Examples include a mission and culture to support innovation and metrics to measure innovation success [15, 26]. Small injections of money and time to support clinicians with innovative ideas could be allocated [9]. Time for thinking and reflection is important, and relief from clinical roles could be rewarded by the outcomes achieved through new innovations.

Contextual factors impacted the ability of individuals with innovative ideas to progress them to implementation. Modification of systems or work practices beyond the team were identified as difficult and a barrier to innovation. Top-down bureaucratic structures can be an impediment to innovation that thrives in flatter organisational structures [27]. Leaders play an important role by assisting clinicians to navigate the bureaucratic processes that hinder or slow down innovation and assist with innovative ideas progressing to delivery.

The knowledge and orientation of employees to support innovation is a cultural and system antecedent for innovation [9, 15, 23]. The lack of a comprehensive strategy that equips staff with the skills, knowledge, and tools for innovation was noted. Knowledge management and communication systems were regarded poorly, and informants conveyed that identifying relevant policies and being able to access them when and where they needed them in a timely fashion was challenging. Effective knowledge management systems could enable further innovation and the more rapid adoption of evidence-based medicine practices.

Clinical champions were an enabling factor as innovation occurred in addition to busy clinical loads and routine work. Time out from clinical activities is rare and can require the recruitment of a locum. Time for innovative thinking and creative thinking is a requirement for innovation [27]. Heterogenous or changing environments are more likely to

promote the adoption of innovations [9, 28]. Diversity can be difficult to attain in rural health settings where the workforce is stable over time, increasing diversity could unlock additional innovation.

The enablers in the case study organisation and those identified in the literature as antecedents to innovation uptake and adoption are presented in Figure 5. This diagram demonstrates leverage points for further innovation in the rural health service studied. Strengthening knowledge management systems, introducing metrics for innovation, a mission and vision directed to innovation, rewarding innovation, and linking this to an overall strategy for improvement could advance further innovation. Providing small amounts of time for thinking and resources to enable clinicians to innovate could encourage further innovation in the hospital studied. This would enable innovators time for innovation-related activities, such as research, planning and generating ideas. Health service leaders can play a vital role in supporting clinicians to work through bureaucratic channels, freeing them to focus on what is important to them when innovating.

CONCLUSION

This case study allowed an in-depth analysis of a rural health setting and an understanding how innovation is enabled. This analysis has contributed to the body of knowledge in rural health service management research. The research determined that innovation occurred in this rural site under unique contextual and organisational factors. The antecedents and determinants of innovation identified in the literature will not usually be present in rural settings such as size, complexity, administrative intensity, and 'slack' resources' [9]. We know that innovation occurs in rural health services, often through necessity and the lack of human, financial and physical resources present in larger settings. Clinicians in this study were driven to find solutions to improve patient care or hospital processes. Innovators pursued their innovations without specific time or resource allocations and drove their ideas to achieve changes. What is promising is that by leveraging known factors that promote innovation, that innovation in rural settings could be further accelerated.

STRENGTHS

Situated in a rural health service and conducted by a rural researcher the case study technique has provided valuable insights into the enabling and limiting factors for innovation in a rural health setting.

LIMITATIONS

The views captured reflect the specific time and place when the study was conducted and the individuals who contributed to the study could have influenced the results and findings. Limitations identified were:

- Age and demographic factors of the informants interviewed may not be represented in other rural settings.
- The lead investigator was known to some of the participants from a past role working in the site and this might have introduced bias.
- Staff from all clinical and administrative departments were interviewed however the findings could be limited by personal opinions, experience, academic backgrounds, personality, and individual perceptions.

While this study found that a rural hospital can innovate, the enablers and limiting factors identified, may not be generalisable to all rural health settings.

OPPORTUNITIES FOR FUTURE RESEARCH

To validate the findings, the research methodologies could be refined, and the study repeated and determine whether the factors identified in this study are evident in other rural hospitals.

COMPETING INTERESTS

None declared.

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Hospital informants and Research Staff, Northern NSW Local Health District.

CONTRIBUTIONS

SL conceptualised and designed the study. SL analysed and interpreted the data.

SL, CC GF critically reviewed and contributed to the manuscript. All authors read and approved the final manuscript.

References

1. Keown OP, Parston G, Patel H, et al. Lessons from eight countries on diffusing innovation in health care. *Health Aff* 2014;33: 1516–1522.
2. Snowden A, Cohen J. Strengthening Health Systems Through Innovation: Lessons Learned. Ontario, 2012.
3. Jang-Jaccard J, Nepal S, Alem L, et al. Barriers for Delivering Telehealth in Rural Australia: A Review Based

- on Australian Trials and Studies. *Telemed e-Health* 2014; 20: 496–504.
4. Humphreys J, Wakerman J. Primary health care in rural and remote Australia: achieving equity of access and outcomes through national reform A discussion paper. 1–28.
 5. Bourke L, Humphreys JS, Wakerman J, et al. Understanding rural and remote health: A framework for analysis in Australia. *Heal Place* 2012; 18: 496–503.
 6. Bourke L, Humphreys JS, Wakerman J, et al. From 'problem-describing' to 'problem-solving': Challenging the 'deficit' view of remote and rural health. *Aust J Rural Health* 2010; 18: 205–209.
 7. Schoo A, Lawn S, Carson D. Towards equity and sustainability of rural and remote health services access: supporting social capital and integrated organisational and professional development. *BMC Health Serv Res* 2016; 16: 111.
 8. Fleuren M, Wiefferink K, Paulussen T. Determinants of innovation within health care organizations. Literature review and Delphi study. *Int J Qual Heal Care*. Epub ahead of print 2004. DOI: 10.1093/intqhc/mzh030.
 9. Greenhalgh T, Robert G, Bate P, et al. Diffusion of innovations in health service organisations: a systematic literature review. Malden, Mass: Blackwell Publishing Ltd, 2005.
 10. Fleuren M, Paulussen TGWM, Dommelen P, et al. Measurement Instrument for Determinants of Innovation (MIDI). Epub ahead of print 2014. DOI: 10.1093/intqhc/mzu060.
 11. Braithwaite J, Ellis LA, Churrua K, et al. The goldilocks effect: The rhythms and pace of hospital life. *BMC Health Serv Res* 2018; 18: 1–5.
 12. Crowe S, Cresswell K, Robertson A, et al. The case study approach. *BMC Med Res Methodol* 2011; 11: 100.
 13. Thomas G. How to do your case study. 2nd ed. London: SAGE Publications Ltd, 2016.
 14. Yin RK. Case study research: design and methods. 5th ed. SAGE Publications Inc., 2014.
 15. Dobni CB. Measuring innovation culture in organizations: The development of a generalized innovation culture construct using exploratory factor analysis. *Eur J Innov Manag* 2008; 11: 539–559.
 16. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. 2007; 19: 349–357.
 17. Gale NK, Heath G, Cameron E, et al. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Med Res Methodol* 2013; 13: 117.
 18. Silverman D. Interpreting Qualitative Data: A Guide to the Principles of Qualitative Research. 4th ed. London: SAGE Publications Ltd, 2011.
 19. Silverman D. Doing Qualitative Research. 5th ed. London: SAGE Publications Ltd, 2017.
 20. Bazeley P, Jackson K. Qualitative Data Analysis with NVIVO. 2nd ed. SAGE Publications Ltd, 2013.
 21. Moreira MRA, Gherman M, Sousa PSA. Does innovation influence the performance of healthcare organizations? *Innov Manag Policy Pract* 2017; 19: 335–352.
 22. Damanpour F. Organizational Complexity and Innovation: Developing and Testing Multiple Contingency Models. *Manage Sci* 1996; 42: 693–716.
 23. Greenhalgh T, Robert G, Macfarlane F, et al. Diffusion of Innovations in Service Organizations: Systematic Review and Recommendations. *Milbank Q* 2004; 82: 581–629.
 24. Damanpour F, Aravind D. Managerial Innovation: Conceptions, Processes, and Antecedents. *Manag Organ Rev* 2012; 8: 423–454.
 25. Dobni CB, Klassen M, Nelson WT. Innovation strategy in the US: Top executives offer their views. *J Bus Strategy* 2015; 36: 3–13.
 26. Dobni B, Klassen M, Nelson T. Innovation strategy in the US: Top executives offer their views. *J Bus Strategy* 2015; 36: 3–13.
 27. Moussa M, McMurray A, Muenjohn N. A Conceptual Framework of the Factors Influencing Innovation in Public Sector Organizations. *J Dev Areas* 2018; 52: 231–240.
 28. Hewlett A, Marshall M, Sherbin L. How Diversity Can Drive Innovation. *Harv Bus Rev*. December 2013

TABLE 2 SUMMARY OF INNOVATION ENABLING AND LIMITING FACTORS BY DIMENSION

Participant	Discipline	Innovation dimension	Enabling or limiting	Factors identified in thematic analysis	Exemplar quotes
3	Nurse	Intention to be innovative	Enabling	Individuals felt valued within their clinical teams and within team innovations can be made	Okay, colleagues yes, definitely think (I am) valued by colleagues. Expertise, knowledge, professionalism, ability to get things moving, all those things, definitely by colleagues. Higher up in management, don't know, minimal feedback from that.
7	Medical			Improvements and ideas able to be implemented	I'm lucky in my small department. Because it's just me and a couple of nurses, we rely on each other and we've built up a lot of trust over the years and they can see where these ideas are coming from, that it is about improving patient care and they can see it working and feel proud that it's coming from their small department. Then they enjoy seeing it go further and the successes that it's had.
18	Nurse				But I think you can do it quickly. I do think it can be done but there's a lot of people that need to be involved in small change.
2	Administration		Limiting	Organisational mission not linked to innovation nor embedded in culture	I wouldn't say it's an underlying culture. There's quite a few departments and individuals that do think innovatively, but it wouldn't be a big part of the culture, but definitely not just a word. I believe that most people that I work with anyway understand what it means to be innovative and can think innovatively but whether or not they can put it into practice within this organisation is probably the real question, yeah.

Participant	Discipline	Innovation dimension	Enabling or limiting	Factors identified in thematic analysis	Exemplar quotes
5	Nurse manager				Although, we recognise that (innovation) and we see that, I don't know that it's actually the everyday culture, now. It's trying to be, but I don't know that it actually is yet, in certain fields and certain teams, but not everywhere I don't think
17	Executive				Innovation per se has not been a focus for us, and we have mostly seen ourselves as a service delivery organisation. If you want to make innovation a bigger part of our portfolio, I think we need to articulate that in our mission statement. We need to articulate that and explicitly within our core values that we foster and encourage and look forward to innovation or we see ourselves as an innovative organisation. I think compared to some of the larger, say, teaching hospitals, where innovation is an embedded part of what they do – that's partly because they have a large number of teachers, trainees, academic staff, professors with university appointments, which is a very different workforce profile from the one that we have. We pursue innovation not as an end in itself, but as a consequence of seeking excellence in service delivery, but to take it one notch higher, we will need to explicitly articulate that.
11	Medical	Context to support innovation	Enabling	Clinicians with ideas provided leadership for innovation	Yes, we can, I suppose that's the key thing, is that it's a small hospital with a close-knit regular team of doctors, nurses, allied health. So, if we want to change something, it usually doesn't involve too many people. We can talk through what we might

Participant	Discipline	Innovation dimension	Enabling or limiting	Factors identified in thematic analysis	Exemplar quotes
					do differently and then basically do it, if we agree that that's sensible.
15	Allied health				I think we were very fortunate, the usual manager for our department is extremely motivated, energetic and sees the clinical value in a lot of these things and puts them in place. So, I think that's why our department, in particular, is quite progressive. I guess that energy and change invigorates a lot of the staff.
23	Nurse		Limiting	Difficulty in modifying systems and processes quickly Number of points of consultation and bureaucratic processes	I wanted to put together a package to be able to improve our cardiac services in the hospital, but the problem was it needed to be talked to on so many different levels that I couldn't get anyone to actually come along with me on the bandwagon to make the change. I got really, really frustrated.
20	Allied health				Something was sent to me by my manager to send to PM who is the LHD safety and quality manager, to get it put up online. Even at that level, and this is Executive A and Executive B, so Executive A who – I'm sure you're familiar with – they both had different ideas about who needed to do the approving to get something put up online. It was a very frustrating thing to realise – but then at the same time they don't seem to see a problem with the way it's set up.
22	Nurse		Limiting	Absence of metrics to evaluate and measure effectiveness of innovation initiatives	That's just monitored by the quality committee – quality risk management committee – but we don't go that next stage in measuring the effectiveness. We know that the project's there. It's been done and there's not a lot of focus on outcomes and

Participant	Discipline	Innovation dimension	Enabling or limiting	Factors identified in thematic analysis	Exemplar quotes
					transferability– that wow, this is really good, let's see if another ward can do it, or something like that.
18	Nurse		Limiting	Knowledge management systems Volumes of communication and information	The way I see it's filtered down is through we have like a newsletter that goes around the hospital staff. We have emails. There's often flyers printed around. If there's a new policy or procedure they'll be education offered. How else do we do it? Newsletter. Team meeting. Staff meetings. Things like that. I do feel like it could be improved upon. I don't know how. I think there's still massive gaps on information sharing. And actually, getting down to the staff on the ground. Like the nurses on the floor. On the night duty.
7	Medical				That's right. The protocols themselves are 20 pages long and the first 10 pages is the history of the development of the protocol and the revision date and who to contact and who signed this off and da-da-da. They're wordy and bureaucratic. No one reads protocols at the moment, they're absolutely ridiculous. The current method for disseminating new knowledge is just hopeless. It's designed by managers for managers to say yes, we sent this protocol out, you should be using this drug in this way because there's a new protocol, and it's, really?
24	Executive	Infrastructure to support innovation	Limiting	Resource constraints and budget to support innovation	That becomes, ooh, very difficult. There is no specific budget that is allocated for innovation. Budgets tend to be allocated on actual clinical needs at this point and requirements to make the system function. There isn't capacity at this stage, at a local level, to identify

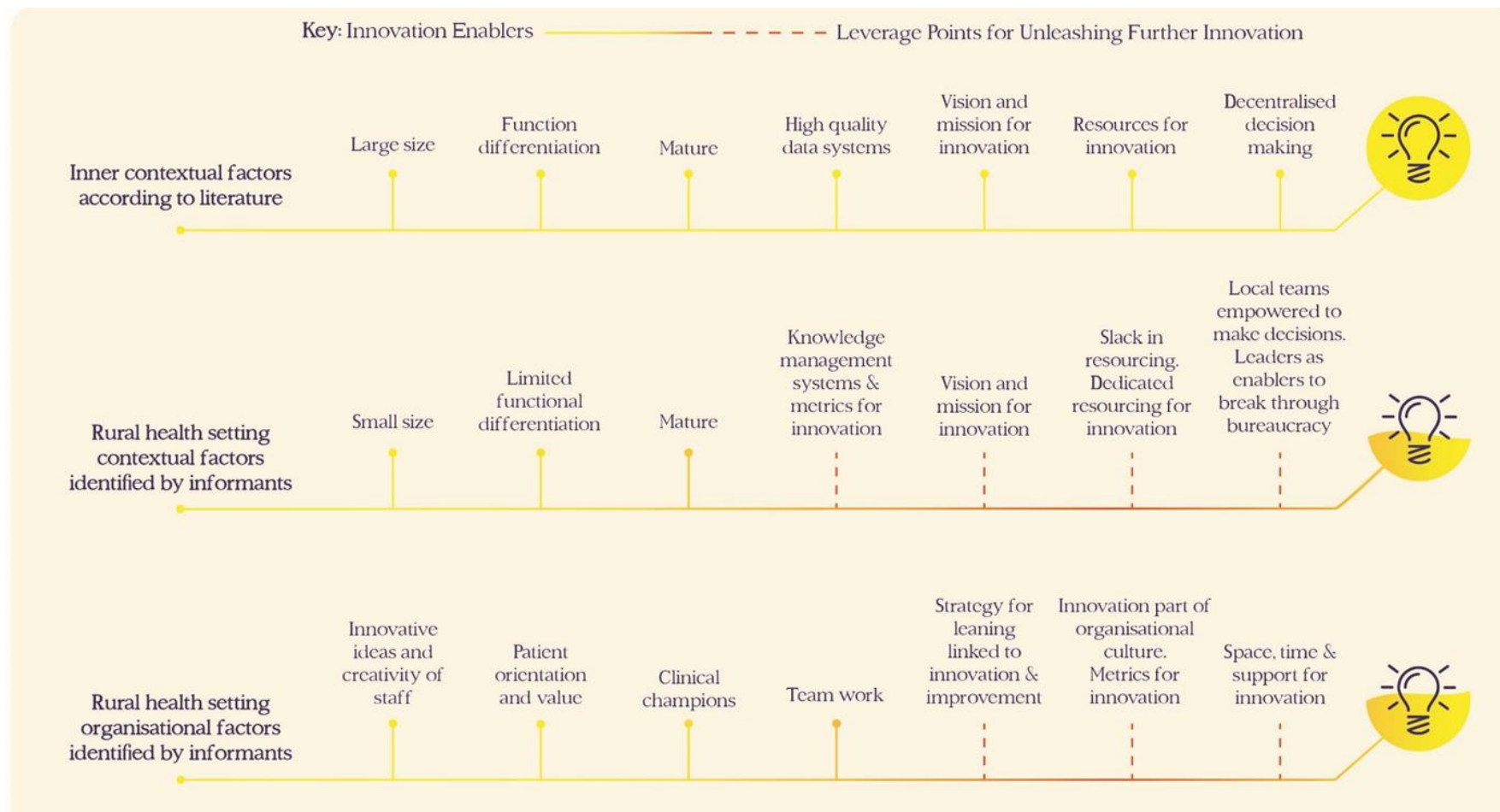
Participant	Discipline	Innovation dimension	Enabling or limiting	Factors identified in thematic analysis	Exemplar quotes
				Time available for innovative thinking and planning	specific amounts of money within our – but in saying that, if there's small things, we can usually find some scope, that some funds could be allocated, but it's only on a very small scale. Nothing on a larger scale.
15	Allied Health				We can, I guess, for minor innovation. It's very much department and personnel driven a lot of the time. I think our department has done that quite a lot and worked very well. There isn't, I guess, a lot of organisational support in terms of getting extra funding or staffing is the big issue. We feel for our clinical load we're already under-staffed and then we're trying to add extra services.
24	Executive				New services ... have to go through an approval process from the district with the Director of Clinical Operations. So, any new services would need to have briefs prepared, sent to the district for consideration with full costings. The likelihood of any new services commencing that will cost the district, is unlikely to get approval at this time.
17	Executive	Knowledge and orientation of employees to support innovation	Enabling	Agencies such as the CEC and ACI provided expertise in innovation and clinical standards	What we've tried to do over the last few years is engage not only internally but also with external organisations that can help drive change and improvement and bring about an environment conducive to creativity. As examples, I will cite the very involved engagement that we've had with the Agency for Clinical Innovation, and we've had a number of ACI-driven projects that are running here locally, and that's helped us improve, innovate, change, by using the agency as an external change

Participant	Discipline	Innovation dimension	Enabling or limiting	Factors identified in thematic analysis	Exemplar quotes
					mediator, which was ACI in this case. Equally, we've also worked with the Clinical Excellence Commission where we've been able to leverage some of their exceptionally good products and innovations and implement them within the organisation.
28	Medical				But having said that, it's remarkable what changes have occurred in this hospital, and I think having the students here has been a positive for that. The input of places like the CEC and the ACI has helped run change and they've put up – they've developed pathways which can be sort of stamped universally. A good example of that is the orthogeriatric model that the ACI and CEC both put up and which we've attempted to implement here. It's still not implemented as well as it should be because we don't have the resources. We're still very much starved compared to larger places. There's no registrars, there's no residents [unclear] but the role has been ill defined. Management doesn't seem to have the resources and the capacity to do that
23	Nurse		Limiting	Outside of mandatory training learning for improvement is largely self-funded Connection between identified areas for improvement/innovation	No. No I don't. I think the learning and development – okay, so let me answer that one. So, with the learning in ED it's specifically for ED, so we do advance our skills in that area and A does target our education so that we are continuously at a high standard of practice, but it's in a high acuity area and you need to be. But I, yeah, I don't feel that – how can I put that? I don't really feel, with a lot of the

Participant	Discipline	Innovation dimension	Enabling or limiting	Factors identified in thematic analysis	Exemplar quotes
				and learning opportunities provided was not clear	education, as I said, I just don't feel that nurses have anywhere to go with it.
7	Medical Clinician				No, I don't think the organisation is trying to get you to be innovative or develop new skills or anything, quite the opposite. The training is all based on established credentialled courses, the nurses do their FLECC, you go and do your EMST, which has been the same for 30 years. They're not innovative courses, they're quite the opposite. The organisation is lagging on that; the people themselves see the value and are queueing up for innovative courses and telling their friends and doing these things in their spare time.
18	Nurse				Sometimes I feel like the education department is just there to sort of tick a box. It's not necessarily innovative. I think it could be improved upon. Yeah. I think actually having educators – because I know that they're on the ward. But a lot of the time I think patient load or something? I don't think they're actually like going around to the bedside with the nurse and checking what they're doing. I do think that yeah – I do think the education department could be improved.
5	Nurse				I wouldn't say it's rewarded. I think for yourself internally you feel rewarded. I feel like especially from being in an acting role for a long time to then actually feel like you have a valid opinion or a response because of what you know. It's a bit of a confidence booster when you go into a meeting, and you actually have half an idea of what you're

Participant	Discipline	Innovation dimension	Enabling or limiting	Factors identified in thematic analysis	Exemplar quotes
					talking about. I don't think it's – I think it's not rewarding here either because there's no one else seems to be on the same page. I think if you worked in a culture or an environment that everybody had the same ideas.

FIGURE 2 LEVERAGE POINTS FOR FURTHER INNOVATION



CAREER SATISFACTION AMONG PHYSICIANS, DENTISTS AND PHARMACISTS: A STUDY FROM JORDAN

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ABSTRACT

OBJECTIVE:

Career satisfaction experienced by healthcare professionals has an impact on the quality of health care. This study aims to evaluate career satisfaction perceived by physicians, dentists and pharmacists working in Jordan.

DESIGN:

The study utilized an online questionnaire distributed among a sample of pharmacists, dentists and physicians working in Jordan. The questionnaire addressed career satisfaction as well as satisfaction regarding family and workplace aspects, relations with patients, colleagues, and society.

SETTING:

Healthcare institutions in Jordan.

MAIN OUTCOME MEASURES:

Physicians, dentists, and pharmacists were surveyed for factors influencing their career satisfaction.

RESULTS:

A total of 294 healthcare personnel participated in this study with a mean age of 37.65 ± 11.7 years (range= 23-68 years). Participants included 46 (15.6%) pharmacists, 128 (43.5%) physicians and 120 (40.8%) dentists with a female majority (76.9%). Only 165 (56.1%) expressed career satisfaction. Marriage, having children, a high monthly income, and house ownership were associated with a significantly higher career satisfaction (≤ 0.050). Moreover, professionals working in academic or non-governmental organizations had a significantly higher career satisfaction ($P=0.001$). Most practitioners were not satisfied with a work-family relation (51.8%), however, they were mostly satisfied with relationships with colleagues (65.9%), and perceived they received appreciation from patients and society (60.5%).

CONCLUSIONS:

Social and financial stability are associated with career satisfaction among healthcare professionals working in Jordan. Further, participants are generally satisfied with relationships with colleagues, supporting staff and patients. They are also satisfied with respect and appreciation offered from society. More attention is warranted for assessment of challenges and problems faced by practitioners in the private sector, particularly economic aspects to improve career satisfaction and mitigate turnover intention.

KEYWORDS

career satisfaction; dentists; healthcare professionals; pharmacists; physicians

INTRODUCTION

Healthcare systems worldwide may encounter several challenges and problems. One of the serious problems encountered is the deficiency of human health resources which represents a major barrier to achieving universal health coverage and building a sustainable health system [1]. This problem seems to affect many countries regardless of their socioeconomic status leading to shortage of healthcare personnel. Within the context of middle-income countries (MIC) and compared to other Eastern Mediterranean countries, Jordan has a large population of national healthcare personnel in the medical, dental, and pharmaceutical sectors. The health workforce in Jordan consists mainly of physicians, pharmacists, dentists, and nurses. Among healthcare workers physicians represent (25%), pharmacists (16%), and dentists (15%) of the workforce [2]. According to 2013 statistics, for every 10,000 Jordanians, there are 28.6 physicians, 17.8 pharmacists, and 10.4 dentists [3], which are considered among the highest per-population rates in the Middle East [2]. This geographic area is politically and culturally distinct, with a possible impact on other areas of the world. Jordan, as an example, has been influenced by the political turbulence in surrounding countries with a resultant continuous flow of refugees and immigrants from Iraq and Syria [4]. Considering that more than 40% of the population has been born abroad, Jordan hosts one of the largest percentages of immigrants in the world compared to its total population [5]. Such demographics present a burden on the country's healthcare system that is concerned with providing services to refugees [6], as well as regional patients who seek healthcare in Jordan as a medically advanced country, and is a favorable destination for medical tourism [7]. Furthermore, the important role of Jordan as a reliable regional healthcare provider is highly acknowledged internationally by large aid donors such as the European Union due to its provision of sustainable healthcare services to less privileged populations of the Middle East under the umbrella of the World Health Organization (WHO) [8].

Medicine, pharmacy, and dentistry are stereotyped in many countries, including Arabic countries, as socially prestigious professions [9], and usually students with the top scores in high school choose one of these career paths. A recent review identified factors influencing career choice among dentistry and pharmacy students including financial remuneration, job stability, job autonomy, and

prestige as important career motivators [10], and often families assume a culturally proactive role in preference of students to choose a healthcare career [11].

Career satisfaction can be described as a pleasant or positive emotional state resulting from the appraisal of job experiences, and eventually determining the productivity and efficiency of various institutions [12]. It is an important factor for healthcare professionals that influences career development and advancement [13]. Further, lack of career satisfaction is associated with suboptimal healthcare delivery, poor clinical outcomes [14], and increased likelihood of staff erosion due to immigration, premature retirement or changing career path. Studies have shown that less than 50% of the required healthcare staff are available to serve rural populations, and sometimes care is provided by non-qualified staff compromising quality of care for the community, particularly the poor [12]. Locally in Jordan and many other countries of the Middle East, international migration of health workers represents a major factor in regional imbalance of health professionals [15], due mainly to political turbulence [16]. Other likely factors that may compromise career satisfaction include unsafe or hostile work environment, where the healthcare provider may feel threatened by violence arising from patients or their families.

Several studies have been conducted to investigate career satisfaction among specific healthcare professional groups such as nurses and general practitioners [10,14]. However, no studies were undertaken so far to investigate career satisfaction collectively among three categories of healthcare personnel namely physicians, dentists, and pharmacists. This study hypothesizes that physicians, dentists and pharmacists working in Jordan have sufficient levels of career satisfaction with no statistically significant differences.

Therefore, this study was conducted to investigate this hypothesis by assessing career satisfaction among physicians, dentists and pharmacists working in Jordan, and determining which factors influence their career satisfaction including socioeconomic factors and relationships with family, colleagues, patients and society.

METHODS

The study was a cross-sectional observational study conducted among healthcare professionals working in

Jordan between July-August 2021. Inclusion criteria identified pharmacists, dentists and physicians who are currently practicing in Jordan. Practitioners were invited to participate through a survey link sent to three professional WhatsApp groups for physicians, pharmacists and dentists.

These WhatsApp groups were originally created by professional leaders among a wide sector of the three respective professional groups for the purpose of continuous medical education (CME). Each of the invited WhatsApp groups for the three professions consisted of 250 participants. These groups were selected by co-authors: N. D-O (dental group), E. B. (physician group) and R. D. (pharmacist group). Data were collected using an anonymous, online questionnaire created using Google Forms. Development of the questionnaire went through the following steps: The first draft of the questionnaire was designed by the first author. The draft was then revised by the other three co-authors. Being from the three professions under investigation, co-authors face-validated the questions and ensured all questions apply to members of their professions. Cronbach alpha and Kappa tests were conducted as explained below. The questionnaire was composed of 32 closed-ended questions divided into three sections of socio-professional demographics, career satisfaction aspects of work environment and career satisfaction aspects of relationship with family, patients and community. Socio-professional demographics included age, gender, marital status, number of children, country of graduation for the bachelor's degree, type of health profession, monthly income in Jordanian Dinars (JOD), overall salary satisfaction and house ownership. The framework of career satisfaction included eleven domains of job satisfaction, namely: work in the main profession of study and training, job stability, and job satisfaction; workplace relationships including relationships with colleagues and supporting staff: duties assigned at work, availability/cost of medical supplies (where relevant), respect from colleagues and level of stress at work, and the participant's career recommendation for future generations. Similarly, the final section of the study assessed career satisfaction in relation to five social domains; these included satisfaction with community respect, patient/community appreciation, and the services provided by the participants to the patients, as well as influence of work on lifestyle (leisure time for participant/family and influence of night shifts).

Sample size determination was carried out using the epidemiological software: Epi Info™ (CDC, Centers for

Disease Control, Atlanta, USA) based on a population size for the three professions in Jordan of 56,800, expected frequency (of satisfaction) 50% and a 4.8% margin of error. A sample of 292 produced a 90% power of this study.

A validity pilot test was performed to ensure clarity of questions and reproducibility of responses. A group of 10 practitioners, who were excluded from the final sample, were invited to complete the questionnaire on two occasions separated by one week to compare responses. Unclear or vague questions were modified. The calculated Cronbach alpha and Kappa values were considered acceptable (0.73 and 0.78 respectively).

Ethical approval was obtained from Deanship of Scientific Research, University of Jordan, (reference #1576). The Statistical Package for Social Science (SPSS) [version 21] was used to calculate descriptives in the form of frequency, and percentages. Statistical significance of association of demographics and other variables with career satisfaction were calculated using cross tabulation (chi square test) with level of significance set at $P \leq 0.05$. Binary logistic regression analysis was carried out to identify significant variables for the prediction of satisfaction.

RESULTS

A total of 294 practitioners participated in this study and these were distributed as follows: 46 (15.6%) pharmacists, 128 (43.5%) physicians and 120 (40.8%) dentists.

Overall response rate was 39.2% ($n=750$ for original WhatsApp groups). Response was variable with the least response rate noticed among pharmacists (18.4%), and highest among dentists (48%), and physicians (51.2%). Participants were 68 (23.1%) males and 226 (76.9%) females. They had a mean age of 37.65 ± 11.7 years (range= 23-68 years).

Satisfaction was highest among pharmacists and lowest among dentists, but differences were not significant ($P=0.546$). Marriage, having children, a high monthly income, and house ownership were associated with a significantly higher career satisfaction (≤ 0.050) (Table 1). Also professionals working in academic institutions or non-governmental organizations (NGOs) had a significantly higher career satisfaction ($P=0.001$) (Table 1). All socio-professional characteristics are presented in Table 1.

TABLE 1 SOCIO-PROFESSIONAL CHARACTERISTICS OF THE STUDY SAMPLE CROSS-TABULATED WITH CAREER SATISFACTION

Socio-professional characteristics	Satisfaction		Total	P value
	Unsatisfied (N=129, 43.9%)	Satisfied (N=165, 56.1%)	N (%)	
Gender				
Male	31 (45.6%)	37 (54.4%)	68 (23.1%)	0.746
Female	98 (43.4%)	128 (56.6%)	226 (76.95)	
Marital status				
Single	57 (58.8%)	40 (41.2%)	97 (33.0%)	0.000
Married	66 (35.5%)	120 (64.5%)	186 (63.3%)	
Divorced	6 (75.0%)	2 (25.0%)	8 (2.7%)	
Widow	0 (0.0%)	3 (100.0%)	3 (1.0%)	
Number of children				
No children	72 (60.5%)	47 (39.5%)	119 (40.5%)	0.000
≤ 4	52 (34.9%)	97 (65.1%)	149 (50.7%)	
> 4	5 (19.2%)	21 (80.8%)	26 (8.8%)	
Country of graduation for the Bachelors				
Jordan	99 (47.1%)	111 (52.9%)	210 (71.4%)	0.074
Other countries	30 (35.7%)	54 (64.3%)	84 (28.6%)	
Profession				
Pharmacy	18 (39.1%)	28 (60.9%)	46 (15.7%)	0.546
Medicine	54 (42.2%)	74 (57.8%)	128 (43.5%)	
Dentistry	57 (47.5%)	63 (52.5%)	120 (40.8%)	
Monthly income (Jordanian Dinar)				
< 500	52 (73.2%)	19 (26.8%)	71 (24.1%)	0.000
500-<3000	75 (38.3%)	121 (61.7%)	196 (66.7%)	
3000->6000	2 (7.4%)	25 (92.6%)	45 (15.2%)	
House ownership				
Rented	32 (62.7%)	19 (37.3%)	51 (17.3%)	0.003
Owned	97 (39.9%)	146 (60.1%)	243 (82.7%)	
Professional setting				
Academic	16 (24.2%)	50 (75.8%)	66 (22.5%)	0.001
Private	71 (52.2%)	65 (47.8%)	136 (46.3%)	
Public	41 (47.7%)	45 (52.3%)	86 (29.2%)	
NGOs	1 (16.7%)	5 (83.3%)	6 (2.0%)	

Most of the study participants were satisfied with workplace factors including professional relationships (colleagues/supporting staff), assigned duties, and availability/cost of medical supplies where applicable. (Table 2) Career satisfaction was also significantly associated with these positive workplace factors. However, most of the study sample (n=198, 67.3%) stated that they would not recommend their career for future generations

(Table 2), and only 56 participants (21.21%) stated that they were satisfied with their salary (table 2).

Most participants were satisfied with the services they provide to their patients and felt respect and appreciation of their patients and community. However, they mostly felt that their work, and night shifts come at the expense of family time (Table 3).

TABLE 2 WORKPLACE FACTORS CROSS-TABULATED WITH CAREER SATISFACTION IN THE THREE HEALTHCARE PROFESSIONS.

Workplace perspectives	Satisfaction		Total	P value
	unsatisfied	Satisfied	N (%)	
Do you work in your field of study?				
Yes	119 (43.0%)	158 (57.0%)	277 (94.2%)	0.048
In my field of study and other fields	8 (80.0%)	2 (20.0%)	10 (3.4%)	
No	2 (28.6%)	5 (71.4%)	7 (2.4%)	
Have you Changed your profession in last 10 years?				
No	96 (42.3%)	131 (57.7%)	227 (77.2%)	0.008
Changed it once	20 (39.2%)	31 (60.8%)	51 (17.3%)	
Changed it more than once	13 (81.3%)	3 (18.8%)	16 (5.5%)	
Are you satisfied with relations with colleagues?				
No	59 (66.3%)	30 (33.7%)	89 (30.3%)	0.000
Yes	70 (34.1%)	135 (65.9%)	205 (69.7)	
Do you think your colleagues respect you?				
No	26 (81.3%)	6 (18.8%)	32 (10.84%)	0.000
Yes	103 (39.3%)	159 (60.7%)	262 (89.16%)	
Do you have unhealthy competition with colleagues?				
No	64 (35.4%)	117 (64.6%)	181 (61.56%)	0.000
Yes	65 (57.5%)	48 (42.5%)	113 (38.44%)	
How do you evaluate stress at work?				
Mild-moderate stress	57 (33.3%)	114 (66.7)	171 (58.2%)	0.000
High stress	72 (58.5%)	51 (41.5%)	123 (41.8%)	
Are you satisfied with relationship with supporting staff?				
No	44 (57.9%)	32 (42.1%)	76 (25.9%)	0.004
Yes	85 (39.0%)	133 (61.0%)	218 (74.1%)	
Are you satisfied with duties assigned to you at work?				
No	120 (46.0%)	141 (54.0%)	261 (88.8%)	0.041
Yes	9 (27.3%)	24 (72.7%)	33 (11.2%)	
Are you satisfied with the availability of medical supplies for work?				
No	80 (53.0%)	71 (47.0%)	151 (51.4%)	0.004
Yes	36 (32.4%)	75 (67.6%)	111 (37.7%)	
Not applicable	13 (40.6%)	19 (59.4%)	32 (10.9%)	
Are you satisfied with the cost of medical supplies used in your work?				
No	89 (49.2%)	92 (50.8%)	181 (61.6%)	0.030
Yes	14 (28.6%)	35 (71.4%)	49 (16.7%)	
Not applicable	26 (40.6%)	38 (59.4%)	64 (21.7%)	
Are you Satisfied with your salary?				
No	125 (52.5%)	113 (47.5%)	238 (80.9%)	0.000
Yes	4 (7.1%)	52 (92.9%)	56 (19.1%)	
Would you recommend your career for future generations?				
No	115 (58.1%)	83 (41.9%)	198 (67.3%)	0.000
Yes	14 (14.6%)	82 (85.4%)	96 (32.7%)	

TABLE 3 SATISFACTION WITH RELATIONS WITH FAMILY, PATIENTS AND COMMUNITY

Satisfaction with relations (family, patients and community)	Satisfaction		Total	P value
	Unsatisfied N (%)	Satisfied N (%)	N (%)	
Does work allow sufficient leisure time for you and your family?				
No	28 (28.3%)	71 (71.7%)	99 (33.68%)	0.000
Yes	101 (51.8%)	94 (48.2%)	195 (66.32%)	
Do night shifts interfere with your family's time?				
No	5 (17.9%)	23 (82.1%)	28 (9.5%)	0.004
Yes	49 (53.3%)	43 (46.7%)	92 (31.3%)	
No night shifts	75 (43.1%)	99 (56.9%)	174 (59.2%)	
Are you satisfied with community respect?				
No	42 (65.6%)	22 (34.4%)	64 (21.8%)	0.000
Yes	87 (37.8%)	143 (62.2%)	230 (78.2%)	
Are you satisfied with patient and community appreciation?				
No	33 (64.7%)	18 (35.3%)	51 (17.3%)	0.001
Yes	96 (39.5%)	147 (60.5%)	243 (82.7%)	
Are you satisfied with the services you provide to patients?				
No	30 (68.2%)	14 (31.8%)	44 (15.0%)	0.000
Yes	99 (39.6%)	151 (60.4%)	250 (85.0%)	

Binary logistic regression analysis was carried out to find significant variables for the prediction of satisfaction. Table 4 describes variables in this regression model.

Nagelkerke R² shows that 24.4% of the variability in satisfaction is accounted for by variations in independent variables.

There were no significant differences in predictive capacity of this regression model across different categories of the test sample as indicated by Hosmer and Lemeshow test (Chi-square= 13.869 and P=0.085).

Predictive capacity of the model was shown to be: 68.1% accurate which is considered an acceptable-good level of accuracy.

TABLE 4: VARIABLES IN THE REGRESSION MODEL AND THEIR SIGNIFICANCE

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Gender	.204	.372	.301	1	.583	1.226	.592	2.541
Age	.001	.042	.001	1	.972	1.001	.922	1.087
Experience in years	.014	.045	.097	1	.755	1.014	.929	1.107
Residence ownership	.693	.407	2.907	1	.088	2.000	.901	4.439
Marital status	.245	.480	.260	1	.610	1.278	.499	3.274
Having children	.443	.475	.871	1	.351	1.558	.614	3.953
Income	1.340	.377	12.643	1	.000	3.819	1.825	7.995
Constant	-4.133	1.629	6.439	1	.011	.016		

a. Variable(s) entered on step 1: Gender, Age, ExperienceYears, RentVsOwner, SingVsMarried, ChildrenCategorical, LowVsHighIncome.

Unstandardized B weights reflects the importance of various variables in the model. The higher the value the larger the effect of the variable would be (regardless of the significance of the variable).

Important variables were, in order of importance: income, residence ownership, having children, married individuals followed by female gender, years of experience and finally age. However, the only significant variable was income.

DISCUSSION

This study was conducted to investigate career satisfaction in a group of pharmacists, dentists and physicians working in Jordan as an example of a middle-income country with important regional contribution to the provision of healthcare services.

Currently, the catastrophic consequences of the COVID-19 pandemic have shown that a multidisciplinary global care agenda should be organized and conducted by a collaborative network of healthcare professionals that is directed by local and global perspectives [17].

In this study, approximately, one in two professionals were satisfied with their career, and this was paralleled in the three professions. Stress is inherent in healthcare professions including medicine, pharmacy and dentistry particularly in the settings of developing countries which adversely influences career satisfaction. Several demographic and professional factors influenced career satisfaction among the three groups. Gender and country of graduation had no influence on career satisfaction, however, the study identified marriage, having children, having a monthly salary higher than JOD 1000 (equivalent to \$1410), and house ownership to be significantly associated with satisfaction.

All these factors expectedly provide socioeconomic stability and emotional support for those with challenging careers. Work-family balance was reported to enhance career satisfaction and the perception of life satisfaction [18]. Another explanation could relate to the fact that married personnel who have children are older with more years of practice and experience making them more settled in their careers and having more stable jobs. This highlights the role that work-family conflict can play in increasing burn out among healthcare professionals.

Personnel working in academic institutions and NGOs also had a higher satisfaction rate. Academia is inherently inspiring, constantly stimulating [19], and considered prestigious on a wide scale [20]. Teaching is habitually just one aspect of a university faculty job as the position also demands conducting research, performing administrative duties and mentoring students among others [13]. Despite the common belief that academics in health professions such as medicine are less paid than their peers in private practice [21], and the possible influence this may have on

career satisfaction, this study showed a higher satisfaction rate for academics. Taking into consideration the necessary maintenance of the academic workforce in healthcare professions, the findings of this study may help highlight the advantages of the academic career and encourage the choice of academic path for these professionals.

This finding is interesting taking into consideration the staggering staffing crisis in academic medical institutions in countries such as the UK where the older workforce and high vacancy rates are prevailing [22].

This study, on the other hand, showed that working in the private sector may be a source of dissatisfaction under unstable economies which could be associated with inconsistent income or job security. Running a private practice may be associated with increased operating cost, decreasing reimbursement, and lack of job security [23]. The society may have the impression that certain healthcare professions are prestigious and highly paid placing them at the top of health professions' hierarchy. A hierarchical pay system is well acknowledged in healthcare disciplines, where physicians, followed by dentists and pharmacists are supposed to get the best pay figures. Certainly, when independent variables were collectively analyzed by logistic regression, income was identified as the significant factor in determining career satisfaction. This study found that almost one in four have a monthly income of less than JOD 500 (equivalent to \$ 705), and only 15% earn more than JOD 3000 monthly (equivalent to \$ 4231). This is way less than that of high income neighboring Gulf countries such as Saudi Arabia where the average income of pharmacists is estimated to be \$4364, or industrialized countries such as the USA where it is estimated to be \$10,459 [24]. Moreover, it is estimated that pediatricians in the USA, who are the least paid specialty, are paid approximately \$15,000 monthly [25]. Unsatisfied participants in this study were those having another work beside their own profession, or those who have changed their profession more than once in the past 10 years.

Professionals who change their profession more frequently are expected to have low satisfaction scores. This can be explained by in-depth look at factors associated with turnover intention. Turnover intention is the potential to leave one's job within a certain time period [26]. Due to ineffective human resource management practices, a substantial proportion of health workers were reported to

have turnover intentions in some developing countries [27]. Cited factors for turnover intention include concerns about burnout, lack of support, weak chances for promotion, and high work stress [28]. More than 50% of the sample had mild-moderate stress at work, while the remainder believed they had high stress. However, almost three in four participants were satisfied with their relationships with supporting staff and colleagues. Also, most participants believed that their colleagues respect them, and that competition at work was healthy (90% and 61.6% respectively). Similar results were reported by a recent Brazilian study where physicians considered relationships with their colleagues the source of the greatest point of career satisfaction [20].

On the other hand, a minority stated that they were satisfied with their professional duties, or with costs and availability of medical supplies required in their work. A previous study indicated that insufficient equipment and supplies contribute to job dissatisfaction among health workers in Africa [29]. Interestingly, most of the participants in this study would not recommend their profession to the future generations. This is in contrary to another study conducted among dentists where only 32.9% stated that they will not recommend their profession to younger generations [30]. A recent review reported that dentists were satisfied with their jobs at a moderate to high level [31]. Work environmental factors including patient relationships, respect, delivery of care, staff, professional relationships, and professional environment were associated with higher satisfaction, whereas, the least satisfaction was attributed to personal time, stress, income, practice management, and professional time [31]. Within the context of healthcare professions, dentists are particularly at risk of developing physical health complaints as a result of their work environment including infections, chemical and radiation injury, hearing and neuropathic problems [32]. Most of the study sample felt that work does not allow sufficient leisure time either for them or their families, and this feeling was significantly associated with lack of career satisfaction. A recent UK study among physicians concluded that satisfaction with leisure time is low and this is detected more among surgical careers than general practitioners [33]. Armstrong et al indicated that work-family conflict was significantly related to job satisfaction [34]. Dissatisfaction with personal time was associated with long working hours among healthcare workers [35], and an elevated suicide risk was reported in physicians, dentists and pharmacists, with a possible contributory factor being easy access to medicinal drugs by physicians and pharmacists [36].

Most of participants in this study were satisfied with their relations with patients and community in terms of respect, appreciation, and provision of services. In analyzing practitioner-patient relationship, it is important to explain the changing trends in the dynamics of this relationship over the recent years in Jordan. It is reported that the highest rates of healthcare workers exposure to violence takes place in the Middle East region with a prevalence of 61.3%, compared to 38.3% in Europe [37]. A wide survey conducted among Jordanian physicians shortly before the COVID-19 pandemic estimated an overall violence prevalence of 63.1% [38]. More recently, another survey conducted among physicians in a major public hospital after the emergence of COVID-19 reported a slightly higher percentage of 65.5% exposure to violence [39]. It seems that public hospitals have higher rates of violence against physicians [39]. On the other hand, this study reports a general satisfaction of practitioners with patients and society relationships including respect and appreciation. This is probably attributed to the wide spectrum of professional settings of the study participants.

This study has limitations attributed to the relatively low response rate and the possibility of under-representation of pharmacists. The cross-sectional design associated with self-perceptions is also another limitation. However, this study allowed for assessment of perceptions of pivotal healthcare professionals, and presented comparisons in important aspects of career satisfaction.

Findings of this study highlighted the main factors that promote career satisfaction including financial security, family stability, and collaborative work environment. This indicates the most important factors that allow for improved career satisfaction among healthcare professionals which will reflect upon enhanced staff retention and optimized quality of care. Future studies should involve larger samples and should employ in-depth analysis of factors contributing to lower career satisfaction including financial and social aspects. Work-related factors and their effects on career satisfaction should also be further investigated such as the number of working hours, the number of years of experience, geographic work location and stage of career [40].

CONCLUSIONS

Family-related factors and indicators of financial stability such as high salary and house ownership play an important

role in promoting career satisfaction among physicians, pharmacists and dentists working in Jordan. Affiliation to academic institutions and NGOs also seems to be associated with career satisfaction. On the other hand, professionals who change their jobs seem to be less satisfied about their careers.

Although the career satisfaction rate was approximately 50%, most professionals were highly satisfied with their work relations with colleagues, patients and supporting staff, however, they were not satisfied with leisure time. The fact that most of them would not recommend their career to future generations may indicate the need for promoting important career factors to enhance satisfaction. More attention is warranted for important job aspects such as provision of necessary medical supplies required for these careers, namely physicians and dentists, at an acceptable cost. Practitioners in private sector also need more attention to address challenges and problems they face. In depth analysis of economic aspects and improving salaries is warranted to prevent lack of career satisfaction and mitigate turnover intention.

Future studies can address the role that national professional associations can assume to collaborate with public authorities in improving work conditions of all healthcare specialties.

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CONFLICT OF INTEREST

Authors declare no conflict of interest

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References

1. Sabitova A, Sajun SZ, Nicholson S, Mosler F, Priebe S. Job morale of physicians in low-income and middle-income countries: a systematic literature review of qualitative studies. *BMJ Open*. 2019 Dec 3;9(12):e028657. doi: 10.1136/bmjopen-2018-028657
2. Nazer LH, Tuffaha H. Health Care and Pharmacy Practice in Jordan. *Can J Hosp Pharm*. 2017 Mar-Apr;70(2):150-155. doi:10.4212/cjhp.v70i2.1649. Epub 2017 Apr 28.
3. The Hashemite Kingdom of Jordan, High Health Council/ General Secretariat. National Human Resources for Health Observatory Annual Report, 2013. <http://www.hhc.gov.jo/uploadedimages/HRHReport2013.pdf>. Accessed 19 October 2021
4. Murshidi MM. Syrian Refugees Constitute 20% of Jordan's Population. *Am J Public Health*. 2016 May;106(5):e18. doi: 10.2105/AJPH.2016.303117.
5. Sbeih IA, Asad MY. History of Neurosurgery in Jordan. *World Neurosurg*. 2016 Apr;88:655-660. doi: 10.1016/j.wneu.2015.09.107. Epub 2015 Oct 11.
6. Al Ryalat N, Ryalat S, Al-Abdalla M, Al-Shayyab MH, Samara O, Taimeh D, Khreesha L, Abu-Hammad OA, Malkawi Z, Dar-Odeh NS. Women in Maxillofacial Surgery and Otolaryngology; Career Obstacles and Success Factors. *J Craniofac Surg*. 2020 Oct 8. doi: 10.1097/SCS.000000000000132. Epub ahead of print.
7. Kangas B. Hope from Abroad in the International Medical Travel of Yemeni Patients. *Anthropol Med*. 2007 Dec;14(3):293-305. doi: 10.1080/13648470701612646. https://ec.europa.eu/trustfund-syria-region/news/alathad-alawrwby-ykhss-43-mlywn-yww-ldm-jhwd-mnzmt-alsht-alalmyt-balardn-2020-11-01_en. Accessed 15 December 2021.
8. Al-Bitar ZB, Sonbol HN, Al-Omari IK. Reasons for choosing dentistry as a career by Arab dental students. *Eur J Dent Educ*. 2008 Nov;12(4):247-51. doi: 10.1111/j.1600-0579.2008.00526.x.
9. Wu LT, Low MM, Tan KK, Lopez V, Liaw SY. Why not nursing? A systematic review of factors influencing career choice among healthcare students. *Int Nurs Rev*. 2015 Dec;62(4):547-62. doi: 10.1111/inr.12220.
10. Saad SM, Fatima SS, Faruqi AA. Students' views regarding selecting medicine as a profession. *J Pak Med Assoc*. 2011 Aug;61(8):832-6.
11. Merga H, Fufa T. Impacts of working environment and benefits packages on the health professionals' job satisfaction in selected public health facilities in eastern Ethiopia: using principal component analysis. *BMC Health Serv Res*. 2019 Jul 16;19(1):494. doi: 10.1186/s12913-019-4317-5.
12. Abu-Hammad S, Elsayed SA, Nourwali I, Abu-Hammad O, Sghaireen M, Abouzaid BH, Dar-Odeh N. Influence of gender on career expectations of

- oral and maxillofacial surgeons. *J Craniomaxillofac Surg.* 2020 Apr;48(4):458-462. doi: 10.1016/j.jcms.2020.02.023. Epub 2020 Mar 3.
13. Goetz K, Musselmann B, Szecsenyi J, Joos S. The influence of workload and health behavior on job satisfaction of general practitioners. *Fam Med.* 2013 Feb;45(2):95-101.
 14. WHO | A Universal Truth: No Health Without a Workforce. <https://www.who.int/workforcealliance/knowledge/resources/hrhreport2013/en/>. Accessed 19 October 2021
 15. Hassan MHA. Migration-the choices we face. *Science.* 2017 May 19;356(6339):667. doi: 10.1126/science.aan5965.
 16. Wong EL, Yeoh EK, Dong D. Covid-19: transforming healthcare will require collaboration and innovative policies. *BMJ.* 2020 Jun 5;369:m2229. doi: 10.1136/bmj.m2229.
 17. Gopalan N, Pattusamy M. Role of Work and Family Factors in Predicting Career Satisfaction and Life Success. *Int J Environ Res Public Health.* 2020 Jul 15;17(14):5096. doi: 10.3390/ijerph17145096.
 18. Nourwali I, Abu-Hammad O, and Dar-Odeh N. Quality of Life of Academic Dentists' Families; a Cross-Sectional Survey. *Int. Arch. Med.*, 2016 January 14;9, doi: 10.3823/2065.
 19. de Oliveira Vasconcelos Filho P, de Souza MR, Elias PE, D'Ávila Viana AL. Physicians' job satisfaction and motivation in a public academic hospital. *Hum Resour Health.* 2016 Dec 7;14(1):75.
 20. Gilbert J, Kothari P, Sanchez N, Spencer DJ, Soto-Greene M, Sánchez JP. Is Academic Medicine a Financially Viable Career? Exploring Financial Considerations and Resources. *MedEdPORTAL.* 2020 Aug 17;16:10958. doi: 10.15766/mep_2374-8265.10958. Erratum in: *MedEdPORTAL.* 2020 Dec 4;16:11083.
 21. Darbyshire D, Gordon M, Baker P, Agius S, McAleer S. Systematic review of interventions to encourage careers in academic medicine. *Med Teach.* 2019 Jan;41(1):61-67.
 22. Satiani B. Health care update: hospital employment or private practice? *Perspect Vasc Surg Endovasc Ther.* 2013 Dec;25(3-4):46-52. doi: 10.1177/1531003513510952. Epub 2013 Nov 20.
 23. Almogbel Y. The Effect of Occupational Stress on the Quality of Life of Pharmacists in Saudi Arabia. *Risk Manag Healthc Policy.* 2021 Feb 16;14:643-654. doi: 10.2147/RMHP.S281317.
 24. Laff M. FAMILY PHYSICIAN SALARIES UP, BUT STILL TRAIL THOSE OF SUBSPECIALISTS. *Ann Fam Med.* 2015 Jul-Aug;13(4):390-1. doi: 10.1370/afm.1826.
 25. Hao MC, Jou RC, Liao CC, Kuo CW. Workplace stress, job satisfaction, job performance, and turnover intention of health care workers in rural Taiwan. *Asia Pac J Public Health.* 2015 Mar;27(2):NP1827-36. doi: 10.1177/1010539513506604. Epub 2013 Oct 30.
 26. Bonenberger M, Aikins M, Akweongo P, Wyss K. The effects of health worker motivation and job satisfaction on turnover intention in Ghana: a cross-sectional study. *Hum Resour Health.* 2014 Aug 9;12:43. doi: 10.1186/1478-4491-12-43.
 27. Dar-Odeh N, Elsayed SA, Nourwali I, Ryalat S, Al-Shayyab MH, Abu-Hammad O. Social factors as career obstacles for female oral and maxillofacial surgeons in three Middle Eastern countries. *Int J Oral Maxillofac Surg.* 2019 Nov;48(11):1504-1508. doi: 10.1016/j.ijom.2019.03.001. Epub 2019 Mar 22.
 28. Vujcic M, Zurn P, Diallo K, Adams O, Dal Poz MR. The role of wages in the migration of health care professionals from developing countries. *Hum Resour Health.* 2004 Apr 28;2(1):3.
 29. Slabšinskienė E, Gorelik A, Kavaliauskienė A, Zaborskis A. Burnout and Its Relationship with Demographic and Job-Related Variables among Dentists in Lithuania: A Cross-Sectional Study. *Int J Environ Res Public Health.* 2021 Apr 9;18(8):3968.
 30. Le VNT, Dang MH, Kim JG, Yang YM, Lee DW. Dentist Job Satisfaction: A Systematic Review and Meta-analysis. *Int Dent J.* 2021 Oct;71(5):369-377. doi: 10.1016/j.identj.2020.12.018. Epub 2021 Feb 19.
 31. Leggat PA, Kedjarune U, Smith DR. Occupational health problems in modern dentistry: a review. *Ind Health.* 2007 Oct;45(5):611-21. doi: 10.2486/indhealth.45.611.
 32. Surman G, Lambert TW, Goldacre M. Doctors' enjoyment of their work and satisfaction with time available for leisure: UK time trend questionnaire-based study. *Postgrad Med J.* 2016 Apr;92(1086):194-200.
 33. Armstrong GS, Atkin-Plunk CA, Wells J. The Relationship Between Work-Family Conflict, Correctional Officer Job Stress, and Job Satisfaction. *Criminal Justice and Behavior.* 2015;42(10):1066-1082. doi:10.1177/0093854815582221
 34. Fahim AE. Predictors of job satisfaction among practicing dentists at hospitals in Suez Canal Area, Egypt. *Int J Occup Med Environ Health.* 2013

- Mar;26(1):49-57. doi: 10.2478/s13382-013-0072-8. Epub 2013 Jan 12.
35. Hawton K, Agerbo E, Simkin S, Platt B, Mellanby RJ. Risk of suicide in medical and related occupational groups: a national study based on Danish case population-based registers. *J Affect Disord*. 2011 Nov;134(1-3):320-6. doi: 10.1016/j.jad.2011.05.044. Epub 2011 Jun 14.
 36. Spector PE, Zhou ZE, Che XX. Nurse exposure to physical and nonphysical violence, bullying, and sexual harassment: a quantitative review. *Int J Nurs Stud*. 2014 Jan;51(1):72-84. doi: 10.1016/j.ijnurstu.2013.01.010. Epub 2013 Feb 19.
 37. Alhamad R, Suleiman A, Bsisu I, Santarisi A, Al Owaidat A, Sabri A, Farraj M, Al Omar M, Almazaydeh R, Odeh G, Al Mousa M, Mahseeri M. Violence against physicians in Jordan: An analytical cross-sectional study. *PLoS One*. 2021 Jan 25;16(1):e0245192. doi: 10.1371/journal.pone.0245192.
 38. Ghareeb NS, El-Shafei DA, Eladl AM. Workplace violence among healthcare workers during COVID-19 pandemic in a Jordanian governmental hospital: the tip of the iceberg. *Environ Sci Pollut Res Int*. 2021 Jun 26;1-9. doi: 10.1007/s11356-021-15112-w. Epub ahead of print.
 39. Almansour H. Factors influencing job satisfaction among recently qualified resident doctors: A qualitative study. *Asia Pacific J of Health Management*. 2021;16(4):i689.

IN AUTHENTICITY, WE TRUST – THE INFLUENCING FUNCTIONS AND BEHAVIOURS OF AGED CARE LEADERS TO BRIDGE THE INTENTION-EXPERIENCE DISPARITY OF FOLLOWERS

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ABSTRACT

STUDY DESIGN

This paper is an output from a mixed methods study of aged care employees in which the quantitative results examining the effects of leadership style on organisational identification (OID) and job satisfaction (JS) of aged care employees populated the agenda for semi-structured interviews and the transcripts subjected to interpretative phenomenological analysis (IPA).

PURPOSE

The purpose of this paper is to identify the influencing functions and relate them to associated influencing behaviours of authentic leaders to assist in reducing the intention-experience disparity (IED) found in the thematic analysis of the transcripts of semi-structured interviews of the study participants.

FINDINGS AND RESEARCH OUTCOMES

Job burnout and organisational disengagement were prevalent in participants. The researcher identified that while aged care leaders worked assiduously to engage their staff, an Intention-Experience Disparity (IED) was operating. Leaders' influencing functions and behaviours are documented from the evidence-based literature and a conceptual model based on authentic leadership principles developed.

RESEARCH LIMITATIONS/IMPLICATIONS

The research deployed quantitative measurements to determine the differences in responses to an online questionnaire that deployed the Multifactor Leadership Questionnaire™ (MLQ5X[Short]), the Identification with a Psychological Group Scale (IDPG) and the Measure of Job Satisfaction (MJS) and differences between responses from leaders and their raters between measured. These differences were used to explore participants' lived experiences and how they made sense of their personal and social worlds at work. In the quantitative study, there may be an overstatement of the strength of the relationship between variables among those motivated to participate in the study. The qualitative study required the researcher to describe the research context thoroughly. Those who wish to transfer the results of this study to a different context than aged care must judge the transferability of findings.

RESEARCH IMPLICATIONS

Decreasing job disengagement and burnout will reduce attrition and turnover and, thus, the availability of the aged care workforce. It will inform leadership development programs and training in aged care and other health and social care sectors. The workforce is a primary consideration for aged care in Australia and globally. Reducing burnout and disengagement will reduce workforce attrition, thus improving the care for some of the most vulnerable in the population.

KEYWORDS

Authentic Leadership, Trust, Job Satisfaction, Aged Care, Seniors Care, Elder Care

INTRODUCTION AND BACKGROUND

This paper reports on outputs from original mixed-methods research into leadership style and two constructs of organisational identification (OID) and job satisfaction (JS) in aged care employees. It also builds on the author's recently published work that organisational identification was not evident within the population under study [1]. The same study also found significant levels of moral distress, job stress, and disengagement of aged care employees that lead to turnover intentions of aged care staff and, therefore, contribute to job burnout and, eventually, workforce attrition [2]. The results and findings of this research led to further enquiry into the influencing behaviours of leaders (IBoLs) that support the Influencing Functions of Leaders (IFoLs) that support the authenticity and ethicality of leaders expected by their followers.

METHOD

The quantitative study (n=187) deployed the MLQ5X[Short] [3], the Identification with a Psychological Group Scale [4] and the Measure of Job Satisfaction [5] via an online questionnaire. The questionnaire provided socio-demographic data, measured the internal consistency for each tool, the data distributions, the significant relationships between factors of one tool and the others and measured differences in responses of the two groups of leaders and raters with detailed results reported by the author in two published papers [1, 2]. The group differences provided the means of populating the semi-structured interview agendas, and Interpretive Phenomenological Analysis (IPA) was the method used to undertake thematic analysis of the transcripts of the digital recordings of the interviews.

FINDINGS

The research found that organisational identification was not evident in the sample in quantitative and qualitative studies conducted for this research [1]. This null finding is important evidence as many aged care organisations rely on their reputation and brand to attract staff. The researcher contends that it is unlikely to be effective in

attracting staff in aged care based on reputation and brand alone. Consequently, different strategies are required to achieve the necessary recruitment to satisfy the demand for aged care workers.

Relative to job satisfaction, the quantitative results demonstrated a significant negative correlation for those leaders classified as passive-avoidant (also known as laissez-faire) leadership styles by the MLQ5X[Short]. Transformational and transactional leaders returned a positive correlation with job satisfaction. The quantitative results were consistent with the qualitative findings that leaders who exhibited a laissez-faire leadership style negatively impacted follower job satisfaction. The reverse was true for those leaders classified as transformational or transactional.

The results and findings confirmed that the aged care employees in the sample expected that their leaders would exhibit positive behaviours of authenticity and ethicality in their leadership. These findings led the researcher to the literature to inform leaders' influencing behaviours that support their influencing functions. The researcher labelled those Influencing Behaviours of Leaders, IBoLs and their Influencing Functions of Leaders, IFoLs. The other output from this part of the research is an evidenced-based conceptual model for leadership development and performance assessment that directly relates to authentic leadership and ethical leadership principles (see figure 1.) and would provide a good fit in the aged care sector. It was concluded that there are four future focus areas for aged care leader development and performance assessment. These are authenticity, trustworthiness, empathy, and presence.

Based on available evidence, such programs would target self-awareness, self-regulation capacities, and ethical competency [6-8]. The programs would also train leaders to engage with their followership and provide an opportunity for a voice in the workplace [9, 10]. Mindfulness-based stress reduction [11] and building moral resilience appear important in leadership development [12]. However, on balance, some reservations emerge from the literature on the effectiveness of moral resilience training [8]. It is also important that systemic change must accompany these strategies [13], as the aim is not simply

to equip staff to withstand toxic cultures or to suggest that the cause is the lack of resilience.

LEADER POWER RELATIONSHIPS AND FOLLOWER TRUST

Research into organisational power focuses on the leader being the holder of power and the follower as a target of the power. However, this is only effective when there is a level of trust operating in the follower group. There are two documented types of trust that are important here:

Affect-based trust is built by social and emotional bonds that regularly inform business or professional relationships and these emotional ties link individuals and provide the basis for affect-based trust [14].

Cognition-based trust, which is the trust built by self-perception and self-interest on the cues of performance and accomplishments through direct interactions with a partner, the basis of which is cognitive reasoning [14]. Cognition-based trust facilitates emotional attachments, embraces an obligation to respond to leaders, and facilitates co-workers' helping behaviours [15] and followers draw inferences about their leaders' characteristics, such as ability, reliability, and integrity, which underpin cognition-based trust [15].

PERSONAL DEVELOPMENT AND THE DEVELOPMENT OF SELF-AWARENESS

Personal development and self-awareness training are important in a leadership development program [16, 17]. This quest for self-awareness is consistent with the authentic leader's objectives and it is central to the leader being "true to oneself" which is the basis of authenticity [18]. Two strategies for personal development associated with increasing authentic leadership behaviours are reflexivity and self-authorship [19]. Participants in a leadership development program must develop a clear sense of self, expressed as self-narratives, which form the base of their authentic leadership by explicitly defining themselves by their values and beliefs [19].

DEVELOPMENT OF AUTHENTIC LEADERSHIP PRACTICE

It is imperative to address the weighty issues of moral distress, role stress, and disengagement causing job burnout and turnover intention among aged care staff. These contribute to the chronic workforce shortages experienced in the sector [2].

Authentic leadership development must include interpersonal leadership. Wulffers and colleagues found that an authentic leadership program, designed around their guidelines, had a proximal effect of increasing authentic leadership behaviours and recommended that leadership development programs commence with personal development, interpersonal leadership skills, and professional development leadership skills [20]. This position is consistent with the earlier work of Bass, who described the attributes exhibited by authentic leaders [21] and assisted in informing the development of the conceptual model shown in Figure 1.

Professional leadership is the third component described by Wulffers and colleagues [20]. Professional leadership is the development of willing cooperation, the provision of direction, the process, and the coordination of organisational members to attain organisational goals. Professional leadership encompasses the formal part of leadership, such as setting or interpreting the organisation's vision and mission and creating a process to achieve the stated organisational goals. The components necessary to achieve professional leadership are trust, sharing, and morals, as vital components of authentic and ethical leadership [22].

The contemporary evidence of leadership in health and social care suggests leaders demonstrate trustworthiness in an interdisciplinary team environment [21, 23]. Table 1., lists the characteristics of authentic leaders identified in the literature. The researcher used these characteristics to inform the conceptual model for leadership development and assessment programs.

TABLE 1. CHARACTERISTICS OF AUTHENTIC LEADERS THAT INFORMED THE CONCEPTUAL MODEL FOR LEADERSHIP DEVELOPMENT AND ASSESSMENT

Authentic Leaders Characteristics	Researcher
Competence	[21, 23, 24];
Understanding and caring for others	[21, 23, 24]
Fostering and maintaining good relations and communication	[21, 24]
Conflict management	[23, 24]

Authentic Leaders Characteristics	Researcher
Delegating and empowering.	[21, 24];
Fostering happiness	[24]
Promoting collective decision-making	[24]
Recognising, developing, and motivating others	[25]; [24]
Encouraging innovative thinking	[25]; [24]
Supporting others	[25]; [24]

The aged care sector must train existing and emerging leaders through a leadership development program in which each of the functions and associated behaviours of authentic leaders guides the design of a leadership development program. Such a program may reduce the incidence, and the severity of moral distress [26], job burnout [27, 28], and disengagement [29] observed in this study's population. Implementing and evaluating such a program and its impact on employee JS would require further empirical enquiry.

MINIMISATION OF THE INTENTION-EXPERIENCE DISPARITY

The participants' lived experiences in the study demonstrated a considerable disparity between leaders' intentions and the experiences perceived by followers. The qualitative analysis found that all participants in this study were well-intentioned and motivated to improve the care process and outcomes for aged care consumers. It was evident that the leaders maintained a genuine interest in consumer welfare, the welfare of their follower groups, and a sense of purpose in their aged care work. Most followers perceived that achieving organisational financial and activity targets was significantly more important to their leaders than the quality of care delivered and the support needs of staff to deliver it. Thus, while leaders stated their intention to support the quality of care and the staff that provide it, all but one follower experienced a top-down approach to managing organisational outcomes. The author asserts this stems from a "command and control culture" rather than a participative culture immersed in distributed leadership [30-32] in the interests of consumer care. Command-and-control cultures [33], appear to exist in organisations where it is perceived that nothing matters except that people do as their told and that tasks are accomplished efficiently, on time and within budget [34]. The question then emerges as to whether this command-and-control culture could cause a lack of transparency, empathy, and engagement evident in the followers' responses in the qualitative analysis. The findings and conclusions of this study are that followers are more

satisfied when there is a demonstration of authentic and ethical leadership and this is consistent with previous research [35-37]. Thus, the outcome of this research further supports an urgent need for leadership training and development concerning authentic and ethical leadership attributes, previously categorised as falling within the power and influence theories of leadership in a framework created by the author [38].

It was apparent from the qualitative study conducted as part of this research that all leaders intended to lead with a transformational style and inspire their followers to provide care for aged care consumers by caring for their staff. However, this was not the lived experience of staff, and it became apparent that there was a disparity between the intention of leaders' and followers' experiences. The author named this phenomenon Intention-Experience Disparity (IED). The IED demonstrated in this study underpins the need for authentic and ethical leadership development efforts to target leader training in areas that assess and increase followers' perception of the authenticity and ethicality of their leaders.

It appears that congruence between leaders' self-perceptions and followers' perceptions of authentic leadership is beneficial. Both must be at high levels to ensure the most beneficial results relating to follower job satisfaction (JS) [39]. Another extensive study that used hierarchical linear modelling analysis demonstrated a positive relationship between authentic leadership, employees' JS, and work engagement [40]. More recently, there were similar findings that employees who perceived their leader as authentic reported increased JS with a reduction in employees' intentions to leave their employment [41].

Rushton and colleagues identified strategies that individuals and systems could use to mitigate the detrimental effects of moral distress and foster moral resilience [42]. Rushton and colleagues' findings suggest that one approach to dealing with moral distress is adding

resilience training to the services of staff development programs to increase moral agency. Moral agency refers to an individual's ability to make moral judgments based on right and wrong notions and accountability for acting accordingly [43]. Moral resilience assists in using learned responses to minimise distress and preserve integrity [44]. Moral resilience training provides strategies for choosing how to respond to ethical dilemmas to minimise personal suffering. However, the evidence base regarding the effectiveness of moral resilience training is scant [45]. Francis and colleagues used simulated moral actions in a virtual reality environment common to the occupational group in the study, which were firefighters [46] and they found that trained individuals made the same moral judgements and actions as those in the untrained group. Further, they demonstrated less arousal and regret, and they suggested that concerns regarding empathy decline in health care professionals reflect the development of a necessary emotional resilience to distressing events [46].

The concept of resilience training is complex, contextual and affected by the interplay between individuals and their environment [47]. Any intervention promoting resilience in healthcare workers must recognise and address structural and organisational factors and individual responses. Further, resilience-based approaches are often grounded in a strength-based model, emphasising elements that promote success while overlooking factors contributing to failure [47].

The evidence suggests that resilience training is an incomplete intervention without examining and addressing factors in the work environment contributing to burnout. Despite an extensive search of the literature, the evidence supporting the long-term effectiveness of resilience training, and therefore, the outcomes of moral resilience training were not apparent. The evidence did, however, demonstrate the importance of moral agency and suggests that developing moral agency in leaders is an essential dimension of organisational leadership development [48-50].

APPLICATION OF THE RESEARCH TO LEADERSHIP TRAINING AND DEVELOPMENT

The qualitative analysis showed that both groups were concerned about similar issues for different reasons. Job burnout is reported to be caused by ongoing moral distress resulting from high workloads [49, 50], a lack of genuine reward and recognition in the workplace [51] and persistent role stress in the followers' group [52]. The

intention-experience disparity between leaders and their followers in this research further exacerbates the factors contributing to moral distress, role stress, and disengagement [49, 53, 54]. Thus, the intention-experience disparity contributes to burnout of aged care staff at all levels and resultant workforce turnover. A recent study by Greason reports on the ethical reasoning process and experiences of moral distress of long-term care staff in the provision of social care [55]. The Greason study of seven interdisciplinary focus groups consisting of 25 front-line staff found that they typically did not have difficulty determining the ethical decision or action; however, they frequently experienced moral distress [55]. It is contended that appropriate development and training of aged care leaders in authentic leadership theory may facilitate contextually based curricula for organisations to help identify and ease the previously described contributory factors that lead to job burnout and underpins many of the recommendations from this research relating to the need for a conceptual model for leadership development based on the principles underlying authentic leadership.

INFORMING LEADERSHIP DEVELOPMENT AND TRAINING PROGRAMS

Authentic leadership theory intersects leadership, ethics, and positive interpersonal relationships within organisational teams [56, 57]. Authenticity relates to acknowledging individual experiences, thoughts, emotions, needs, preferences, beliefs, and processes culminating in knowing oneself and demonstrating to others that the leader is following their true self [58]. Authentic leadership is multidimensional and describes how leaders should behave when viewed from a normative perspective. It examines the antecedents and consequences of leader behaviour when viewed from a social scientific perspective [59].

In considering the existing body of literature on authentic leadership, and the insights and outcomes of this study, Table 2 synthesises the characteristics of authentic leaders into four themes:

1. Developing self,
2. Developing positive interpersonal behaviours,
3. Developing ethical leadership practices,
4. Developing others.

It is further proposed that if leaders could consistently exhibit personal behaviours of leaders (PBoLs) over time, they could exert influence and demonstrate the influencing behaviours of leaders (IFoLs) in their leadership

role. The author grouped moral distress, job burnout, and disengagement follower groups as the Three Workplace Maladies. Preventing or alleviating their effects in the workplace will help to prevent the complications of job dissatisfaction and eventual job burnout, and workforce

attrition. The researcher acknowledges that establishing a causal link between leader behaviour, leader influence, and follower experience concerning job burnout requires further empirical investigation and evaluation.

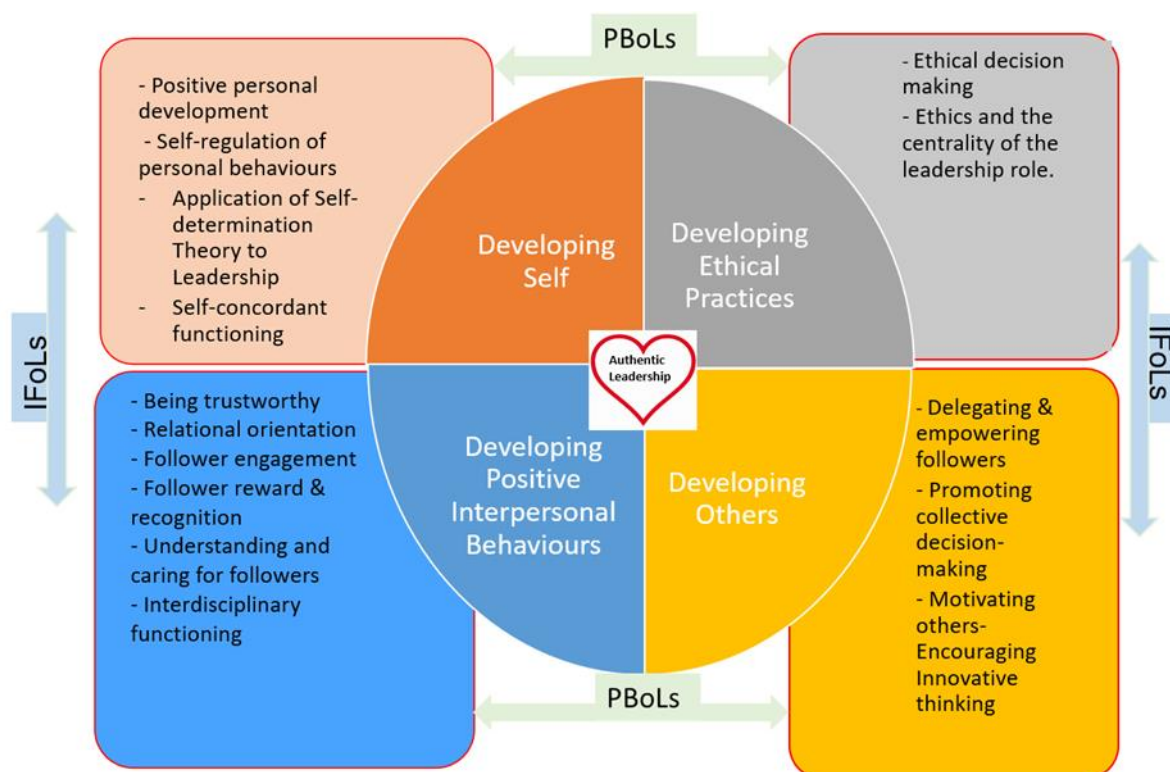
TABLE 2. PERSONAL BEHAVIOURS OF LEADERS (PBOLs) AND INFLUENCING FUNCTIONS OF LEADERS (IFOLs)

PBoL	IFoL
1. Developing the self <ul style="list-style-type: none"> a. Self-awareness, self-regulated behaviour, positive personal development, and self-determination [60]. b. Self-concordant values-based functioning <ul style="list-style-type: none"> i. Personal and professional goal-directedness. ii. Personal need satisfaction. iii. Longitudinal well-being [61] 	<ul style="list-style-type: none"> • Reflective practice when making decisions examining their strengths and weaknesses without bias. Leaders draw on their experience and learn from the leader's real-world life, professional experiences, and life stories. • Focuses on long-term results without wasting time being overly concerned with temporary setbacks or lower-than-expected results in the short term. Subscribes to the view that patience and hard work take time and yield rich results.
2. Developing positive interpersonal behaviours <ul style="list-style-type: none"> 1) Unbiased and balanced processing of information. 2) Authentic relational orientation toward others, including: <ul style="list-style-type: none"> a) Being open and transparent to others [56, 60, 62]. b) Fostering and maintaining positive interpersonal behaviours [24] 	<ul style="list-style-type: none"> • Balanced processing of objective evaluation of information before deciding, including encouraging others to question or challenge one's values. • Relational transparency by being true to one's values and expressing this to others, open sharing of information about one's thoughts and feelings. • Devising and maintaining valid and reliable employee recognition and reward strategies. • Listening skills, including when another disagrees. Willing to consider all ideas with an open mind and change their opinion if the arguments and evidence make sense.
3. Developing ethical leadership practices <ul style="list-style-type: none"> a. Adherence to ethical standards in decision-making [63]. b. Conceiving the leader role as central to the leader's self-concept [58] 	<ul style="list-style-type: none"> • Integrity - words and actions are consistent. Being truthful and transparent. • Sharing success with the team and giving credit where due. • Leading with heart and demonstrating courage and empathy by actively listening to others and acting decisively when appropriate. • Strong commitment to the collective good and demonstrates this to others. • Confident perception of self and others exhibiting moral courage.
4. Developing others <ul style="list-style-type: none"> • Delegating, empowering [21, 24] and caring [21]for others. • Encouraging innovating thinking [24] 	<ul style="list-style-type: none"> • Consistency and adherence to principles, so that leader behaviour is consistent and not swayed by superficialities. Supports follower groups to achieve personal and team goals. • Providing a work environment conducive to employee engagement and voice. Providing the right tools and the best work environment ignites creativity and innovation, satisfying organisational priorities and follower success and advancement.

A conceptual model emerged from the literature synthesis related to the characteristics of authentic leaders expressed in Table 2 and the four themes that incorporate leaders' influencing behaviours and influencing functions.

This model considers the attributes of authentic leadership described by George (2004) and the PBoLs and IFoLs described in Table 2, thus providing a curriculum framework for a leadership development program for aged care

FIGURE 1. CONCEPTUAL MODEL FOR AN AUTHENTIC LEADERSHIP DEVELOPMENT PROGRAM FOR AGED CARE



CONCLUSION

Significant and consistently documented workforce challenges faced by aged care providers in the aged care workforce are documented in successive reports [64, 65]. The ageing of the population and the changing fiscal climates in many countries, including Australia, mean greater demand for aged care services [66, 67]. The aged care system must strive to decrease attrition among aged care workers to stem the workforce attrition and attract new workers to address the burgeoning demand for quality, safe services for older people.

This research found that the intention-experience disparity (IED) between aged care leaders and workers requires attention from aged care leaders. The leader development program focuses on reducing the IED by a leadership development program focusing on authentic and ethical leadership. Developing aged care leaders concentrating on authenticity and ethicality in their leadership practice will reduce the IED. The researcher

found no previous studies that measured the extent of IED in any workforce group, and there is room for the development of an evidence-based tool that could measure this. The conceptual model for a leadership development program focusing on authentic and ethical leadership principles would facilitate greater congruence between the influencing functions of leaders and their behaviours. The following recommendations would enhance the body of knowledge about the phenomenon investigated by this study.

RECOMMENDATIONS:

It is recommended that:

1. Leadership training and development and leader performance assessment target authentic and ethical leadership practice to bridge the intention-experience disparity between leaders and their followers from the conceptual model represented in this paper.
2. Training and developing aged care leaders in programs that are contextually aligned to the aged care sector and address authentic

leadership principles to help identify and ease the contributory factors that lead to job burnout, moral distress and role stress will assist with the recruitment and retention of aged care workers.

3. Valid, reliable, evidence-based metrics be developed to measure leader performance against criteria vested in authentic and ethical leadership theories.
4. The outcomes of moral resilience training are evaluated for effectiveness in preventing moral distress among aged care workers.
5. The phenomenon that the author labelled The Intention-Experience Disparity (IED) is further researched to measure the extent and effectiveness of leadership efforts to bridge the disparity.
6. The causal link between leader behaviour, leader influence, and follower experience of disengagement, role stress and moral distress be further empirically investigated.

References

1. Olley R. More I than we - the effect of organisational identification in the Australian aged care workforce. *Leadersh Health Serv (Bradf Engl)*. 2022;ahead-of-print(ahead-of-print):1751-879.
2. Olley R. Hear me, see me, trust you – job burnout and disengagement of Australian aged care workers. *Leadership in Health Services*. 2022;ahead-of-print(ahead-of-print).
3. Bass B, Avolio B. *Manual for the Multifactor Leadership Questionnaire*. Redwood, CA.: Mindgarden, Inc.,; 1998.
4. Mael FA, Tetrick LE. Identifying Organizational Identification. *Educational and Psychological Measurement*. 2016;52(4):813-24.
5. Traynor M, Wade B. The development of a measure of job satisfaction for use in monitoring the morale of community nurses in four trusts. *J Adv Nurs*. 1993;18(1):127-36.
6. Young PD, Rushton CH. A concept analysis of moral resilience. *Nurs Outlook*. 2017;65(5):579-87.
7. Helft PR, Bledsoe PD, Hancock M, Wocial LD. Facilitated ethics conversations: a novel program for managing moral distress in bedside nursing staff. *JONAS Healthc Law Ethics Regul*. 2009;11(1):27-33.
8. Rushton CH. Building moral resilience to neutralize moral distress. *American Nurse Today*. 2016;11(10):A1.
9. Patmore G. *Open Access Publishing in European N*, Jstor, Knowledge U. *Worker voice: employee representation in the workplace in Australia, Canada, Germany, the UK and the US 1914-1939*. Liverpool: Liverpool University Press; 2016.
10. Harvey C, Willis E, Henderson J, Hamilton P, Toffoli L, Verrall C, et al. Priced to care: Factors underpinning missed care. *Journal of Industrial Relations*. 2016;58(4):510-26.
11. Vaclavik EA, Staffileno BA, Carlson E. Moral Distress: Using Mindfulness-Based Stress Reduction Interventions to Decrease Nurse Perceptions of Distress. *Clin J Oncol Nurs*. 2018;22(3):326-32.
12. Davis M, Batcheller J. Managing Moral Distress in the Workplace: Creating a Resiliency Bundle. *Nurse Lead*. 2020;18(6):604-8.
13. Greer TW, Shuck B. Mounting the New Guard: The Golden Rule as a Basis for Organizational Culture Change in Response to Challenges in Academia. *Advances in Developing Human Resources*. 2020;22(1):102-12.
14. Tomlinson EC, Schnackenberg AK, Dawley D, Ash SR. Revisiting the trustworthiness–trust relationship: Exploring the differential predictors of cognition- and affect-based trust. *Journal of Organizational Behavior*. 2020;41(6):535-50.
15. Zhu Y, Akhtar S. How transformational leadership influences follower helping behavior: The role of trust and prosocial motivation. *Journal of Organizational Behavior*. 2014;35(3):373-92.
16. Waite R, McKinney N, Smith-Glasgow ME, Meloy FA. The Embodiment of Authentic Leadership. *Journal of Professional Nursing*. 2014;30(4):282-91.
17. Crawford JA, Dawkins S, Martin A, Lewis G. Putting the leader back into authentic leadership: Reconceptualising and rethinking leaders. *Australian Journal of Management*. 2019;45(1):114-33.
18. Brown ME, Treviño LK. Ethical leadership: A review and future directions. *The Leadership Quarterly*. 2006;17(6):595-616.
19. Eriksen M. Authentic Leadership. *Journal of Management Education*. 2009;33(6):747-71.
20. Wulffers T, Bussin M, Hewitt M. Fast-tracking authentic leadership development by means of a programme. *SA Journal of Human Resource Management*. 2016;15(1):1-e13.

21. Bass B. The Bass handbook of leadership : theory, research, and managerial applications / Bernard M. Bass with Ruth Bass. Bass R, Stogdill RMB, Stogdill's handbook of l, editors. New York: Free Press; 2008.
22. Mastrangelo A, Eddy ER, Lorenzet SJ. The importance of personal and professional leadership. *Leadership & Organization Development Journal*. 2004;25(5):435-51.
23. Margolis L, Rosenberg A, Umble K. The Relationship between Interprofessional Leadership Education and Interprofessional Practice: How Intensive Personal Leadership Education Makes a Difference. *Health & Interprofessional Practice*. 2015;2(3).
24. Yukl G, Gordon A, Taber T. A Hierarchical Taxonomy of Leadership Behavior: Integrating a Half Century of Behavior Research. *Journal of Leadership & Organizational Studies*. 2016;9(1):15-32.
25. Fleishman EA. The description of supervisory behavior. *Journal of Applied Psychology*. 1953;37(1):1-6.
26. Walsh JP. Care, Commitment and Moral Distress. *Ethical Theory and Moral Practice*. 2018;21(3):615-28.
27. Laschinger HK, Wong CA, Grau AL. Authentic leadership, empowerment and burnout: a comparison in new graduates and experienced nurses. *J Nurs Manag*. 2013;21(3):541-52.
28. Lee HF, Chiang HY, Kuo HT. Relationship between authentic leadership and nurses' intent to leave: The mediating role of work environment and burnout. *J Nurs Manag*. 2019;27(1):52-65.
29. Winton BG, Whittington JL, Meskelis S. Authentic leadership: making meaning and building engagement. *European Business Review*. 2022;34(5):689-705.
30. Bolden R. Distributed Leadership in Organizations: A Review of Theory and Research. *International Journal of Management Reviews*. 2011;13(3):251-69.
31. Jones S. Distributed leadership: a critical analysis. *Leadership*. 2014;10(2):129-41.
32. Quek SJ, Thomson L, Houghton R, Bramley L, Davis S, Cooper J. Distributed leadership as a predictor of employee engagement, job satisfaction and turnover intention in UK nursing staff. *J Nurs Manag*. 2021;29(6):1544-53.
33. Halpin BW, Smith V. Recruitment: an undertheorized mechanism for workplace control. *Theory and Society*. 2019;48(5):709-32.
34. Parsons DP, Owen C, Adams R, Scott C. Beyond Command and Control: Leadership, Culture and Risk: CRC Press; 2017.
35. Leroy H, Anseel F, Gardner WL, Sels L. Authentic Leadership, Authentic Followership, Basic Need Satisfaction, and Work Role Performance. *Journal of Management*. 2012;41(6):1677-97.
36. George B. Authentic Leadership: Rediscovering the Secrets to Creating Lasting Value. 1. Aufl.;1st; ed. New York, NY: Jossey-Bass [Imprint]; 2004.
37. George B, Sims P. True north: discover your authentic leadership. 1st.;1. Aufl.;1; ed. San Francisco, CA: Jossey-Bass; 2007.
38. Olley R. A Focussed Literature Review of Power and Influence Leadership Theories. *Asia Pacific Journal of Health Management [Internet]*. 2021; 16(2).
39. Černe M, Dimovski V, Marič M, Penger S, Škerlavaj M. Congruence of leader self-perceptions and follower perceptions of authentic leadership: Understanding what authentic leadership is and how it enhances employees' job satisfaction. *Australian Journal of Management*. 2013;39(3):453-71.
40. Penger S, Černe M. Authentic leadership, employees' job satisfaction, and work engagement: a hierarchical linear modelling approach. *Economic Research-Ekonomska Istraživanja*. 2014;27(1):508-26.
41. Olaniyan OS, Hystad SW. Employees' psychological capital, job satisfaction, insecurity, and intentions to quit: The direct and indirect effects of authentic leadership. *Revista de Psicología del Trabajo y de las Organizaciones*. 2016;32(3):163-71.
42. Rushton CH, Schoonover-Shoffner K, Kennedy MS. Executive Summary: Transforming Moral Distress into Moral Resilience in Nursing. *Am J Nurs*. 2017;117(2):52-6.
43. Walsh A. Pulling the heartstrings, arguing the case: a narrative response to the issue of moral agency in moral distress. *J Med Ethics*. 2010;36(12):746-9.
44. Schroeter K. Ethics in Practice: From Moral Distress to Moral Resilience. *J Trauma Nurs*. 2017;24(5):290-1.
45. Mealer M, Moss M. Moral distress in ICU nurses. *Intensive Care Med*. 2016;42(10):1615-7.
46. Francis KB, Gummerum M, Ganis G, Howard IS, Terbeck S. Virtual morality in the helping professions: Simulated action and resilience. *Br J Psychol*. 2018;109(3):442-65.

47. Taylor RA. Contemporary issues: Resilience training alone is an incomplete intervention. *Nurse Educ Today*. 2019;78:10-3.
48. Hiekkataipale M-M, Lämsä A-M. (A)moral Agents in Organisations? The Significance of Ethical Organisation Culture for Middle Managers' Exercise of Moral Agency in Ethical Problems. *Journal of Business Ethics*. 2017;155(1):147-61.
49. Karakachian A, Colbert A. Nurses' Moral Distress, Burnout, and Intentions to Leave: An Integrative Review. *J Forensic Nurs*. 2019;15(3):133-42.
50. Helmers A, Palmer KD, Greenberg RA. Moral distress: Developing strategies from experience. *Nurs Ethics*. 2020;27(4):1147-56.
51. Bagnoli C. Feeling Wronged: The Value and Deontic Power of Moral Distress. *Ethical Theory and Moral Practice* [Internet]. 2021:[1-18 pp.].
52. Jinky Leilanie L. Organizational Role Stress Indices Affecting Burnout among Nurses. *Journal of International Women's Studies* [Internet]. 2018; 9(3).
53. Kim A, Mor Barak ME. The mediating roles of leader-member exchange and perceived organizational support in the role stress-turnover intention relationship among child welfare workers: A longitudinal analysis. *Children and Youth Services Review*. 2015;52:135-43.
54. Witton N, Goldsworthy S, Phillips LA. Moral distress does this impact on intent to stay among adult critical care nurses? *Nurs Crit Care*. 2022.
55. Greason M. Ethical Reasoning and Moral Distress in Social Care Among Long-Term Care Staff. *Journal of Bioethical Inquiry: An interdisciplinary forum for ethical and legal debate* [Internet]. 2020; 17(2):[283-95 pp.].
56. Avolio BJ, Gardner WL. Authentic leadership development: Getting to the root of positive forms of leadership. *The Leadership Quarterly*. 2005;16(3):315-38.
57. Avolio BJ, Gardner WL, Walumbwa FO, Luthans F, May DR. Unlocking the mask: a look at the process by which authentic leaders impact follower attitudes and behaviors. *The Leadership Quarterly*. 2004;15(6):801-23.
58. Harter S. Authenticity. In: Snyder CRL, S. J. (Eds.), editor. *Handbook of Positive Psychology*: Oxford University Press; 2002. p. 382-94.
59. Brown M, Treviño L, Harrison D. Ethical leadership: A social learning perspective for construct development and testing. *Organizational behavior and human decision processes*. 2005;97(2):117-34.
60. Luthans F, Avolio B. Authentic Leadership development. In: Cameron J, Dutton J, R. Q, editors. *Positive organizational scholarship*. San Francisco: Berrett-Koehler; 2003. p. 241-58.
61. Shamir B, Eilam G. "What's your story?" A life-stories approach to authentic leadership development. *The Leadership Quarterly*. 2005;16(3):395-417.
62. Ilies R, Morgeson FP, Nahrgang JD. Authentic leadership and eudaemonic well-being: Understanding leader-follower outcomes. *The Leadership Quarterly*. 2005;16(3):373-94.
63. May DR, Chan AYL, Hodges TD, Avolio BJ. Developing the Moral Component of Authentic Leadership. *Organizational Dynamics*. 2003;32(3):247-60.
64. Mavromaras K, Knight G, Isherwood L, Crettenden A, Flavel J, Karmel T, et al. *The Aged Care Workforce*, 2016. Canberra: Australian Government; 2017.
65. Australian Productivity Commission. *Productivity Commission Inquiry Report - Caring for Older Australians, Report No.53, Final Inquiry Report*. Canberra: Australian Government; 2011.
66. Anne MF, Anna EB, Catherine JE, Barbara G, Richard M, Irene JH, et al. The impact of population ageing on end-of-life care in Scotland: projections of place of death and recommendations for future service provision. *BMC Palliative Care* [Internet]. 2019; 18(1):[1-11 pp.].
67. Khadka J, Lang C, Ratcliffe J, Corlis M, Wesselingh S, Whitehead C, et al. Trends in the utilisation of aged care services in Australia, 2008–2016. *BMC Geriatrics* [Internet]. 2019; 19(1):[1-9 pp.].

INVESTIGATING THE DEVELOPMENT AND ACCESS TO HEALTHCARE SERVICES ACROSS IRANIAN PROVINCES

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ABSTRACT

BACKGROUND:

A country's health status and the accessibility by its people to various healthcare services represent important indicators of development. This study investigated the development of Iranian provinces and measured accessibility to healthcare services within them.

METHODS:

The study extracted data from the country's statistical yearbook over five years (2015-2019) and analyzed the data through multi-criteria decision-making (MCDM) techniques. More specifically, numerical taxonomy was used to measure the level of development in each province, the CRITIC method helped to calculate the weights of the indicators, and the combined compromise solution (CoCoSo) method was employed to rank the Iranian provinces.

RESULTS:

The findings of taxonomy analysis demonstrated that provinces such as East Azerbaijan, West Azerbaijan, Isfahan, Tehran, Khorasan Razavi, Khuzestan, Fars, Kerman, Gilan, and Mazandaran were among the Iranian provinces that had reached satisfactory development. The ranking of the provinces using the CoCoSo method revealed that provinces such as Semnan, Yazd, Ilam, and South Khorasan were the most privileged regions in terms of accessibility to healthcare services.

CONCLUSION:

Comparing health indicators over different years showed that, despite the progress of all Iranian provinces, there were marked differences in the distribution of healthcare services across the country.

KEYWORDS

healthcare, accessibility, development level, numerical taxonomy, CRITIC, CoCoSo

INTRODUCTION

The process of comprehensive development involves various social, cultural, economic, and political activities.

Similarly, human development, as an essential criterion for achieving general development, depends on the health status of human communities. The reason for this is that development in the health sector is a basic driver of development in other areas. The health status of any

country is considered to be an important indicator of its development. The health sector itself in any society is assessed based on the different health resources is provided and the accessibility to such resources. Therefore, it would be very important to ensure a fair distribution of health and medical resources, while facilitating people's fair access to healthcare services [1, 2].

Health performance sector indicators can only be improved if services rely on advanced equipment and facilities. However, a lack of facilities and human resources, along with an improper distribution of them, could lead to major challenges facing the health sector in developing countries [3]. Despite the importance of a fair and proper distribution of facilities in different geographical areas, there are conspicuous differences between urban and rural areas in terms of their access to health resources. Meanwhile, even states or provinces in a country may show many inequalities in the availability/accessibility of healthcare services. Many studies have addressed the quality of facilities and the ways of enhancing indicators of development in the health sector.

For instance, in Iran studies have explored such provinces as Kerman, Zanjan, Kurdistan, Sistan and Baluchestan, and Khorasan Razavi [1, 4-7], while some investigations compared conditions in different provinces [8]. The findings in these studies, along with the surveys conducted in other countries [9-11], have shown that health services/facilities are usually concentrated in urban areas while revealing considerable differences regarding access to healthcare resources among cities and even states/provinces. Such inequalities could significantly affect the efficiency of a healthcare system [12].

A properly designed development plan for the health system must first evaluate the status of the community in terms of the availability of health facilities and performance indicators. Meanwhile, it would be particularly important to determine the healthcare development levels of different provinces because the information about a provinces' medical resources and capacities helps remarkably to formulate proper national and regional plans.

The purpose of this study was to investigate the status of health indicators and to rank Iranian provinces through multi-criteria decision-making (MCDM) techniques, by

using data for the period 2015-2019. The study emphasizes that identifying and ranking the regions based on health indicators can make it possible to unveil the distribution status of these indicators and provide a reliable basis for planning the equitable distribution of health indicators in the future.

MATERIALS AND METHODS

This study was an applied, descriptive survey that drew on cross-sectional data to analyze 18 significant healthcare indicators in the provinces of Iran. The access indicators used in this study were from the three specific categories of: human resources; medical centers; and equipment actively utilized in healthcare. The complete list of indicators is in Table 3. The data were collected from the statistical yearbooks of Iran between 2015 and 2019. The data were then analyzed through multiple criteria decision-making¹ methods, namely taxonomy analysis, the CRiteria Importance Through Intercriteria Correlation² method, and the combined compromise solution³ method. As this study relied on MCDM analysis methods, no sampling method was employed and the whole target population was examined.

Primarily, the indicators obtained for all the Iranian provinces (31 provinces) were analyzed using the taxonomy analysis method. Different methods have been used to assess the development level of the regions and one of the most important of them is numerical taxonomy. The numerical taxonomy divides a set into more or less homogeneous subsets and uses it as a scale for recognizing the level of economic and social development.

The taxonomy method provides the possibility to divide the data into two or more categories based on the mean or standard deviation. Therefore, in this study, we used the average and considered the lower than the average as developing, and higher as developed provinces.

It should be noted the taxonomy procedure did not consider the factor of population (population number). The provinces that showed a below-average development rate were categorized as "developing", whereas the provinces with a development rate greater than the average value were considered to be "developed" ones.

¹ MCDM

² .CRITIC

³ . CoCoSo

At the next stage, the provinces were ranked in terms of their accessibility to health indicators. To this end, first, the weights of the indicators were computed using the CRITIC method. Then, the provinces were prioritized through the CoCoSo method based on their populations.

This study was approved under the ethical code IR.KMU.REC.1400.396 from the Kerman university of medical science.

Set out below, are each of the methods used and their steps are described in detail.

NUMERICAL TAXONOMY

Numerical taxonomy is one of the methods for grading different regions in terms of development and has been used in studies that investigated the level of development in terms of access to health indicators. [8, 14-16]. The steps of this method are briefly as follows:

Step 1: In the first step, a decision matrix consisting of n criteria and m alternatives was developed. In this study, the criteria were indicators in the healthcare sector and alternatives were all provinces of the country. The decision matrix is then normalized according to Equation (1), where x_{ij} is the data of each column, \bar{x} is the average of each column and σ is the standard deviation of the data of each column.

$$Z_{ij} = \frac{x_{ij} - \bar{x}}{\sigma} \quad (1)$$

Step 2: In the next step, using the elements of the normalized matrix, the distances between different provinces are calculated using Equation (2). In this regard, C_{io} is the distance of region i from the ideal region of Z_{ij} , Z_{ij} are the values of the normalized matrix and Z_{oj} is the ideal value of the j indicator.

$$C_{io} = \sqrt{\sum (Z_{ij} - Z_{oj})^2} \quad (2)$$

Step 3: In this step, the shortest distance between the two alternatives is determined and the homogeneity distance is calculated based on the upper and lower limits according to Equations (3) and (4).

$$d^+ = \bar{d} + 2\sigma_d \quad (3)$$

$$d^- = \bar{d} - 2\sigma_d \quad (4)$$

Also at this stage, the alternatives between the upper and lower limits are considered homogeneous. If their minimum distance is outside this range, they will be considered heterogeneous.

Step 4: In the last stage, the degree of development for each alternative is obtained. This degree is a value between zero and one, and in some exceptions, it can take more than one. The closer this value is to zero, the more developed the province will be. On the other hand, the closer this value is to one, indicates the low level of development of that alternative. [8] The degree of development can be calculated using Equation (5).

$$D_i = \frac{C_{io}}{C_o} \quad (5)$$

In the above equation, the value of C_o is obtained from the sum of the mean value of C_{io} and twice its standard deviation.

CRITIC METHOD

CRITIC is a method for calculating the weight of criteria in multi-criteria decision-making problems in which the importance of criteria is determined by correlation coefficients and standard deviation of data. [17] The CRITIC method has been used to determine the importance and weight of criteria in various contexts such as software selection [18] and sustainable supply chain risk management [19]. The steps for using this method are briefly described below.

Step 1: In the first step, a decision matrix containing n indicators and m alternatives is developed and normalized using Equation (6) where x_{ij} is the value of each element of matrix, x_{\min} and x_{\max} are the minimum and maximum values of the matrix in each column, respectively.

$$r_{ij} = \frac{x_{ij} - x_{\min}}{x_{\max} - x_{\min}} \quad (6)$$

Step 2: Then, the value of c for each column of the decision matrix is determined according to the Equation (7), where r_{ij} shows elements of the normalized decision matrix, σ is the standard deviation of the data of each column and m is the number of indicators.

$$c = \sigma \sum_{i=1}^m (1 - r_{ij}) \quad (7)$$

Step 3: Finally, the value of c calculated for each column of the matrix is divided by the sum of the values of c , in order to obtain the final weight of each indicator, which is shown in Equation (8).

$$W = \frac{c}{\sum_{i=1}^m c} \quad (8)$$

COMBINED COMPROMISE SOLUTION (COCOSO) METHOD

CoCoSo is a technique for prioritizing a set of alternatives by the combination of simple additive weighting and an exponentially weighted product model. The CoCoSo method provides simpler and easier steps and eliminates the weaknesses of other MCDM methods such as TOPSIS or COPRAS (26). This method has been used in various contexts such as supplier selection [21, 22] and health sector evaluation [23]. The steps of this method are briefly reviewed below.

Step 1: First, a decision matrix, including indicators and alternatives, is formed and normalized. According to Equation (9) and (10) where x_{ij} is the value of each element of the matrix, x_{\min} and x_{\max} are the minimum and maximum values of the matrix in each column, respectively. This normalization is different for the cost and benefits indicators. It should also be noted that in this study, all indicators were of a benefit nature.

$$r_{ij} = \frac{x_{ij} - x_{\min}}{x_{\max} - x_{\min}} \quad \text{for benefit indicators} \quad (9)$$

$$r_{ij} = \frac{x_{\max} - x_{ij}}{x_{\max} - x_{\min}} \quad \text{for cost indicator} \quad (10)$$

Step 2: In the next step, two values S and P are calculated according to Equations (11) and (12). S value is obtained according to the grey relational generation approach, whereas P value is determined based on the WASPAS multiplicative attitude. Also, the value of w is obtained from weight calculating methods (in this study, the CRITIC method). In addition, the r_{ij} values are elements of the normalized decision matrix.

$$S = \sum_{j=1}^n (w_j r_{ij}) \quad (11)$$

$$P = \sum_{j=1}^n (r_{ij})^{w_j} \quad (12)$$

Step 3: Then, the values of K_a , K_b and K_c are calculated for each alternative using S and P values through Equations (13) to (15). Equation (13) shows the arithmetic mean of Weighted product method (WPM) and weighted sum method (WSM), Equation (14) depicts a sum of relative scores of the two methods in comparison to the best, and Equation (15) expresses the balanced compromise of WSM and WPM scores. Furthermore, λ is chosen by decision-makers, which is usually 0.5 (2).

$$K_a = \frac{P+S}{\sum (P+S)} \quad (13)$$

$$K_b = \frac{S}{\min S} + \frac{P}{\min P} \quad (14)$$

$$K_c = \frac{\lambda (S) + (1-\lambda)(P)}{\lambda (\max S) + (1-\lambda)(\max P)} \quad (15)$$

Step 4: Lastly, the previous values are integrated as the sum of geometric and arithmetic means to determine a final K value according to Equation (16). Higher value of K indicates the superiority of that alternative.

$$K = (K_a * K_b * K_c)^{1/3} + \frac{1}{3}(K_a + K_b + K_c)$$

RESULTS

After the information about the health system in the provinces was collected over the five year period from 2015 to 2019, taxonomic analysis was used to evaluate the degree of development of each province. Based on this method, a value closer to zero would point to a more developed provincial status. In contrast, a value closer to one would indicate lower levels of development in a given province. To conduct a more precise analysis, the average development of the entire country was calculated and was considered to be a measure of development. According to Table 1, during these five years provinces such as East Azerbaijan, West Azerbaijan, Isfahan, Tehran, Khorasan Razavi, Khuzestan, Fars, Kerman, Gilan and Mazandaran exhibited a status higher than the national development average and were thus categorized as "developed" provinces. Meanwhile, Ilam, North Khorasan, Semnan, and South Khorasan showed the lowest level of development (see Table 1).

TABLE 1. LEVEL OF DEVELOPMENT FOR PROVINCES OF IRAN

Provinces	Years				
	2015	2016	2017	2018	2019
East Azerbaijan	0.6300	0.6243	0.6369	0.6403	0.6615
West Azerbaijan	0.6844	0.7116	0.7049	0.6907	0.7360
Ardabil	0.8077	0.8216	0.8096	0.8064	0.8155
Isfahan	0.5085	0.5460	0.5333	0.5360	0.5581
Alborz	0.7653	0.7728	0.7703	0.7549	0.7698
Ilam	0.8341	0.8475	0.8449	0.8431	0.8566
Bushehr	0.8059	0.8198	0.8172	0.8183	0.8308
Tehran	0.1487	0.2163	0.2064	0.19410	0.2432
Chaharmahal and Bakhtiari	0.8043	0.8167	0.8190	0.8134	0.8207
South Khorasan	0.8151	0.8265	0.8242	0.8201	0.8327
Razavi Khorasan	0.4804	0.5061	0.4932	0.4969	0.5120
North Khorasan	0.8191	0.8332	0.8274	0.8259	0.8449
Khuzestan	0.6883	0.6133	0.6199	0.5996	0.6133
Zanjan	0.7928	0.8116	0.8056	0.8082	0.8076
Semnan	0.8240	0.8369	0.8339	0.8383	0.8513
Sistan and Baluchestan	0.7263	0.7380	0.7240	0.7114	0.7201
Fars	0.5510	0.5404	0.5188	0.5423	0.5522
Qazvin	0.8012	0.8091	0.8093	0.8119	0.8135
Qom	0.8105	0.8305	0.8309	0.8335	0.8427
Kurdistan	0.7796	0.7940	0.7904	0.7878	0.7916
Kerman	0.7040	0.6925	0.6793	0.6639	0.6746
Kermanshah	0.7566	0.7564	0.7502	0.7490	0.7533
Kohgiluyeh and Boyer-Ahmad	0.8361	0.8446	0.8401	0.8344	0.8375
Golestan	0.7335	0.7626	0.7560	0.7653	0.7713
Gilan	0.7018	0.7306	0.7262	0.7237	0.7377
Lorestan	0.7625	0.7829	0.7726	0.7795	0.7586
Mazandaran	0.6260	0.6458	0.6639	0.6633	0.6676
Markazi	0.7747	0.7899	0.8003	0.7889	0.7967
Hormozgan	0.7573	0.7763	0.7768	0.7907	0.8071
Hamadan	0.7422	0.7593	0.7496	0.7653	0.7765
Yazd	0.7835	0.7937	0.7901	0.7869	0.8183
Average	0.7168	0.7307	0.7263	0.7253	0.7378

The results also revealed that from 2015 to 2016 all 31 provinces showed an increasing development trend. However, from 2016 to 2017, the average development rate of the provinces underwent a decline. Finally, a sharp increase was demonstrated in 2018 in the development trend as the year that marked the highest rate of development (see Figure 1). In addition, the analysis clarified that the development rates of all provinces had decreased over the period of five years, although only Khuzestan and Kerman provinces showed great progress in this period.

The results also revealed that in 2015 such indicators as "rehabilitation centers" and "specialized medical doctors"

had the highest weights, whereas the least important indicator was "active hospitals." In 2016, "the number of dentists" was recognized as the most important factor, followed by "general and specialized clinics." The least important indicator in 2016 was "general practitioners." In addition, the results of the analysis indicated that in 2017, "general and specialized clinics" were recognized as the most important indicator, followed by "the number of pharmacists." In the same year, "health houses" showed the lowest weight was recognized as the least important indicator. In 2018, "rehabilitation centers" was considered to be the most important indicator for the second time over the period of five years, followed by "the number of dentists." However, "the number of pharmacies" showed

the lowest weight. In the final year, 2019, the indicator “the number of nurses” displayed the highest weight and was recognized as the most important factor, followed by

“urban and rural health centers.” The least important indicator was “health houses” (see Table 2).

FIGURE 1. AVERAGE LEVEL OF DEVELOPMENT BETWEEN 2015 – 2019

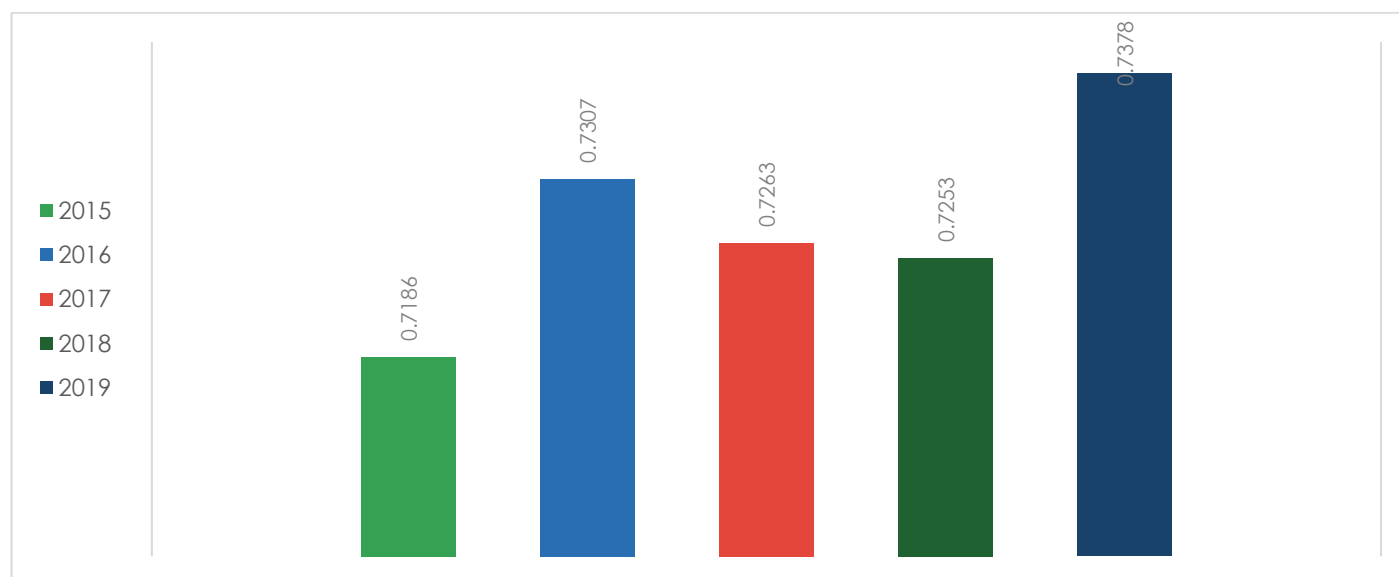


TABLE 2. WEIGHT COEFFICIENTS OF HEALTH INDICATORS PER CAPITA FOR EACH PROVINCE

Indicators	2015	2016	2017	2018	2019
General Practitioners	0.0523	0.0456	0.0526	0.0413	0.0530
Specialists	0.0526	0.0548	0.0566	0.0737	0.0577
Pharmacists	0.0440	0.0487	0.0585	0.0451	0.0545
Dentists	0.0522	0.0738	0.0534	0.0637	0.0551
Doctor of Philosophies	0.0755	0.0640	0.0557	0.0607	0.0552
Nurses	0.0380	0.0563	0.0573	0.0610	0.0668
Mamas	0.0553	0.0460	0.0539	0.0481	0.0533
Active Hospitals	0.0352	0.0504	0.0561	0.0518	0.0561
Active Beds	0.0570	0.0541	0.0577	0.0649	0.0532
Medical Laboratories	0.0626	0.0711	0.0576	0.0641	0.0565
Rehabilitation centers	0.0755	0.0502	0.0562	0.0742	0.0560
Nuclear Medicine Centers	0.0408	0.0485	0.0548	0.0516	0.0540
Pharmacies	0.0429	0.0538	0.0554	0.0382	0.0554
General and Specialized Clinics	0.0660	0.0732	0.0598	0.0645	0.0548
Emergency Centers	0.0711	0.0499	0.0526	0.0500	0.0532
Primary Healthcare Centers	0.0522	0.0469	0.0532	0.0539	0.0546
Health Centers	0.0745	0.0630	0.0569	0.0413	0.0587
Health Houses	0.0523	0.0499	0.0520	0.0521	0.0521

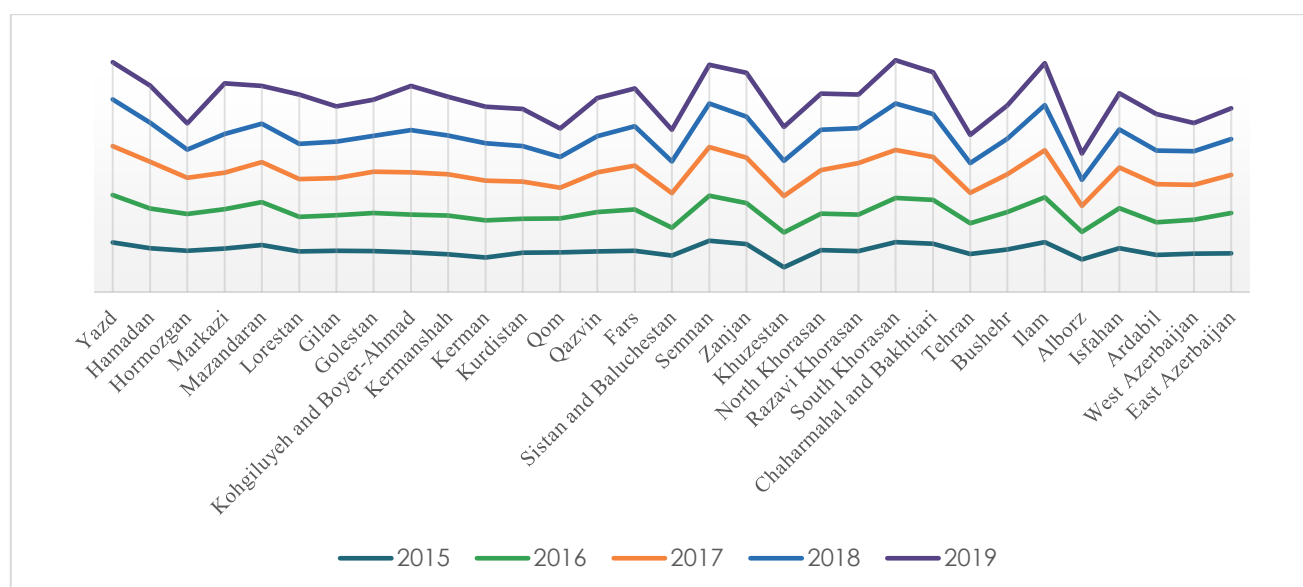
The provinces were then prioritized using the CoCoSo method. In this method, higher K values pointed to higher ranks, which showed the provinces' access to the indicators of the health sector in proportion to their populations. On this account, such provinces as Semnan, Yazd, and Central Khorasan Razavi were in a better situation than the other provinces. Table 3 lists the details of all provinces.

Figure 2 also illustrates the ranks of the provinces according to the health indicators. The results revealed that over the five years investigated in this study, in 2015 Khuzestan and Alborz were among the least developed provinces in Iran, respectively.

TABLE 3. K VALUE ACCORDING TO THE COCOSO METHOD FOR EACH PROVINCE

Provinces	Years				
	2015	2016	2017	2018	2019
East Azerbaijan	1.8630	1.9550	1.8433	1.7210	1.4896
West Azerbaijan	1.8516	1.6398	1.6891	1.6137	1.3628
Ardabil	1.7819	1.5856	1.8360	1.6203	1.7727
Isfahan	2.1143	1.9246	1.9746	1.8392	1.7443
Alborz	1.5715	1.3281	1.2581	1.2566	1.2725
Ilam	2.4121	2.1609	2.2786	2.1770	2.0239
Bushehr	2.0454	1.8118	1.8335	1.7095	1.6147
Tehran	1.8342	1.4801	1.4759	1.4328	1.3618
Chaharmahal and Bakhtiari	2.3365	2.1047	2.0711	2.0750	2.0248
South Khorasan	2.4031	2.1394	2.3138	2.2531	2.0839
Razavi Khorasan	1.9778	1.7645	2.4762	1.6957	1.6270
North Khorasan	2.0145	1.7753	2.0960	1.9554	1.7389
Khuzestan	1.1937	1.6809	1.7590	1.6981	1.6400
Zanjan	2.3118	1.9806	2.1933	1.9783	2.1235
Semnan	2.4738	2.1722	2.3486	2.1019	1.8773
Sistan and Baluchestan	1.7607	1.3436	1.6651	1.5402	1.5238
Fars	1.9846	1.9927	2.1218	1.9015	1.8208
Qazvin	1.9587	1.9093	1.9079	1.7422	1.8478
Qom	1.9100	1.6359	1.4865	1.4845	1.3848
Kurdistan	1.8985	1.6362	1.7872	1.7285	1.7852
Kerman	1.6667	1.7853	1.9240	1.8151	1.7589
Kermanshah	1.8235	1.8701	1.9920	1.8703	1.8769
Kohgiluyeh and Boyer-Ahmad	1.9140	1.8288	2.0273	2.0471	2.1397
Golestan	1.9752	1.8465	1.9934	1.7256	1.7433
Gilan	1.9908	1.7115	1.8035	1.7563	1.6961
Lorestan	1.9540	1.6739	1.8207	1.7098	2.3737
Mazandaran	2.2728	2.0665	1.9353	1.8486	1.8349
Markazi	2.0977	1.9068	1.7575	1.8684	2.4521
Hormozgan	1.9949	1.7694	1.7525	1.3520	1.2729
Hamadan	2.1123	1.9234	2.2568	1.8806	1.7935
Yazd	2.3896	2.2930	2.3624	2.2561	1.8004

FIGURE 2. K VALUE FOR EACH PROVINCE BETWEEN 2015 – 2019



DISCUSSION

Because the development of the health sector basically contributes to the expansion of other sectors in a society, policymakers must take into account and substantially investigate regional (e.g., provincial) developments. The present study ranked Iranian provinces from the perspective of health indicators using taxonomy analysis and the CoCoSo method.

The findings of the taxonomy method used, which did not factor in the effect of population on the weights of health indicators, helped to categorize the provinces into two groups in terms of their health sector development. The first group included provinces with development levels greater than that of the national average, including East Azerbaijan, West Azerbaijan, Isfahan, Tehran, Khorasan Razavi, Khuzestan, Fars, Kerman, Gilan, and Mazandaran.

Although during the period 2015-2019 the provinces achieved different ranks, they were all included in the first category. The second category consisted of the provinces that were less developed than the national average level, among which Ilam, North Khorasan, Semnan, and South Khorasan were the least developed ones. The observations of Kazemi et al. showed that Fars, Isfahan, Gilan, Tehran, Khorasan Razavi, and Khuzestan were among highly or relatively developed provinces; this finding was consistent with the results of the present study [8].

However, Kazemi et al identified Mazandaran, Kerman, West Azerbaijan, and East Azerbaijan as underdeveloped provinces, which clashed with the results of the present study [8]. The reason for such a difference in the results could be attributed to period during which the studies were conducted. More specifically, from 2012 to 2019 (when the last statistical yearbook was published), such provinces as East Azerbaijan, West Azerbaijan, Kerman, Gilan, and Mazandaran showed significant progress in terms of their health indicators, managed to achieve above-average ranks, and could be considered to be "developed" provinces.

Amini et al. [24] stated that Isfahan and Tehran had high ranks in relation to their facilities of the health sector and their healthcare status was good. However, Ardabil, Qom, Sistan and Baluchestan, and Kohgiluyeh and Boyer-Ahmad were among the underdeveloped provinces in terms of

access to healthcare facilities. This observation was consistent with the findings of the present study.

At the next stage, the weights of the indicators were measured through the CRITIC technique. The results revealed that the most important indicators showed different values over the period of five years, and "the number of rehabilitation centers" for two years was considered to be the main indicator. In their study in 2018, Shahraki et al. introduced "the number of rehabilitation centers" as one of the most influential indicators in the healthcare development of a province [16]. In 2017, "the number of pharmacists" was considered to be one of the most important indicators. Tahari et al. observed that "the number of pharmacists" was more important in the development of the health sector than other research indicators [25].

The provinces were ranked through CoCoSo method. As the results showed, among the 31 provinces under investigation, Semnan, Yazd, Ilam, and South Khorasan exhibited the best status over the period of five years, while Khuzestan and Alborz showed the worst status. In other words, the provinces that gained the highest weights through the CRITIC technique indicators had a better status than the other provinces and enjoyed better conditions in the final CoCoSo-based ranking.

The results of this study revealed a significant difference between the Iranian provinces in terms of their health facility development levels. Overall, the results of most studies exploring this field also indicated that the health sector resources were inadequately distributed [16, 26, 27]. The healthcare system has an undeniably important function in promoting fairness and reducing inequalities regarding access to healthcare services in any society. Health is an issue that not only affects development directly, but also it indirectly impacts other organizations in the course of development. In addition, the Iranian Constitution emphasizes that competent bodies must provide necessary health facilities at a community level.

STRENGTHS AND LIMITATIONS

Focusing on the latest information available in the health sector and using ranking methods, the present study sought to determine the differences between Iranian provinces in terms of their healthcare development levels and access to health services. This study used precise techniques to prioritize the data and provided invaluable findings.

However, the statistical yearbook is published late and access to up-to-date results was not available. Also, due to the increase in details, we could not analyze all the published details. Therefore, conducting studies with more detailed analysis or a comparative study to compare the statistical indicators of different countries rely on other MCDM techniques is suggested.

CONCLUSION

To improve the distribution of health services and reduce related inequalities across regions (e.g., states/provinces), policymakers must use reliable information and have a clear understanding of the status of health indicators in the regions they investigate. The reason for this is that development plans and decisions concerning new measures require a scientific analysis of the information available. Given such issues, the present study ranked Iranian provinces in terms of their access to health indicators and the distribution of healthcare services (development). After collecting the data from the statistical yearbooks published between 2015 and 2019, the study conducted taxonomy analysis on the data.

The results showed that East Azerbaijan, West Azerbaijan, Isfahan, Tehran, Khorasan Razavi, Khuzestan, Fars, Kerman, Gilan, and Mazandaran were among developed provinces. Furthermore, the provinces were ranked through the CoCoSo method, and as a result of which, it was clarified that Semnan, Yazd, Ilam, and South Khorasan were the provinces with highest degree of access to health indicators.

The results of comparing the data of different years indicated that, despite the progress of all provinces, there were still many differences in relation to the distribution of services across Iran. Therefore, healthcare policymakers/authorities must prioritize plans that would reduce inequality in these regions and would allocate more funds to them for the purpose of development.

ABBREVIATION

- MCDM Multi-criteria decision-making
- CoCoSo Combined compromise solution
- CRITIC CRiteria Importance Through Intercriteria Correlation

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CONFLICT OF INTEREST:

The authors declared no conflict of interest.

References

1. Ghazanfarpour H. Stratification & development ratio of medical Service in Kerman Province cities by concentration index. *Spatial Planning*. 2014 Feb 20;3(4):1-8. [In Persian].
2. Bonakdar SM, Dehghan Nayyeri L. The health status of Isfahan during 1825-1981. *Iranian Journal of Medical Ethics and History of Medicine*. 2011 May 10;4(3):9-26.
3. Yusefi AR, Sharifi M, Nasabi NS, Rezabeigi Davarani E, Bastani P. Health human resources challenges during COVID-19 pandemic; evidence of a qualitative study in a developing country. *PloS one*. 2022 Jan 24;17(1):e0262887
4. Bahrami R. An Analysis on the Extent of Health Sector Development in the Cities of Kurdistan Province Using Linear TOPSIS Method. *Scientific-Research Quarterly of Geographical Data (SEPEHR)*. 2016 Feb 20;24(96):39-49.
5. Jafari M, Seyfi H, Jafari A. Measuring the health & treatment sector development level in Zanjan province townships by numerical taxonomy method in 2011: 61-69
6. Karimzadeh M, Karimzadeh B. Evaluating Development level of Sistan and Baluchistan Province in Terms of Accessibility to Health Care Services. *Zanko J Med Sci.*, 2018: 19 (62) :18-30
7. Mousavi M, Meshkini A, Veysian M, Hosseini M. Assess the Levels of development Health services with the model Multiple Criteria Decision Making (Case study: city of Khorasan Razavi province). *Journal of Studies of Human Settlements Planning*. 2017 Feb 27;11(37):99-112.
8. Kazemi A, Rezapoor A, Faradonbeh SB, Nakhaei M, Ghazanfari S. Study the development level of provinces in Iran: a focus on health indicators. *Journal of Health Administration (JHA)*. 2015;18(59).
9. Sun S, Chen J, Johannesson M, Kind P, Xu L, Zhang Y, Burström K. Regional differences in health status in China: population health-related quality of life results from the National Health Services Survey 2008. *Health & place*. 2011 Mar 1;17(2):671-80.
10. Theodorakis PN, Mantzavinis GD. Inequalities in the distribution of rural primary care physicians in two remote neighboring prefectures of Greece and Albania. *Rural and remote health*. 2005 Sep 1;5(3):1-9.
11. Zheng X, XinMing SO, Gong CH, YunZhong YO, Qiang RE, JuFen LI, Zhang L, LingFang TA, JiHong WE, QiuYuan CH. Health inequalities during 20 years of rapid

- economic development in China (1980–2000): a mortality analysis. *Biomedical and Environmental Sciences*. 2011 Aug 1;24(4):329-34.
12. Yar Mohammadian M H, Bahrami S, Forughi Abari A. Health Directors and Experts, and Proper Need Assessment Models. *Iranian Journal of Medical Education*,. 2003; 3 (1) :71-79.
 13. Masoud M., Moazazi Mehr Tehran A.M., Shobayri S.N. Determine undevelopment rankings of Isfahan County (numerical Taxonomy method). *Urban-Regional Studies and Research (University of Isfahan)*, 2011: 2(8):39-54.
 14. Rezaei S, Kazemi Karyani A, Ghahremani E. Development status and access to health care resources using numerical taxonomy and Morris Model: a case study. *Scientific Journal of Kurdistan University of Medical Sciences*. 2015 May 10;20(2):40-50.
 15. Sadeghifar J, Seyedin H, Anjomshoa M, Vasokolaie GR, Mousavi SM, Armoun B. Degree of the development of Bushehr province towns in health indicators using numerical taxonomy. *Razi Journal of Medical Sciences*. 2014; 21(118):81-91.
 16. Shahraki MR, Abbasi Hasanabadi N. Ranking the Cities of Sistan and Baluchestan Province Based on Health and Treatment Indices Using the TOPSIS Method. *Journal of Payavard Salamat*. 2019 Mar 10;12(6):433-46.
 17. Diakoulaki D, Mavrotas G, Papayannakis L. Determining objective weights in multiple criteria problems: The critic method. *Computers & Operations Research*. 1995 Aug 1;22(7):763-70.
 18. Tuş A, Aytaç Adalı E. The new combination with CRITIC and WASPAS methods for the time and attendance software selection problem. *Opsearch*. 2019 Jun;56(2):528-38.
 19. Rostamzadeh R, Ghorabae MK, Govindan K, Esmaili A, Nobar HB. Evaluation of sustainable supply chain risk management using an integrated fuzzy TOPSIS-CRITIC approach. *Journal of Cleaner Production*. 2018 Feb 20;175:651-69.
 20. Yazdani, M., Zarate, P., Zavadskas, E. K., & Turskis, Z.. A Combined Compromise Solution (CoCoSo) method for multi-criteria decision-making problems. *Management Decision*. 2019; 57(9), 2501-2519.
 21. Yazdani M, Wen Z, Liao H, Banaitis A, Turskis Z. A grey combined compromise solution (CoCoSo-G) method for supplier selection in construction management. *Journal of Civil Engineering and Management*. 2019;25(8):858-74.
 22. Zolfani SH, Chatterjee P, Yazdani M. A structured framework for sustainable supplier selection using a combined BWM-CoCoSo model. In *International scientific conference in business, management and economics engineering*. Vilnius, Lithuania 2019 May 8 (pp. 797-804).
 23. Torkayesh AE, Pamucar D, Ecer F, Chatterjee P. An integrated BWM-LBWA-CoCoSo framework for evaluation of healthcare sectors in Eastern Europe. *Socio-Economic Planning Sciences*. 2021 Dec 1;78:101052.
 24. Amini N, Yadolahi H, Inanloo S. Ranking of country provinces health. *Social Welfare Quarterly*. 2006 Apr 10;5(20):27-48.
 25. Tahari Mehrjardi MH, Babaei Mybodi H, Morovati Sharifabadi A. Investigation and ranking of Iranian provinces in terms of access to health sector indicators. *Health Information Management*. 2012 Sep 22;9(3).
 26. Nemati R, Seyedin H, Nemati A, Sadeghifar J, Nasiri AB, Mousavi SM, Rahmani K, Nasiri MB. An analysis of disparities in access to health care in Iran: evidence from Lorestan province. *Global journal of health science*. 2014 Sep;6(5):81.
 27. Abolhallaje M, Mousavi SM, Anjomshoa M, Nasiri AB, Seyedin H, Sadeghifar J, Aryankhesal A, Vasokolaie GR, Nasiri MB. Assessing health inequalities in Iran: a focus on the distribution of health care facilities. *Global journal of health science*. 2014 Jul;6(4):285.

THE RELATIONSHIP BETWEEN THE QUALITY OF HEALTH SERVICES AND TUBERCULOSIS PATIENTS' SATISFACTION AT THE PALU CITY HEALTH CENTER

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ABSTRACT

INTRODUCTION:

Tuberculosis is an infectious disease that is still a global concern and most sufferers are of productive age. Factors for treatment failure are usually related to treatment supervision and the quality of health services. This study aimed to analyze the relationship between the quality of health services and the level of satisfaction of tuberculosis patients at the Palu City Health Center.

METHODS:

This research is quantitative research with cross sectional study conducted on 116 respondents. The instrument used in this research is a questionnaire. The analysis in this study used the Chi-Square and Multiple logistic regression.

RESULTS:

The results of the analysis showed that availability ($p < 0.001$), respect and caring ($p < 0.001$), safety ($p < 0.001$), timeliness ($p < 0.001$) and tangible ($p < 0.001$) were associated with tuberculosis patient satisfaction. The multivariate analysis found that timeliness ($p = 0.002$; OR = 17.692) was the most dominant factor in influencing patient satisfaction.

CONCLUSIONS:

Availability, respect and caring, safety, timeliness, and tangibles are related to the satisfaction of tuberculosis patients. Timeliness service is the most dominant factor influencing the satisfaction of tuberculosis. Palu City Health Center are expected to continue to make efforts to improve health services by health workers in the TB program to increase comfort and improve patient health.

KEYWORDS

tuberculosis, quality of health services, patient satisfaction

INTRODUCTION

Tuberculosis is still a global concern that accounts for a quarter of the total population contaminated with TB, and most of the sufferers are of productive age (15–55 years). TB is also related to economic loss, where a person suffering from TB is considered to lose their family income for about 3–4 months, and if they die, their family will lose future potential income for 15 years. It means losing income until the children can be considered to earn money at that age and add family income. Indonesia experienced an increase in cases diagnosed with TB in 2015, from 331,703 to 393,323 in 2020.[1] Indonesia through the Ministry of Health in several years is implementing a TB-related control program by making a regulation covering TB prevention and control programs [2]. Several factors associated with TB treatment failure in patients are typically related to supervisory supervision and the quality of health services. [3]

Achieving the mission of a healthy Indonesia needs to be done by increasing access to health services and increasing quality health resources in accordance with the quality standards of health care services. Assessment of the quality of services for TB patients can be seen from the satisfaction and experience of patients during treatment. Failure to meet health service standards for TB has serious consequences, resulting in increased transmission due to delayed diagnosis and treatment; increased mortality and morbidity due to inappropriate treatment; and increased drug resistance due to patient dropouts.[4–6]

The Key Quality Characteristics Assessment for Hospitals theory developed by Sower *et al.* [7] can be used to help assess health facilities to measure the quality of their health services. Research by Halim & Wulandari [8] obtained the largest value in the respect and caring category, which shows that the patient's expectations are quite high compared to other patient and their care categories. Respect and caring require officers to focus fully on patients and be patient and responsive in carrying out their obligations. Another study by Sayori *et al.* [9] observed that there was an influence between service quality and the satisfaction of inpatients at the Jayapura Hospital in Jayapura City, Papua on the safety aspect.

SERVQUAL (Service Quality) is often used in evaluating the quality of health services.[10] According to Alim *et al.* [11], their research found that there was a correlation of tangibles (i.e. physical facilities of the building, equipment

and facilities used in the process of health services) on patient satisfaction. The study explains that there are several hospital services that make patients satisfied, such as condition of the waiting room which is clean and the physical appearance of health workers is good. Meanwhile, Datuan *et al.* [12] study found a connection between patient satisfaction and punctuality. The efficiency of the job done by health services can be determined by how quickly officials give their services.

Based on a preliminary study conducted through interviews with five TB patients seeking treatment at the Palu City Health Center, South Sulawesi, Indonesia, it was found that there were as many as four patients who said that the services provided by the Puskesmas (*Public Health Centre*) officers did not meet their expectations, which included prevention, transmission, to the process of effective and appropriate treatment. Based on this background, the researchers wanted to study the relationship between the quality of health services and the level of satisfaction of tuberculosis patients at the Palu City Health Center.

METHODS

STUDY DESIGN

This type of research is quantitative analytic with a cross sectional design. This study design aims to test the hypothesis that there are associations between service quality including availability, respect and caring, safety, timeliness, and tangible and tuberculosis patient satisfaction at the Palu Health Center.

STUDY AREAS AND TARGET POPULATION

The population in this study is tuberculosis patients who were undergoing treatment programs at the Kamonji Health Center, Singgani Health Center, Talise Health Center, Sangurara Health Center, and Tipo Health Center at Palu City, Central Sulawesi, Indonesia. Patients were enrolled based on patient registered data at the Puskesmas and then contacted to ask about their willingness to take part in the research.

SAMPLE SIZE DETERMINATION AND TECHNIQUES

This study used a total sampling technique. Total sampling is a sampling technique when all members of the population are used as samples [13]. Population in this study came from five health centers according to data from Palu City Health Office therefore the sample that used as a study was 116 patients.

INSTRUMENTS AND PROCEDURES

The instrument used in this study was questionnaire. The instrument was made using a Likert scale on the independent variable and the Guttman scale on the dependent variable. The reliability of the questionnaire in this study was tested using the Cronbach Alpha (α) test, with $\alpha=0.60$. Therefore, the instrument was deemed reliable. We explain the description of the study to patients starting from the purpose, benefits, research procedures, and confidentiality of patient data. Patients were also given a written informed consent to sign. Then we conducted interviews with patients with questionnaires containing questions related to information about the availability of services; the attitude of the officers who were respectful and caring; the safety felt by the patients; the timeliness of services; and tangible of Health Center services. Availability referred to in this study is the availability of care or services provided for the information needs that are entitled to be received by patients. Respect and caring referred to in this study is the attitude of health workers who respect and care when serving patients. Safety referred to in this study is a sense of well-being, security and comfort that is not related to side effects, infections and other negative impacts that patients feel when carrying out treatment and care at the health center. Timeliness referred to in this study is the timeliness of health workers in providing services, then also looking at the care given to patients in the most useful or necessary time. The tangibles referred to in this study are the availability of physical

facilities, equipment and means of communication in the health service process.

DATA ANALYSIS

For descriptive characteristics, a univariate analysis was conducted. The Chi-square test and Multiple logistic regression were applied in the bivariate and multivariate analyses, respectively. The multivariate test includes research factors that had significant bivariate results. All the data were analyzed using SPSS 26 software.

ETHICAL STATEMENT

This research has received an approval from the Research Ethics Commission of the Faculty of Public Health, Hasanuddin University with the approval number: 7320/UN4.14.1/TP.01.02/2022.

RESULTS

As set out in Table 1, most respondent's age group is 29-34 years (23 respondents 19.9%), and most of the respondents are female (59 respondents 50.9%). In relation to occupation, it is known that most of the respondents work as entrepreneurs (29 respondents 25%), the highest education level is senior high school (75 respondents 64.7%), and most of the respondents live with their partners (82 respondents 70.7%).

TABLE 1. DISTRIBUTION OF RESPONDENT CHARACTERISTICS

Characteristics	n	%
Age Group		
16-21	22	19
22-28	17	14.7
29-34	23	19.9
35-40	14	12.1
41-47	13	11.2
48-53	13	11.2
54-60	11	9.5
61-66	3	2.6
Gender		
Male	57	49.1
Female	59	50.9
Profession		
Government Employees	16	13.8
Private Employees	16	13.8
Housewife	24	20.7
Entrepreneur	29	25.0

Farmer	1	0.9
Fisherman	1	0.9
Student	28	24.1
Other	1	0.9

Last Education

Primary School	1	0.9
Secondary School	3	2.6
Senior High School	75	64.7
Diploma	1	0.9
Bachelor	35	30.2
S2-S3	1	0.9

Living With

Husband/Wife	82	70.7
Parent	16	13.8
Siblings	4	3.4
Live Alone	5	4.3
Other	9	7.8

Source: Primary Data, 2022

Table 2 shows that most of the respondents feel that the availability of care or service is always available at the Health Center (63 respondents 54.3%), in relation to the respect and caring variable (52 respondents 44.8%) feel the care from the officers is good. For the safety variable, 44 respondents (37.9%) answered that safety when receiving health services was already high. In relation to the timeliness variable, (40 respondents 34.5%) answered that

the timeliness of the service was good. On the tangible variable 60 respondents (51.7%) answered that the physical evidence from the Health Center service was good, and on the patient satisfaction variable as many as 42 respondents (36.2%) were satisfied with the services from the Health Center. In comparison, as many as 74 respondents (63.8%) considered that they were still dissatisfied with the services of the Health Center.

TABLE 2. DISTRIBUTION OF RESPONDENTS BASED ON VARIABLES

Variable	n	%
Availability		
Available	63	54.3%
Not Available	53	45.7%
Respect and caring		
Good	52	44.8%
Not Good	64	55.2%
Safety		
High	44	37.9%
Low	72	62.1%
Timeliness		
Good	40	34.5%
Not Good	76	65.5%
Tangible		
Good	60	51.7%
Not Good	56	48.3%
Patient satisfaction		
Satisfied	42	36.2%
Less Satisfied	74	63.8%

Source: Primary Data, 2022

Table 3 shows that the percentage of satisfied patients is higher in the availability of care or services as 37 respondents (58.7%), good respect and caring as 35 respondents (67.3%), high safety as 37 respondents (84.1%), good timeliness as 36 respondents (90%), and good tangible as 32 respondents (53.3%), as well as the proportion between those five variables and patient satisfaction, significantly differ ($p < 0.001$) which means there

is relationship between those variables and tuberculosis patient satisfaction at the Palu City Health Center.

Table 4 shows that the most dominant variable affecting patient satisfaction is timeliness, with odds ratio (OR) 17.692, 95% Confidence Interval (95% CI = 2.797-111.916), $p = 0.002$; therefore, it can be interpreted that good timeliness can increase patient satisfaction 17 times higher than the poor timeliness. Safety also had significant result with OR = 9.366 (1.225-71.623), $p = 0.031$.

TABLE 3. RELATIONSHIP BETWEEN SERVICE QUALITY AND TUBERCULOSIS PATIENT SATISFACTION AT THE PALU CITY HEALTH CENTE

Variables	Patient Satisfaction						p-value
	Satisfied		Less Satisfied		Total		
	n	%	n	%	n	%	
Availability							
Available	37	58,7	26	41,3	63	100	
Not Available	5	9,4	48	90,6	53	100	
Respect and caring							<0.001
Good	35	67,3	17	32,7	52	100	
Not Good	7	10,9	57	89,1	64	100	
Safety							<0.001
High	37	84,1	7	15,9	44	100	
Low	5	6,9	67	93,1	72	100	
Timeliness							<0.001
Good	36	90	4	10	40	100	
Not Good	6	7,9	70	92,1	76	100	
Tangibles							<0.001
Good	32	53,3	28	46,7	60	100	
Not Good	10	17,9	46	82,1	56	100	

Source: Primary Data, 2022

TABLE 4. DOMINANT FACTORS AFFECTING TUBERCULOSIS PATIENT SATISFACTION AT THE PALU CITY HEALTH CENTER

Variables	B	Sig.	Exp (B)	95% CL	
				Lower	Upper
Availability	0.774	0.340	2.168	0.443	10.616
Respect and caring	-0.002	0.998	0.998	0.156	6.381
Safety	2.237	0.031	9.366	1.225	71.623
Timeliness	2.873	0.002	17.692	2.797	111.916
Tangibles	-0.430	0.618	0.651	0.120	3.518
Constant	-7.868	0.000	0.000		

Source: Primary Data, 2022

According to Table 3 and Table 4, our hypothesis about the relationship between service quality and TB patients' satisfaction was deemed accepted for which there were five indicator of quality service had significant results

($p < 0.001$). However, multivariate analysis shows that only two indicators of quality service (i.e., timeliness and safety) had a dominant impact on TB patients' satisfaction which can be indicated that in further analysis two out of five

quality service indicators was deemed accepted as dominant factor affecting patient satisfaction.

DISCUSSION

RELATIONSHIP BETWEEN AVAILABILITY AND TUBERCULOSIS PATIENT SATISFACTION

Availability is an element that is assessed in terms of the availability of health services, namely services that are always provided for the needs of patients who need them and can also be seen from the information needs received by patients. The results show that availability was related to patient satisfaction with the treatment program for tuberculosis patients at the Palu City Health Center. Based on the distribution results, it was found that most respondents felt the availability of care or services. This was because most of the patients were satisfied with the good availability factor. The availability of drugs and health facilities is a factor in patient satisfaction with services, and officers always explain drugs and drug doses that must be taken appropriately to patients.

The findings from this research is in line with the research of Ayaad et al. [14], which suggests that there is a significant relationship between the availability variable and the quality of health services. The availability of information systems and human resources can increase the quality of health services, drug management, and save time for patient care.

RELATIONSHIP BETWEEN RESPECT CARING AND TUBERCULOSIS PATIENT SATISFACTION

Respect and caring are the desired behaviors and actions of health workers which are assessed in terms of providing services to patients respectfully and courteously to fulfil the patient's rights as human beings. The results of this study indicate that respect and caring have a significant relationship to patient satisfaction while undergoing treatment programs at the Palu City Health Center. Based on the results for this study of the distribution of the respect and caring categories, it was found that most of the respondents answered less well. This was assumed to be due to the lack of attention from Puskesmas officers to patients. Officers are considered to have not given special time to patients to consult about the illness they are suffering from, and officers do not have a clear record of the disease experienced by the patient.

The results of the study presented by Gurusinga [15], showed a significant relationship between the caring

behavior of nurses and patient satisfaction. Patients expect health workers to listen carefully, give advice, respect patients, support recovery, and take care of patients physically and emotionally.

RELATIONSHIP BETWEEN SAFETY AND TUBERCULOSIS PATIENT SATISFACTION

Safety is the behavior of providing a sense of security for treatment and care, avoiding the side effects of infection, injury, or other negative effects that may occur when providing services at the Puskesmas to patients. The results showed that safety had a relationship with patient satisfaction for those undergoing treatment programs at the Palu City Health Center. Based on the results of the distribution of the safety category, most patients feel that security from the Puskesmas is still low. This is assumed because patients feel that there is still a lack of discipline in health protocols implemented by officers, for example, such as using masks when meeting so that patients feel they are still not safe in interacting with officers.

Additional supporting research was proposed by Fatima et al. [16], who found that patient privacy and safety were positively related to patient satisfaction. The results also indicate that all staff are intended to provide care to their patients; provide a clean and comfortable client environment; have strong communication, productively go to patient calls; for specialist accessibility; comfortable working hours for clients within the hospital; and advances in input systems.

RELATIONSHIP BETWEEN TIMELINESS AND TUBERCULOSIS PATIENT SATISFACTION

Timeliness is the provision of services according to the time specified by the officers to the patient without waiting too long. The results showed that timeliness had a relationship with patient satisfaction while undergoing treatment programs at the Palu City Health Center. The results of the distribution of the timeliness category showed that most of the patients felt that timeliness was still not good. This was assumed to be because of the delay in services felt by patients, such as in the administrative process where officers were not in place when the patient wanted to take medication and also in the delay in information related to the status of TB diagnosis to patients.

These results are in line with the research of Datuan et al. [12], which states that timeliness affects patient satisfaction. Respondents said that the punctuality of opening and closing times for services was good, officers did not make

patients wait long to get health services, and service officers arrived at the administration department on time.

RELATIONSHIP BETWEEN TANGIBLES AND TUBERCULOSIS PATIENT SATISFACTION

Tangible is the appearance of services provided by health care that can be seen, such as the physical structure of the health care, the integrity of medical equipment, the cleanliness of the room, and the appearance of hospital staff that can be seen and felt directly by the patient. The results showed that tangible had a relationship with patient satisfaction undergoing treatment programs at the Palu City Health Center. This is because most tuberculosis patients still feel the good tangibles owned by the health center in accordance with the patient's referrals, such as a neat and clean Puskesmas waiting room, officers who have clean and complete medical equipment, clean and tidy appearance of officers and good condition. The health center building is good and still suitable for use.

As stated in the research conducted by Alim et al. [11] good tangibles are very important given by the health providers because what is seen and felt directly by the patient will change the patient's perception of the health providers. This means that if the patient feels that the physical facilities, the cleanliness of the waiting room, and the appearance of the health officers who provide services to the patient are good, the patient's perception of the health providers will also be good.

Based on the conditions discovered directly by the researcher during the course of this research, some limitations may be of direct concern to future researchers. The limitations in this study are the number of health centers selected for research, which is five Puskesmas with a total of 116 respondents, which does not describe the real situation in all of Palu City health centers. The data collection that is measured is only using quantitative questionnaire, therefore, it is not clear what causes and reasons can be explained by respondents regarding their ratings of the quality of health services.

CONCLUSION AND RECOMMENDATION

From the study results it can be concluded that availability, respect and caring, safety, timeliness, and tangibles are related to the satisfaction of tuberculosis patients at the Palu City Health Center. Timeliness of service is the most dominant factor influencing the satisfaction of tuberculosis patients at the Palu City Health Center. Health centers are

expected to continue to make efforts to improve health services by health workers in the TB program so as to increase comfort and improve patient health.

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References

1. WHO. Global TB Report 2020. Accessed on October 4th, 2021. <https://www.who.int/publications/i/item/9789240013131>
2. Ministry of Health Republic of Indonesia. Regulation of The Minister of Health of The Republic of Indonesia Number 21 of 2020 Concerning the Ministry of Health's Strategic Plan for 2020-2024. <https://peraturan.bpk.go.id/Home/Details/152564/permenkes-no-21-tahun-2020>
3. Suarayasa K, Pakaya D, Felandina Y. Situation Analysis of Pulmonary Tuberculosis Management in Sigi Regency. *J Kesehat Tadulako*. 2019;5(1):1–62.
4. Syapitri H, Hutajulu J, Aryani N, Saragih FL. The Relationship of The Quality of Health Services With the Satisfaction Level of Lung TB Patients That are Taking a Treatment Program. *J Surya Muda*. 2021 Feb;3(1).
5. Merzistya ANA, Adi MS, Sutiningsih D, Rahayu SR. The Quality of Tuberculosis Services in Patients' Perspectives: a Literature Review. *J Adm Kesehat Indones*. 2021;9(1):67.
6. Stallworthy G, Dias HM, Pai M. Quality of tuberculosis care in the private health sector. *J Clin Tuberc Other Mycobact Dis*. 2020;20:100171.
7. Sower V, Duffy JA, Kilbourne W, Kohers G, Jones P. The dimensions of service quality for hospitals: Development and use of the KQCAH scale. *Health Care Management Review*. 2001;26:47–59.
8. Halim CN, Wulandari RD. Analysis of the Causes of Decrease in Patient Visits Based on the GAPS Service Quality Model. *J Adm Kesehat Indones*. 2013;1(2):182–191.
9. Sayori FT, Maidin A, Sudirman I. Papua Province In 2013 Service Quality Inpatient Care of Patient Satisfaction Levels in Jayapura Hospital Papua Province in 2013. *Bagian Manajemen Pelayanan Kesehatan, Fakultas Kesehatan Masyarakat, Universitas Hasanuddin*. 2013;1–13.
10. Parasuraman A, Zeithaml VA, Berry LL. SERVQUAL: A Multiple-Item Scale Measuring Consumer Perception of

Service Quality. Wiley Encyclopedia of Management. 1988:1.

11. Alim A, Tangdilambi N, Badwi A. Health Service Quality (Analytical Study of Outpatients at Makassar Hospital). *J Manaj Kesehatan Yayasan RSDr Soetomo*. 2019;5(2):165.
12. Datuan N, Darmawansyah, Daud A. The Effect Of Quality Of Health Services On Satisfaction Of BPJS Participants Patients In Makassar Hajj Regional General Hospital. 2018;6(1):1–7.
13. Sugiyono. Quantitative Research Methods, Qualitative and R&D. Alfabeta: Bandung. 2011
14. Ayaad O, Alloubani A, ALhaja EA, Farhan M, Abuseif S, Al Hroub A, et al. The role of electronic medical records in improving the quality of health care services: Comparative study. *Int J Med Inform*. 2019;127(April):63–67.
15. Gurusinga R. Nurse Caring Behavior on Patient Satisfaction in Hospitals. *J Aisyah J Ilmu Kesehat*. 2020;5(1):129–134.
16. Fatima T, Malik SA, Shabbir A. Hospital Healthcare Service Quality, Patient Satisfaction and Loyalty: An Investigation in context of Private Healthcare Systems *International Journal of Quality & Reliability Management* Article information :2018;(April).

CONCERNS AMONG PARENTS OF DENTAL PROFESSION STUDENTS DURING COVID-19 PANDEMIC

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ABSTRACT

AIM

This study was undertaken to assess the concerns of the parents of dental profession students during the COVID-19 pandemic.

MATERIALS AND METHODS

In this survey a structured questionnaire was sent to all the participants through Google Forms. The questionnaire was designed into five sections. The complete questionnaire consisted of 19 questions. In the first section, participants needed to answer demographic information (five Questions). The second part of the questionnaire (four questions) assessed anxiety of parents and the third part was related to their professional career (three questions), the fourth part asked about effective disinfection practices (four questions) in the college premises and hostel, while the fifth part questioned about learning mode (three questions) during COVID-19 pandemic.

RESULTS

The total response rate in this present survey was 78.02%. 52.2% of parents stated that they are really anxious and have disturbed mental health. Significant percentages (more than 80%) of the parents were worried about their son/daughter's career advancement and dental profession but, 87.7% of the parents were not ready to change their son/daughter's profession. 53.2% of the parents believed that their wards were unable to learn efficiently without attending college and 44.9% of the parents were not satisfied in online assessment during COVID-19 pandemic.

CONCLUSION

Within the limitations of this present study, it was concluded that majority of the parents expressed fear and anxiety about their children's profession. Regarding the mode of learning, half of the parents expressed concern that their wards were unable to learn efficiently without attending college and clinics and also, they were unsatisfied with online assessment.

KEYWORDS

COVID-19 pandemic, concerns, dental students, parents, anxiety

INTRODUCTION

The COVID-19 pandemic has disrupted people in many aspects of life also including education. To inhibit the spread of this pandemic, distance learning from conventional face to face learning has been implemented. During this implementation of online learning, obstacles were encountered which included positive benefits like accelerating technology integration, information, and communication in learning behaviour. [1,2]

The pandemic was declared by the World Health Organization (WHO) on Mar 11, 2020, following which, overnight, curfews and lockdowns had been implemented worldwide. It was identified that this highly infective virus is transmitted through direct and indirect modes. The dental profession demands the patients violate the recommended one-meter safe distance and dental procedures generating aerosols. It was no surprise that all non-essential dental procedures were suspended as a part of the interim guidance [3]. However, if this theory was true, then surely dentists and other members of the team would be at risk because of close contact and high volume of patients seen. To treat the patients in dentistry, surgical and aerosol procedures using rotary cutting and scaling instruments are involved. During these procedures chances of creating infective aerosol of water, saliva, blood and debris are increased. SARS-CoV-2 transmission during dental procedures may happen through inhalation of these aerosols or by direct contact with mucous membranes, oral fluids, contaminated instruments and equipment surfaces [4,5]. If adequate precautions are not taken properly, dental health personnel and trainees will have high risk of contracting any infection through cross contamination/infection. [6,7,8]

Worldwide, health personnel are encountering constant stress during COVID-19 pandemic in their daily work related to risk of infection, frustration, exhaustion and social isolation. Due to the possible high risk of contagion when performing routine dental procedures and close relationship between risk of infection and psychological stress and anxiety, it is essential that this aspect should also be recognized while training in dental health services. [9,10,11,12] Dental health personnel who perceive their likelihood of infection as high, may experience this pandemic as more personally life-threatening and experience greater traumatic stress when compared to

other professions who have less chances of acquiring infection. [13]

The global COVID-19 pandemic is a stressor that originated outside of the family system has given the novelty and uncertainty concerning this disease; also, likely to be perceived significant for many parents and children. In fact, emerging research has shown that parents' perceived impact of COVID-19 is associated with increased parenting stress and, in turn, increased risk of harsh parenting. Even for families who have not been directly exposed to the virus, they are likely to experience indirect effects of the COVID-19 pandemic. The most prevalent stressor among parents included changes to their mood and general stress levels. Likewise, a majority of parents reported experiencing symptoms of anxiety and depression as well as poor sleep. These results are consistent with prior research examining the effects of public health crises on the health and well-being of individuals [14]. Hence, this present study was undertaken to assess the concerns from parents of dental professional students during COVID-19 pandemic.

MATERIALS AND METHODS

STUDY DESIGN AND SETTING

This descriptive study was designed to elicit the information from parents of dental students who are presently studying an undergraduate dental professional degree. The study was conducted in Mysuru, India from May 2021 to July 2021 after the second lockdown due to COVID-19 pandemic.

In this survey a structured closed ended questionnaire was sent to all the participants using Google Forms [15]. The required information about a student's parents was elicited from the institution administrative office.

Before beginning the study, ethical clearance was obtained from the Institutional Review Board [JSSDCH IEC Research Protocol No: 11/2021]. Those parents who responded by completing the questionnaire were included in the study. Follow up was done by sending three reminders and final data was collected in the month of July 2021.

QUESTIONNAIRE

The questionnaire was designed into five sections. The complete questionnaire consisted of 19 questions. In the first section, participants needed to answer demographic

information (5 Questions) like name, year of the son / daughter studying, place, education, occupation. The second part of the questionnaire (4 questions) assessed anxiety of parents and the third part was related to their professional career (3 questions), fourth part enquired about effective disinfection (4 questions) in the college premises and hostel while the fifth part questioned about learning mode (3 questions) during COVID-19 pandemic. The students admitted for studies in the dental college were from all over the country. In India there are a total of 28 states and 8 union territories are present and, in each state, the local language is different. However, in the present study questionnaire English language has been used. The parents who could not comprehend English language were asked to take help from their children, relatives or neighbours.

The questionnaire was face and content validated by experts who were not involved in the study. Before administering the final questionnaire, it was pretested on ten participants of student parents, whose responses were not included for analysis. After fulfilling validity and reliability criteria the questionnaire was finally considered for the main study.

STATISTICAL ANALYSIS

The statistical analysis was carried out using SPSS (version 23) for Windows. Descriptive statistics was carried out by frequency distribution. Chi-Square Test was used to compare the differences from parents of students who belonged to different years. The level of significance was kept at $p < 0.05$.

RESULTS

A total of 301 parents of first year to internship students, responded to the questionnaire. The total response rate in this survey was 78.02 percent. The internal consistency was checked using Cronbach's alpha which was found to be 0.77 and Kappa Value 0.84 maximum response was obtained from the intern's parents. In the survey the majority (86%) of the parents filled in the questionnaire themselves.

More than 99% of the parents were concerned regarding health of their son/daughter during this COVID-19 pandemic. 52.2% of the parents stated that they are really anxious and have disturbed mental health. Both the above-mentioned questions were found to be statistically

significant while assessing anxiety of the parents. Majority of the parents (95.7%) were concerned that their children might contract the COVID-19 infection while treating patients or through close contact with friends and classmates.

Significant percentages (more than 80%) of the parents were worried about their son/daughters' career advancement and dental profession however but 87.7% of the parents were not ready to change their son/daughters' profession. The remaining 14(4.7%) of the parents wanted to change the profession and 23(7.6%) were uncertain to continue dentistry.

Nearly 90% of the parents were aware that the Institute had taken adequate measures for disinfection and prevention for COVID-19. Though strict disinfection protocol was followed by the institute, 86.7% of the parents were concerned about contact tracing, testing and quarantine/isolation procedures, if any student was COVID-19 positive.

Regarding the mode of learning majority of the parents were happy with online mode of teaching but were not satisfied with the assessment of students through online mode. Fifty percent of the parents expressed that their wards were unable to learn efficiently without attending college and clinics.

DISCUSSION

This present study investigated the dental student's parental worries/concerns during COVID-19 pandemic. The responses obtained from the parents showed substantial concerns about their children studying and treating patients during this sensitive pandemic situation. After emergence of COVID-19 in early 2020, dental student's parents were anxious about disinfection methods in the college and hostel premises, career enhancement, and the mode of learning for the dental profession and skills. When compared to all other professions, the dental profession has the highest risk in contracting infection while treating patients.[16]

During the COVID-19 pandemic situation treating dental diseases were highly challenging and required thorough knowledge of COVID-19 transmission. As per our literature search there were no studies related to anxiety of parents of the dental professional students during COVID-19 pandemic. However, a previous literature investigated on,

how healthcare professionals can provide guidance and support to parents of adolescents.

Santabarbara J et al, in a systematic review and meta-analysis, reported that dental students' anxiety ranges from 14.22% to 75.92% [17]. In this present study more than half of the dental student's parents were very anxious and had disturbed mental health during the first and second wave. Increased stress and anxiety of the parents was due to, since the initial stages of the pandemic to date, none have accurate knowledge about the virus transmission, signs and symptoms, modes of treatment and precautions related to corona virus. Also, another reason may be due to dental diseases diagnosis and treatment procedures required close contact of the patients through saliva, aerosols etc.

A significant percentage of the parents worried about their children profession in dentistry and majority of the parents still did not want to change their wards profession. In this present study majority of the parents felt practicing dentistry is unsafe. The parents also thought that this virus will remain for a prolonged period and dental procedures would be difficult to carry out in the future which would affect their wards to practice dentistry. During this pandemic period, psychological pressure on them increased, and situations such as anxiety, fear, and high stress levels have adversely affected their mental health. At the same time, daily distressing news through social media, news, and increasing number of cases and deaths both in countries and the world, difficult working conditions, difficulties in provision of personal protective equipment, combined with the concerns of dentists in ensuring well-being of themselves and their family caused increased fear, anxiety, and high-stress levels [18]

Nearly 40% of the parents were not satisfied with online mode of teaching and more than 50% of the parents felt that their children were unable to learn practical skills without attending college and doing preclinical work. The Sarialioglu Gungor A, Sesen Uslu Y, Donmez N [18] study set out 59.1% of the dental students expressed distance learning is not effective as traditional face-to-face education during COVID-19 pandemic. Most of the parents believed that dental profession is the art and science and learning practical skills through preclinical work and direct interaction with patients is the best approach to enlighten their children career.

This present study carried out had certain limitations. Firstly, due to COVID-19 pandemic face to face interview was not

feasible so the data collected through social media thinking that participants would understand the questionnaire completely. Secondly, data obtained was self-reported, convenience sampling method was used, and the cross-sectional study design and an open-ended questionnaire could be used due to multiple varied opinions from parents was anticipated. Finally, data was collected from one college so external validity is questionable.

CONCLUSION

Within the limitations of this present study, it was concluded that majority of the parents expressed fear and anxiety about their children profession. Though the institution followed stringent protocols and maintained good disinfection procedures, parents were still concerned with contact tracing and quarantine procedures. Regarding mode of learning, half of the parents expressed that their wards were unable to learn efficiently without attending college and clinics and also unsatisfied with online assessment.

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References:

1. Lase, Delipiter and Zega, Trisa Genia Chrisantiana and Daeli, Dorkas Orienti, Parents' Perceptions of Distance Learning during COVID-19 Pandemic in Rural Indonesia (February 25, 2021). Available at SSRN: <https://ssrn.com/abstract=3890610orhttp://dx.doi.org/10.2139/ssrn.3890610> Accessed on 01 Dec 2020.
2. R. Puspita, Kemendikbud: 68 Juta Siswa Terdampak Pandemi COVID-19, REPUBLIKA.co.id, Jakarta, Aug. 04, 2020. Accessed on 01 Dec 2020.
3. Imulhim B, Allassaf A, Alghamdi S, Alroomy R, Aldhuwayhi S, Aljabr A, Mallineni SK. Dentistry Amidst the COVID-19 Pandemic: Knowledge, Attitude, and Practices Among the Saudi Arabian Dental Students. *Front Med (Lausanne)*. 2021 Apr 7;8:654524. doi: 10.3389/fmed.2021.654524. PMID: 33898488; PMCID: PMC8058223.

4. Uhlen, M.M., Ansteinsson, V.E., Stangvaltaite-Mouhat, L. et al. Psychological impact of the COVID-19 pandemic on dental health personnel in Norway. *BMC Health Serv Res* 21, 420 (2021). <https://doi.org/10.1186/s12913-021-06443-y>. Accessed on 01 Dec 2020.
5. Centers for Disease Control and Prevention. Guidance for Dental Settings, Interim Infection Prevention and Control Guidance for Dental Settings during the Coronavirus Disease 2019 (COVID-19) Pandemic. <https://www.cdc.gov/coronavirus/2019-ncov/hcp/dental-settings.html>. Accessed on 01 Dec 2020.
6. Coulthard P. Dentistry and coronavirus (COVID-19) - moral decision-making. *Br Dent J*. 2020;228(7):503–5.
7. Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B. Transmission routes of 2019-nCoV and controls in dental practice. *Int J Oral Sci*. 2020;12(1):9.
8. Ather A, Patel B, Ruparel NB, Diogenes A, Hargreaves KM. Coronavirus disease 19 (COVID-19): implications for clinical dental care. *J Endod*. 2020;46(5):584–95.
9. World Health Organization. Infection prevention and control of epidemic and pandemic-prone acute respiratory infections in health care. WHO guidelines. https://www.who.int/csr/bioriskreduction/infection_control/publication/en/. Accessed on 01 Dec 2020.
10. Chaudhary FA, Ahmad B, Ahmad P, Khalid MD, Butt DQ, Khan SQ. Concerns, perceived impact, and preparedness of oral healthcare workers in their working environment during COVID-19 pandemic. *J Occup Health*. 2020;62(1):e12168.
11. Boyraz G, Legros DN, Tigershtrom A. COVID-19 and traumatic stress: the role of perceived vulnerability, COVID-19-related worries, and social isolation. *J Anxiety Disord*. 2020;76:102307.
12. Kang L, Li Y, Hu S, Chen M, Yang C, Yang BX, et al. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *Lancet Psychiatry*. 2020;7(3):e14.
13. Uhlen, M.M., Ansteinsson, V.E., Stangvaltaite-Mouhat, L. et al. Psychological impact of the COVID-19 pandemic on dental health personnel in Norway. *BMC Health Serv Res* 21, 420 (2021). <https://doi.org/10.1186/s12913-021-06443-y>
14. Brown SM, Doom JR, Lechuga-Peña S, Watamura SE, Koppels T. Stress and parenting during the global COVID-19 pandemic. *Child Abuse Negl*. 2020 Dec;110(Pt 2):104699 https://docs.google.com/forms/d/e/1FAIpQLSfkX8VEsVauU6RSe10Hs2E4PF2QjKM3acvwQNWfoLgZv0J5RQ/viewform?usp=sf_link
15. Ayatollahi J, Ayatollahi F, Ardekani AM, Bahrololoomi R, Ayatollahi J, Ayatollahi A, Owlia MB. Occupational hazards to dental staff. *Dent Res J (Isfahan)*. 2012 Jan;9(1):2-7. doi: 10.4103/1735-3327.92919. PMID: 22363355; PMCID: PMC3283973.
16. Santabarbara J, Idoiaga N, Ozamiz-Etxebarria N, Bueno-Notivol J. Prevalence of Anxiety in Dental Students during the COVID-19 Outbreak: A Meta-Analysis. *Int J Environ Res Public Health*. 2021 Oct 19;18(20):10978.
17. Al-Amad, S.H., Hussein, A. Anxiety among dental professionals and its association with their dependency on social media for health information: insights from the COVID-19 pandemic. *BMC Psychol* 9, 9 (2021).
18. Sarialioglu Gungor A, Sesen Uslu Y, Donmez N. Perceptions of dental students towards online education during the COVID-19 pandemic. *Eur Oral Res*. 2021 Sep 1;55(3):124-132.

APPENDIX

TABLE 1: DENTAL PROFESSIONAL STUDENTS PARENTS ANXIETY DURING COVID -19 PANDEMIC

Response	1 st year	2 nd year	3 rd year	4 th year	Internship	TOTAL	p-value
Q1- Are you aware that your son/daughter is treating patients during COVID-19 pandemic and they can get infected?							
Yes	50(92.6)	57(90.5)	89(98.9)	22(100)	70(97.2)	288(95.7)	0.243
No	01(1.9)	2(3.2)	1(1.1)	0(0)	0(0)	4(1.3)	
Don't know	03(5.6)	4(6.3)	0(0)	0(0)	2(2.8)	9(3.0)	
Q2-Are you concerned about the health of your son/daughter during this pandemic?							
Yes	54(100)	63(100)	90(100)	21(95.5)	71(98.6)	299(9.3)	0.044
No	0(0)	0(0)	0(0)	1(4.5)	0(0)	1(0.3)	
Don't know	0(0)	0(0)	0(0)	0(0)	1(1.4)	1(0.3)	
Q3- Are you aware that the students and staff have been educated about the symptoms of COVID-19?							
Yes	50(92.6)	61(96.8)	86(95.6)	22(100)	66(91.7)	285(94.7)	0.489
No	0(0)	0(0)	2(2.2)	0(0)	1(1.4)	3(1.0)	
Don't know	4(7.4)	2(3.2)	2(2.2)	0(0)	5(6.9)	13(4.3)	
Q4-During this pandemic, are the concerns about your son's /daughter's causing you anxiety and disturbing your mental health?							
Yes	20(37.0)	30(47.6)	55(61.1)	10(45.5)	42(58.3)	157(52.2)	0.039
No	33(61.1)	28(44.4)	29(32.2)	9(40.9)	25(34.7)	124(41.2)	
Don't know	1(1.9)	5(7.9)	6(6.7)	3(13.6)	5(6.9)	20(6.6)	

Chi square test was used. P<0.05 was used for statistical significance

TABLE 2: DENTAL PROFESSIONAL STUDENTS PARENTS CONCERN ABOUT PROFESSIONAL CAREER DURING COVID -19 PANDEMIC

Response	1 st year	2 nd year	3 rd year	4 th year	Internship	TOTAL	p-value
Q1- Are you concerned that if this pandemic continues it will affect your son's/daughter's profession and career advancement?							
Yes	37(68.5)	58(92.1)	79(87.8)	19(86.4)	62(86.1)	255(84.7)	0.007
No	14(25.9)	3(4.8)	7(7.8)	1(4.5)	5(6.9)	30(10.0)	
Don't know	3(5.6)	2(3.2)	4(4.4)	2(9.1)	5(6.9)	16(5.3)	
Q2- Are you worried about son's/daughter's dentistry profession because of this COVID-19 pandemic?							
Yes	35(64.8)	55(87.3)	77(85.6)	16(72.7)	58(80.6)	241(80.1)	0.055
No	17(31.5)	6(9.5)	11(12.2)	6(27.3)	11(15.3)	51(16.9)	
Don't know	2(3.7)	2(3.2)	2(2.2)	0(0)	3(4.2)	9(3.0)	
Q3- After COVID-19 pandemic do you want your sons/daughters to change their profession?							
Yes	1(1.9)	0(0)	9(10.0)	0(0)	4(5.6)	14(4.7)	0.122
No	51(94.4)	57(90.5)	74(82.2)	20(90.9)	62(86.1)	264(87.7)	
Don't know	2(3.7)	6(9.5)	7(7.8)	2(9.1)	6(8.3)	23(7.6)	

Chi square test was used. P<0.05 was used for statistical significance

TABLE 3: DENTAL PROFESSIONAL STUDENTS PARENTS CONCERN TOWARDS DISINFECTION IN COLLEGE AND HOSTEL DURING COVID -19 PANDEMIC

Response	1 st year	2 nd year	3 rd year	4 th year	Internship	TOTAL	p-value
Q1- Are you concerned about the mental status of your ward as they may encounter COVID-19 positive patients?							
Yes	40(74.1)	46(73.0)	80(88.9)	18(81.8)	61(84.7)	245(81.4)	0.067
No	10(18.5)	13(20.6)	10(11.1)	3(13.6)	5(6.9)	41(13.6)	
Don't know	4(7.4)	4(6.3)	0(0)	1(4.5)	6(8.3)	15(5.0)	
Q2- Are you concerned if hand washing stations/hand sanitizers are available in college?							
Yes	44(81.5)	52(82.5)	79(87.8)	18(81.8)	54(75.0)	247(82.1)	0.033
No	10(18.5)	10(15.9)	11(12.2)	2(9.1)	17(23.6)	50(16.6)	
Don't know	0(0)	1(1.6)	0(0)	2(9.1)	1(1.4)	4(1.3)	
Q3- If your son's /daughter's or any other students on campus contacts COVID-19 are you concerned that the guidelines for contact tracing, testing and quarantine /isolation will be followed by the institute?							
Yes	46(85.2)	52(82.5)	82(91.1)	21(95.5)	60(83.3)	261(86.7)	0.262
No	5(9.3)	4(6.3)	7(7.8)	1(4.5)	6(8.3)	23(7.6)	
Don't know	3(5.6)	7(11.1)	1(1.1)	0(0)	6(8.3)	17(5.6)	
Q4- Are you aware about the regular disinfection procedures and personal protective kits availability in the hospital?							
Yes	42(77.8)	42(66.7)	77(85.6)	18(81.8)	64(88.9)	243(80.7)	0.043
No	5(9.3)	14(22.2)	8(8.9)	3(13.6)	4(5.6)	34(11.3)	
Don't know	7(13.0)	7(11.1)	5(5.6)	1(4.5)	4(5.6)	24(8.0)	

Chi square test was used. P<0.05 was used for statistical significance

TABLE 4: DENTAL PROFESSIONAL STUDENTS PARENTS CONCERN TOWARDS LEARNING MODE DURING COVID -19 PANDEMIC

Response	1 st year	2 nd year	3 rd year	4 th year	Internship	TOTAL	p-value
Q1- Are you happy with the online teaching mode during COVID-19 times?							
Yes	36(66.7)	32(50.8)	46(51.1)	13(63.6)	44(61.1)	172(57.1)	0.109
No	12(22.2)	29(46.0)	37(41.1)	5(22.7)	21(29.2)	104(34.6)	
Don't know	6(11.1)	2(3.2)	7(7.8)	3(13.6)	7(9.7)	25(8.3)	
Q2- Do you believe that your sons /daughters are able to learn efficiently without attending college during COVID-19 pandemic?							
Yes	14(25.9)	14(22.2)	35(38.9)	5(22.7)	24(33.3)	92(30.6)	0.125
No	29(53.7)	40(63.5)	46(51.1)	10(45.5)	35(48.6)	160(53.2)	
Don't know	11(20.4)	9(14.3)	9(10.0)	7(31.8)	13(18.1)	49(16.3)	
Q3- Is online mode of assessing the students satisfactory?							
Yes	23(42.6)	19(30.2)	38(42.2)	9(40.9)	20(27.8)	109(36.2)	0.336
No	18(33.3)	32(50.8)	39(43.3)	8(36.4)	38(52.8)	135(44.9)	
Don't know	13(24.1)	12(19.0)	13(14.4)	5(22.7)	14(19.4)	57(18.9)	

Chi square test was used. P<0.05 was used for statistical significance

RELATIONSHIP BETWEEN PERCEIVED STRESS AND QUALITY OF LIFE OF NURSES WORKING IN COVID-19 WARDS

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ABSTRACT

BACKGROUND:

Stressors during the COVID-19 pandemic led to a lack of concentration and lack of energy to achieve career goals, fatigue, poor performance, burnout and reduced quality of life of many people, especially nurses.

METHODS:

This descriptive-analytical study was completed with the aim of determining the relationship between perceived stress and quality of life of nurses working in the care wards for patients with COVID-19 in hospitals affiliated with the Mazandaran University of Medical Sciences (Mazandaran, Iran) during 2020-2021. Inclusion criteria included willingness to participate in the study, having at least a bachelor's degree in nursing and working in care wards of patients with COVID-19. Data collection tools included a demographic information questionnaire, Cohen Perceived Stress Questionnaire and WHO Quality of Life Questionnaire. Frequency, percentage, Mean and standard deviation indices were used to describe the variables. Also, Mann-Whitney, Kruskal-Wallis and Spearman correlation coefficients were used to assess the relationship between variables.

RESULTS:

The Mean (SD) age of participants was 33.48 (6.64) years. Most were female (73.3%). The total scores of quality of life and perceived stress variables of nurses were 47.63 ± 24.31 and 27.62 ± 4.61 , respectively. Nurses' scores of quality-of-life domains included physical health, psychological, social relationships and environmental domain were $(46.52 \pm 12.69, 46.57 \pm 12.70, 46.39 \pm 19.45$ and $50.52 \pm 10.52)$, respectively. Nurses' quality of life had a direct significant relationship with the variables of sleep quality and job satisfaction ($P < 0.001$). Perceived stress score also had a significant inverse relationship with physical and social dimensions and total quality of life score ($P < 0.001$).

CONCLUSIONS:

Based on the results of this study, and the negative effects of nurses' perceived stress on their quality of life, it is necessary to pay serious attention to nurses' concerns in these work situations. It is recommended that considered appropriate interventions to reduce perceived stress and improve the quality of life in nurses who care for patients with COVID-19 be implemented.

KEYWORDS

stress, quality of life, nurses, coronavirus disease, COVID-19

INTRODUCTION

The outbreak of the novel coronavirus (COVID-19) disease in China in early December 2019 was rapidly transmitted to other countries in various ways, such as air travel and it developed into a pandemic by March 2020 [1-3]. Since the COVID-19 Declaration as a pandemic, 43 million cases have been reported worldwide [4]. The COVID-19 pandemic has created unprecedented challenges to healthcare professionals worldwide. In the face of this epidemic, health care staff as those at the forefront of care for COVID-19 patients and are exposed to mental health problems such as stress and anxiety [4, 5]. Iran's health system is also one of the nations affected by this pandemic and its disagreeable effects [6]. In Iran, from March 2019 to November 2020, COVID-19 has affected more than 60,000 nurses across the country, and unfortunately, around 100 nurses have lost their lives. These conditions lead to different psychological stresses amongst the Iranian frontline nurse workforce [7].

For a long time, nurses, who make up the largest number of health care workers in all countries, have always been at the forefront of specific epidemics and risking their lives in the performance of their duties [8]. During the COVID-19 pandemic, nurses have been in close contact with COVID-19 patients and are prone to infection besides transmission to their fellows and family members [9]. The health of medical staff, especially nurses, during the COVID-19 pandemic is unfavourable and alarming. Studies have reported nurses experiencing high levels of stress during this pandemic [10, 11]. In a study undertaken in Iran, the rate of depression, anxiety and stress in the nurses working in COVID-19 related wards has been reported as medium [12]. The main factors associated with nurses perceived stress consist of perceived risk of infection to themselves and their families, patient mortality, lack of clear-cut medication for treating the disease, long working hours, inadequate personal protective equipment and inadequate training on infection control measures, prolonged quarantine, frustration, fatigue, financial loss, rumors, negative beliefs about vaccination [13-15]. Nursing staff who spend most of their time with the infected patients have come precariously close to disaster because the lack of nursing staff, chronic fatigue, and high rate of illness and death of them due to coronavirus pandemic [7]. Moreover, stressful factors during COVID-19 pandemic have resulted in distraction and loss of energy for completing job tasks,

fatigue, poor performance, burnout, and ultimately reduced quality of life for themselves [16, 17].

Quality of life is an important indicator to determine whether nurses have been able to successfully deal with stressful events induced challenges [18, 19]. Quality of life is a multidimensional concept affected by several stressor factors involved in the COVID-19 pandemic, including family concerns, the pressure about unclear health status of family members and reduced social interactions, the factors which both personally and professionally directly or indirectly affect the quality of life of health professionals [20]. Stress has been reported as one of the most valued factors in the nurses' quality of life as the studies derived results that have revealed that stress increase has had a negative impact on some of the dimensions of nurses' quality of life [21, 22]. The results of studies showed low quality of life among health professionals, especially among nurses who cared patients with coronavirus [7, 19, 23].

In this regard, reviewing the available research literature databases has shown that although some studies have been conducted throughout the world and Iran to investigate the relationship between stress and the quality of life of the nurses, but in considering the enormous impact of this newly emerged disease on all dimensions of human life and especially the health providers both in Iran and internationally. Studies completed during pre-COVID-19 outbreak cannot be generalized to the post-COVID-19 pandemic and it's necessary to perform specific research. Studies were undertaken on the perceived stress of nurses during the prevalence of COVID-19 pandemic [17], but so far no research in Iran has analyzed the relationship between the perceived stress and the quality of life of the nurses working in the care wards for COVID-19 patients. Therefore, the present study has been undertaken to determine the association between the perceived stress and the quality of life of nurses working in the wards for COVID-19 patients of medical educational hospitals in Sari. It is hoped that this study's results may be applied by the competent authorities for reducing stress, promoting the quality of life and ultimately, the quality of nursing care.

METHODS

The present study uses a descriptive-analytical method with the aim of determining how the perceived stress and the quality of life of the nurses working in COVID-19 patient care

wards are related in the setting of the medical-educational hospitals in Sari (Mazandaran-Iran) during 2020-2021. The research population consists of nurses working in the COVID-19 wards in these hospitals that are affiliated with the Mazandaran University of Medical Science in Sari (Imam Khomeini Hospital, Bu Ali Sina Hospital, Fatemeh Zahra Heart Hospital and Shahid Zare Hospital).

The inclusion criteria were willingness to participate in the study, and working in COVID-19 patient care wards.

Having acquired a permit from the Ethics Committee (The code of ethics: IR. MAZUMS.REC.1399.8322) and the Department of Research of the Mazandaran University of Medical Science and coordinating with the hospital management, the researcher attended the research environment and began sampling.

After selecting the research samples (participants) and obtaining the participants' written consent to participate in the study where due explanation was given about the study purpose and method to the participants. Prospective participants were assured about the information to be extracted through the questionnaire would remain completely confidential and their participation or non-participation in the study would not affect the job evaluation of the nurses and being part of this study was optional. All the personnel working in coronavirus specific wards were selected based on the inclusion criteria and were sampled using census data and entered into the study.

The instruments used in this study, were the Demographics Questionnaire, Cohen Perceived Stress Scale [24] and Quality of Life Questionnaire [26].

A) Demographics Questionnaire: This questionnaire is a researcher-built questionnaire being completed by the nurses, which includes the variables such as: age, gender, marital status, education, work experience [27], work shift, employment status and the history of stressful events for nurses.

B) Perceived Stress Scale: Perceived Stress Scale developed by Cohen et al. in 1983 [24] is made up of 14 options to measure the thoughts and feelings about stressful events, control, overcoming, coping with stress and the stress perceived by an individual during last month. In this questionnaire, the Likert scale (never, very low, medium, relatively high and high) was used and the subject

got the score ranging from 0 and 4 points, of which 0 and 56 are the lowest and the highest scores. Cohen et al. in 1983 [24] reported optimal validity and reliability for this scale and the internal consistency coefficients for each of the subscales and the questionnaire's overall score were estimated between 0.84 and 0.86 [24]. In a study in Iran, this questionnaire's validity was confirmed and Cronbach's alpha was calculated as 0.76 [25]. In the present study, Cronbach's alpha of the perceived stress questionnaire was estimated as 0.78.

C) The World Health Organization Quality of Life Questionnaire (WHOQOL-BREF): This instrument measures four areas of physical health (7 options), mental health (6 options), social relationship (3 options) and the environmental health (8 options) with 24 options, where the first 2 do not belong to any of the areas and assess the quality of life in general. Thus, this questionnaire has 26 options, each of which is given a score of 1-5. Finally, a score of 4-20 is gained in each area, where score 4 signifies the worst and score 20 the best status in each area. These scores can also be converted into the range 0-100 [26]. This questionnaire's validity and reliability have been reported as optimal [28]. In a research done in Iran, this questionnaire's validity has been reported based on the homogeneity coefficient for the whole scale of 0.92 [26]. In the present study, the Cronbach's alpha for the World Health Organization questionnaire of the quality of life was calculated as 0.77.

In this study, SPSS-22 was used for analyzing the data. Frequency, percentage, mean and standard deviation indices were used to describe the variables. The scores of the dimensions, namely, the perceived stress and quality of life questionnaires did not have a normal distribution hypothesis (using Kolmogorov-Smirnov test). In this regard, Mann-Whitney, Kruskal-Wallis and Spearman correlation coefficients were used to examine the relationship between the variables. The significance level less than 5 % was considered.

RESULTS

In the present study, 195 nurses working in the COVID-19 patients' care wards in the medical-educational hospitals affiliated with Mazandaran University of Medical Science in Sari participated in this study. The Mean (SD) age of the participants was 33.48 ± 6.46 years. The majority of the participants were women (73.3%) with a BSc degree

(86.2%). Other details about the subjects' demographics are demonstrated in Table 1.

gained as 27.62 ± 4.61 . Other details regarding the scores of the quality of life and their dimensions besides the perceived stress scale are reported in Table 2.

The Mean (SD) score of the subjects' perceived stress was

TABLE 1: DEMOGRAPHIC PROFILE OF THE PARTICIPANT

Variable		Frequency [Percentage]
Gender	Female	143 [73.3]
	Male	52 [26.7]
Education level	Bachelor	168 [86.2]
	Master and PhD	27 [13.8]
Marital Status	single	43 (22.1)
	Married	146 [74.8]
	Divorced	6[3.1]
Shift work	Only morning	7 [3.6]
	Only evening	3[1.5]
	Morning & evening	17[8.7]
	Permanent nightshifts	2[1.0]
	Internal rotation [mix of night and day shifts]	166[85.2]
History of a specific disease	Yes	66 [33.8]
	no	129 [66.2]
Impaired sleep quality	Yes	106[54.4]
	No	89[45.6]
Having job satisfaction	Yes	52[26.7]
	No	143[73.3]
History of COVID-19	Yes	118[60.5]
	No	77[39.5]
Nurse Work Experience	<2	17 [8.7]
	2-5	40 [20.5]
	5-10	80 [41.1]
	>10	58 [29.7]
Employment status	formal	79 [40.8]

TABLE 2: MEAN [SD] SCORE OF QUALITY OF LIFE AND THAT OF PERCEIVED STRESS AMONG NURSES WORKING IN COVID-19 PATIENTS' CARE WARDS

Variable	Variable domain	Mean [SD]	Cronbach's α
Quality of life	physical health	46.52[12.69]	0.77
	psychological health	46.57[12.70]	
	social relationships	46.39[19.45]	
	environment	50.52[10.52]	
Perceived stress	-----	27.62[4.61]	0.78

TABLE 3: RELATIONSHIP BETWEEN DIMENSIONS OF QUALITY OF LIFE AND PERCEIVED STRESS & DEMOGRAPHIC VARIABLES

Variable		Quality of life domains					Perceived stress
		physical	psychological	social	environmental	Total score	
Gender	Female	45.98±12.52	45.69±13.83	45.36±19.74	50.46±10.98	45.28±26.40	28.24±4.29
	Male	48.01±13.16	49.02±8.48	49.20±18.54	50.66±9.25	54.09±15.80	25.9±5.05
	P-value	0.36	0.39	0.27	0.83	0.16	0.004
Education level	Bachelor	46.85±12.68	46.01±12.93	46.56±16.60	50.93±10.96	47.39±25.25	27.80±4.70
	Master and PhD	44.44±12.81	50.00±10.78	45.37±18.82	47.92±6.82	49.07±17.65	26.48±3.89
	P-value	0.31	0.08	0.67	0.06	0.59	0.03
Marital status	Single	44.93±13.66	47.58±12.44	45.04±17.94	53.20±10.33	46.51±28.39	28.70±4.27
	Married	46.57±12.45	46.12±12.86	46.23±19.91	49.57±10.53	47.35±23.03	27.30±4.76
	Divorced	56.55±6.55	50.00±11.78	59.72±15.29	54.17±8.98	62.50±22.36	27.50±1.76
	P-value	0.09	0.45	0.21	0.12	0.51	0.35
Nurse Work Experience	<2	42.65±13.09	50.73±8.62	50.98±19.96	52.39±8.45	52.94±25.97	27.06±4.97
	2-5	44.37±11.99	45.52±14.48	45.51±21.87	49.69±10.66	49.06±26.00	26.57±6.14
	5-10	48.26±13.14	45.62±13.29	44.79±19.64	51.64±11.86	44.84±26.21	28.71±3.43
	>10	46.73±12.25	47.37±11.48	47.84±17.42	48.98±8.85	48.92±19.63	26.98±4.51
	P-value	0.21	0.38	0.54	0.22	0.63	0.10
Employment status	Formal	48.73±12.01	48.42±10.54	47.89±18.22	50.04±10.15	50.63±18.55	27.46±3.65
	Informal	44.07±14.52	45.09±15.11	40.96±18.46	50.66±10.88	42.82±28.16	28.68±4.21
	p-value	0.246	0.580	0.096	0.839	0.032	0.234
Shift work	Morning	45.92±13.43	45.83±12.03	44.05±19.67	53.57±9.79	48.21±24.40	27.86±3.85
	evening	41.67±16.88	47.22±15.77	44.44±17.35	54.17±6.51	41.67±38.19	28.00±2.65
	Morning & evening	43.70±13.03	54.45±8.72	39.22±17.86	45.22±7.66	44.85±25.02	28.41±1.97
	nightshifts	46.43±5.05	58.33±5.89	45.83±5.89	54.56±11.05	50.0±0.0	28.00±4.24
	Internal rotation	46.92±12.70	45.83±12.96	47.27±19.74	50.85±10.77	47.97±24.36	27.51±4.88

	P-value	0.87	0.04	0.67	0.14	0.94	0.97
History of a specific disease	Yes	41.61±13.50	44.23±15.43	40.28±18.92	47.73±10.72	38.45±24.64	27.82±2.94
	No	49.03±11.51	47.75±10.94	49.54±19.03	51.93±10.17	52.32±22.84	27.51±5.27
	P-value	<0.001	0.59	0.004	0.01	<0.001	0.75
History of COVID-19	Yes	45.40±12.92	44.07±14.47	44.63±20.69	50.90±11.38	43.96±28.29	27.83±4.86
	No	48.24±12.20	50.32±8.19	49.12±17.14	49.92±9.08	53.25±14.96	27.29±4.21
	P-value	0.09	0.006	0.09	0.31	0.07	0.38
Impaired sleep quality	Yes	43.80±13.15	42.95±15.05	41.67±19.89	50.0±11.64	39.62±27.08	28.44±3.93
	No	49.76±11.37	50.80±7.29	52.08±17.38	51.12±9.03	57.16±16.09	26.63±5.16
	P-value	0.001	0.002	<0.001	0.62	<0.001	0.03
Job satisfaction	Yes	49.72±11.18	50.08±7.31	55.22±16.66	51.44±8.74	57.93±16.97	25.98±5.24
	No	45.35±13.04	45.27±13.98	43.24±19.45	50.17±11.11	43.88±25.52	28.21±4.22
	P-value	0.04	0.05	<0.001	0.492	<0.001	0.01
Perceived stress	R	-0.21	-0.13	-0.31	0.01	-0.31	-
	P-value	0.003	0.06	<0.001	0.99	<0.001	

Table 3, analyzes the relationship between the dimensions of quality of life and perceived stress questionnaires and the demographic variables of the study participants. The scores of the physical dimension of the quality of life questionnaire were significantly associated with the variables of chronic disease, sleep quality disorder and job satisfaction. The nurses without the history of a specific disease and with no sleep disorder and with job satisfaction had higher quality of life scores. Also, a meaningful relationship was observed between the variables as work shift, the history of suffering from COVID-19 disease and sleep disorder and the psychological dimension of the quality of life. Besides, the variables, namely, the history of disease, sleep disorder and job satisfaction were significantly related to the social dimension of quality of life and the variables of disease history and the environmental dimension of quality of life were significantly associated. The total score of the quality of life was also related to the variables, i.e., the employment type, the history of disease, sleep disorder and job satisfaction. The perceived stress score also had an inverse and significant relationship with the variables as gender, education, sleep disorder and job satisfaction. Also, the perceived stress score revealed a significant inverse relationship with the physical and social dimensions and the total score of the quality of life.

DISCUSSION

This study was conducted with the aim of determining the relationship between the perceived stress and the quality of life of the nurses working in COVID-19 wards. The findings showed the perceived stress level in the nurses working in COVID-19 care wards as relatively moderate. In other words, considering that the maximum score obtained from the perceived stress questionnaire can be 56 and the average score obtained by the subjects studied in this research is 27.62 ± 4.61 , so the subjects were suffering from a moderate level of stress. Consistent with the results of the present study, the findings of other studies in China and Turkey indicated those nurses working in COVID-19 wards experience high levels of stress [11, 29]. A study in Iran also reported the anxiety, stress, and depression in frontline nurses critically getting higher during the COVID-19 pandemic [30]. Findings in another study in Iran, conducted to evaluate and compare the mental health of the nurses in COVID-19 wards with those of other wards, also revealed COVID-19 ward nurses suffering from lower mental health, but no significant difference was spotted between the nurses of COVID-19 wards and those of other wards [31]. In a study conducted in the United States and Georgia, it was reported that during COVID-19 outbreak, the nurses only occasionally consider their stress as too severe and believe

that they are usually able to cope with stress in their lives [32]. Of possible reasons for the mentioned studies' results being different in terms of the subjects' stress levels, we can state be the study setting, and the questionnaires used to measure stress in the studies. In the present study, the perceived stress questionnaire developed by Cohen et al. was employed; while in other studies, the Mental Health Survey [31], Depression, Anxiety, Stress Scale [30], the Post-Traumatic Stress Disorder Test [32], and the Perceived Stress Scale [11] were used. In addition, some studies [32] were conducted in countries outside of Iran. Since Iran is a developing country, and when compared to other countries (especially developed countries) it has different culture, policy making and health care systems. These differences can affect the planning and management and the adoption of appropriate measures by the health care system. Also, these differences can affect nurses in areas such as protective resources, financial and psychological support, which ultimately affects their mental health as well as their stress level [33]. For other results in this study - quality of life of 64.6% of the nurses working in COVID-19 was at low level. In accord with the present study, research completed in India reported that according to the total quality of life among hospital staff based on WHOQOL BREF scores, 4.3% of the physical domain, 16.6% of the psychological domain, 65.4% of the social domain and 21.7% of the environmental health domain of the quality of life of the hospital staff were at a poor level [34]. The results of some other studies were in agreement with those in the present study [10, 35]. While in a study done in Qatar, the quality of life of the nurses was at a positive level and no significant difference was found between the quality of life of the nurses in COVID-19 wards and non-COVID-19 wards [36]. The probable reasons behind the differences in the results could be the cultural differences of the individuals, the financial, psychological and social supports and the protective equipment being supplied for the health systems and different conditions of COVID-19 pandemic in these countries. Also, differences in some demographic characteristics such as gender in the studies can be a possible cause behind the differences in the results. So that in the study conducted in Qatar [36], the gender of the majority of the subjects was male while in this study and other studies [10, 35], most were female. In this line, some studies reported men with better quality of life than women [35, 37]. As a result, regarding this point that the majority of the participants in the study done in Qatar were men, this might be one of the possible reasons for the difference in the results of the mentioned studies. Of noticeable results of the present study, we can point out

the negative and significant relationship between the perceived stress and quality of life, which is consistent with those found in other studies in different countries [18, 38]. The perceived stress brings about physical, emotional, and social reactions that, if persistent and ineffectively adapted to it, can lead to some outcomes such as poor health which threatens the quality of life [18]. In addition, as the levels of stress increase following exposure to the virus-infected workplace and its obscure nature, the process of burnout may be intensified and their quality of life gets impaired [16].

Based on the results of the present study, the perceived stress score showed an inverse and significant relationship with the variables as gender, education, sleep disorder and job satisfaction. Consistent with the study done by Nabavi and et al. in 2021 [40], a significant relationship was reported between gender and education of the nurses [39]. While in another study, no significant relationship was observed between gender and stress. Of the possible reasons behind the different results, we can mention the different study location. This study was done in Iran while the above study [40] was done in the US. Thus, the issues such as the cultural and social differences among the countries can be of the probable reasons behind the differences. In addition, in another study, unlike the results of this study, no relationship was reported among stress, education and gender [41]. Of the reasons behind different results is the time allocated for the study. This research was conducted during COVID-19 outbreak while the mentioned study was performed in 2014 when there was no COVID-19 pandemic. Moreover, in the present study, it was found that the variables as work shift, the history of COVID-19 disease and sleep disorder were meaningfully associated with the psychological dimension of the quality of life, and the variables, namely, disease history, sleep disorder and job satisfaction were significantly related to the social dimension of the quality of life and the variable as disease history was significantly associated with the environmental dimension of the quality of life [42]. In another study, a significant relationship was seen between the quality of life and job satisfaction of the psychiatric nurses [43]. In the present study, the results showed no significant relationship between marital status, age and the quality of life, while in another research, a significant relationship was found between the nurses' marital status, age and the quality of life [44]. Among the possible reasons for the different results, we can mention different study time (diverse conditions of the current pandemic) and also the workplace ward of the nurses. In this study, the study nurses

were working in COVID-19 wards, while in the mentioned research, the nurses were working in non-COVID-19 wards.

LIMITATIONS

The present study had some limitations such as being cross-sectional and confined to the nurses working in COVID-19 wards and the data being collected by a self-report tool. In addition, a census sampling method was used but some of the nurses working in COVID-19 wards were reluctant to take part in the study. On the other hand, this study has been performed several months after the first peak of COVID-19 that might have produced different results if done in the early stages of the pandemic. Also, the coping strategies the individuals employed for coping with stress are not included in the research. Therefore, it is proposed to do some would-be studies with higher sample size and analyze the effects of the physiological methods and stress coping strategies on stress level and the quality of life of the nurses working in COVID-19 wards.

CONCLUSIONS

The results of this study revealed that the perceived stress of frontline nurses during the outbreak of COVID-19 was moderate but at the same time, their quality of life was at a low level. Because nurses are mostly interacting with patients and compared to other health system staff, they have the highest frequency and make up the main body of the health system; consequently, being threatened in terms of their mental health can result in negative outcomes. Therefore, paying serious attention to addressing the concerns of frontline nurses is necessary, and it is recommended to consider appropriate interventions to reduce the perceived stress and improve the quality of life of nurses in the COVID-19 wards. Health managers and policy makers should attention to provide comprehensive care involving frontline nurses and their families. Psychosocial support strategies such as counseling, training and strategies for coping with stress need to be implemented to improve well-being of nurses who care for patients with COVID-19. Furthermore, it would be useful to conduct face-to face interviews with Health staff with the aim to inquire their needs and provide integrated support in times of crisis such as epidemic.

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DISCLOSURE

The authors report no conflicts of interest in this work.

References

1. Ebrahim S-H, Ahmed QA, Gozzer E, Schlagenhaut P, Memish Z. Covid-19 and community mitigation strategies in a pandemic. *BMJ*. 2020; 368:m1066.
2. Kyprianidou M, Christophi CA, Giannakou K. Perceived Stress During the COVID-19-Related Confinement in Cyprus. *Frontiers in Public Health*. 2021;9.
3. Li Z, Ge J, Yang M, Feng J, Qiao M, Jiang R, et al. Vicarious traumatization in the general public, members, and non-members of medical teams aiding in COVID-19 control. *Brain, behavior, and immunity*. 2020;88:916-9.
4. Çınar D, Kılıç-Akça N, Zorba-Bahçeli P, Bağ Y. Perceived stress and affecting factors related to COVID-19 pandemic of emergency nurses in Turkey. *J Nurs Manag*. 2021;29:1916-23.
5. Lai J, Ma S, Wang Y, Cai Z, Jianbo Hu, Wei N, et al. Factors Associated with Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. *JAMA Network Open*. 2020;3(3): e203976.
6. Maher A, Malmir R, Toghyani R, Safari M. COVID-19 Crisis Management: Reengineering the Health Care System in Iran. *Journal of Medical Council of Islamic Republic of Iran*. 2020;38(1):8-11.
7. Amjadi S, Mohammadi S, Khojastehrad A. Perceived stress and quality of life among frontline nurses fighting against COVID-19: A web-based cross-sectional study. *Journal of Education and Health Promotion*. 2020; 11:1-7.
8. Lin C, Peng Y, Wu Y, Chang J, Chan C, Yang D, et al. The psychological effect of severe acute respiratory syndrome on emergency department staff. *Emergency Medicine Journal*. 2007;24(1):7-12.
9. Heidari A, Abdollahi M., Fear of Covid-19 in Nurses: A Concept Analysis with a Walker-Avant Approach. *Journal of Torbat Heydariyeh University of Medical Sciences*. 2021;9(2):81-90.
10. Peñacoba C, Catala P, Velasco L, Carmona-Monge FJ, Garcia-Hedrerera F, Gil-Almagro F. Stress and quality of life of intensive care nurses during the COVID-19

- pandemic: Self-efficacy and resilience as resources. *Nursing in Critical Care*. 2021;26(6):493-500.
11. Bilgic S, Celikkalp U, Mısırlı C. Stress level and sleep quality of nurses during the COVID-19 pandemic. *Work*. 2021 (Preprint);70:1021-9
 12. Sarboozihosein-Abadi T, Askari M, Miri K, Namazi Nia M. Depression, stress and anxiety of nurses in COVID-19 pandemic in Nohe-Dey Hospital in Torbat-e-Heydariyeh city, Iran. *Journal of Military Medicine*. 2020;22(6):526-33.
 13. Sarfika R, Huriani E, Mailani F, Muthia R. Perceived Stress and Intention to Work during the COVID-19 Pandemic among Nurses in West Sumatra Indonesia. *Open Access Maced J Med Sci*. 2022;10(G):318-24.
 14. Ornell F, Halpern S-C, Henrique-Paim Kessler F, Corrêa-deMagalhães-Narvaez J. The impact of the COVID-19 pandemic on the mental health of healthcare professionals. *Cadernos de saude publica*. 2020;36:e00063520.
 15. Chen Q, Liang M, Li Y, Guo J, Fei D, Wang L, et al. Mental health care for medical staff in China during the COVID-19 outbreak. *The Lancet Psychiatry*. 2020;7(4):e15-e6.
 16. Bahmani A, Investigating the Effect of Work Shifts in Coronavirus Conditions on Employee Burnout with the Mediating Role of Coronavirus Stress. *Quarterly Journal of Nursing Management (IJNV)*. 2021;9(4):21-6.
 17. Ali-Chekole Y, YimerMinaye S, Semagn Mekonnen-Abate, Mekuriaw B. Perceived stress and its associated factors during COVID-19 among healthcare providers in Ethiopia: a Cross-Sectional Study. *Advances in Public Health*. 2020;2020:1-7.
 18. Alhawtmeh H, Alsholol R, Dalky H, Al-Ali N, Albataineh R. Mediating role of resilience on the relationship between stress and quality of life among Jordanian registered nurses during COVID-19 pandemic. *Heliyon*. 2021;7(11):e08378.
 19. Stojanov J, Malobabic M, Stanojevic G, Stevic M, Milosevic V, Stojanov A. Quality of sleep and health-related quality of life among health care professionals treating patients with coronavirus disease-19. *International Journal of Social Psychiatry*. 2021;67(2):175-81.
 20. Kandula U-R, Wake A-D. Assessment of Quality of Life Among Health Professionals During COVID-19: Review. *Journal of Multidisciplinary Healthcare* 2021; 14:3571-85.
 21. Layali I, Ghajar M, Abedini E, Emadian S, Joulaei M. Role of Job Stressors on Quality of Life in Nurses. *Journal of Mazandaran University of Medical Sciences*. 2019;29(180):129-33(Persian).
 22. Jafari M, Habibi-Houshmand B, Maher A. Relationship of occupational stress and quality of work life with turnover intention among the nurses of public and private hospitals in selected cities of Guilan Province, Iran, in 2016. *Journal of health research in community*. 2017;3(3):12-24.
 23. Nie A, Su X, Zhang S, Guan V, Li J. Psychological impact of COVID-19 outbreak on frontline nurses: A cross-sectional survey study. *J Clin Nurs*. 2020; 29:4217-26.
 24. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *journal of health and social behavior*. 1983;24.
 25. Safaei M, Shokri O. Assessing stress in cancer patients: Factorial validity of the perceived stress scale in Iran. *Iranian Journal of Psychiatric Nursing (IJPN)*. 2014;2(4):13-22(persian).
 26. Nejat S, Montazeri A, Holakouee-Naini C, Mohammad K, MajdZadeh S. Standardization of the World Health Organization Quality of Life questionnaire (WHOQOL-BREF): translation and psychometric Iranian species. *School Health and Health Research Institute*. 2006;4(4):71-6.
 27. Heidari T, Azimilolaty H, Khorram M, Rezaei S, Mousavinasab S-N, Nikbakht R. Association between moral intelligence, burnout and quality of nursing care. *Clinical Ethics*. 2021;1:1-12.
 28. Usefy A, Ghassemi GR, Sarrafzadegan N, Mallik S, Baghaei A, Rabiei K. Psychometric properties of the WHOQOL-BREF in an Iranian adult sample. *Community Mental Health Journal*. 2010;46(2):139-47.
 29. Wu W, Zhang Y, Wang P, Zhang I, Wang G, Lei G, et al. Psychological stress of medical staffs during outbreak of COVID-19 and adjustment strategy. *Journal of Medical Virology*. 2020;29(10):1962-70.
 30. Zakeri M, Rahiminezhad E, Salehi F, Ganjeh H, Dehghan M. Burnout, Anxiety, Stress, and Depression Among Iranian Nurses: Before and During the First Wave of the COVID-19 Pandemic. *Frontiers in Psychology*. 2021;12.
 31. Davarinia-Motlagh-Quchan A, Tajabadi A, Borzoei F, Heshmatifar N, Mohammadzadeh-Tabrizi Z, Rastaghi S, et al. Comparison of Mental Health of Nurses Working in COVID-19 Reference Hospitals with Other Hospitals. *Journal Mil Med*. 2020;22(11):1145-52.
 32. Moore KS, Hemmer C, Ma JT, Icom A. Nursing Professionals' Stress Level During Coronavirus Disease 2019: A Looming Workforce Issue. *The Journal for Nurse Practitioners*. 2021;17(6):702-6.

33. Giplaye H. Healthcare Delivery System in Developed, Developing and Underdeveloped Countries. *Texila International Journal of Nursing*. 2019; 2019:1-7.
34. Ranjan L, Gupta P, Gujar N, Baraik S. Psychological distress and quality of life among hospital staff in India during COVID-19 pandemic. *Shanlax Int J Arts Sci Humanit*. 2021; 8:55-60.
35. MohamadzadehTabrizi Z, Mohammadzadeh F, Davarinia-Motlagh A, Quchan A, Bahri N. COVID-19 anxiety and quality of life among Iranian nurses. *BMC nursing*. 2022;21(1):1-10.
36. Nashwan AJ, Villar RC, Al-Qudimat AR, Kader N, Alabdulla M, Abujaber AA, et al. Quality of Life, Sleep Quality, Depression, Anxiety, Stress, Eating Habits, and Social Bounds in Nurses during the Coronavirus Disease 2019 Pandemic in Qatar (The PROTECTOR Study): A Cross-Sectional, Comparative Study. *Journal of Personalized Medicine*. 2021; 11:918.
37. Ko H, Park Y-H, Cho B, Lim K-C, Chang S, YM Y, et al. Gender differences in health status, quality of life, and community service needs of older adults living alone. *Archives of Gerontology and Geriatrics*. 2019; 83:239-45.
38. Kim W-J, Lee K-H, Yoon B-H, Jong-Hun Lee, Kim M-D, Jung Y-E, et al. Occupational Stress and Quality of Life in Mental Health Welfare Center Workers. *Mood Emot* 2020;18(1):28-36.
39. Nabavi A, Sheyklo S, Sarabi N, Fouroghi S, Moosavi A. The association between job stress and health-related quality of life in the nurses of Dezful Grand Hospital in 2020. *Nursing Development in Health*. 2021; 11(2):63-77.
40. Wu T-Y, FOX D, Stokes C, Adam C. Work-related stress and intention to quit in newly graduated nurses. *Nurse Education Today*. 2012;32(6):669-74.
41. Alipoor R, Ebrahimi A, Omid R, Hedayati A, Ranjbar H, Hosseinpour S. Depression, anxiety, stress and related demographic variables in nurses of Valiasr hospital in Fasa University of Medical Sciences in 2014. *Pajouhan Scientific Journal*. 2015;13(4):51-9.
42. Moradi T, Maghaminejad F, Azizi-Fini I. Quality of working life of nurses and its related factors. *Nursing and Mmidwifery Studies*. 2014;3(2).
43. Falahi K-M, Karimlou M, Rahgoy A, Moghadam F. Quality of life and factors related to it among psychiatric nurses in the university teaching hospitals in Tehran. *HAKIM RESEARCH JOURNAL*. 2007;9(4):24-30.
44. Khoshnudi M, Safari A, Nejat-Parvaz M. Quality of Life and Demographic Characteristics in Nurses of hospitals of Kashmar in 2018: Cross sectional study. *Journal of Nursing Education*. 2019;7(6):60-6.

PATIENT'S SATISFACTION IN UTILIZING PUBLIC HEALTH CENTER SERVICES DURING THE COVID-19 PANDEMIC BASED ON GENDER, AGE, EDUCATION LEVEL, AND OCCUPATION

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ABSTRACT

A public health center is at the forefront of breaking the COVID-19 chain. Limiting the number of patients accessing care during the pandemic is thought to affect patient satisfaction with the quality of service at the public health center during the COVID-19 pandemic. This study aims to know the level of satisfaction of patients visiting a health center based on gender, age, education level, and profession criteria during the COVID-19 pandemic in Sumbersari District, Indonesia.

This study used an analytical observational study method for visitors of the Sumbersari Public Health Center in February-March 2021. The population was 126,279 people visiting Sumbersari Public Health Center, meaning a purposive sampling requires 100 people to participate. The research variables were gender, age, education level, occupation, and the patient's satisfaction. The measuring instrument used was a questionnaire. The data were analyzed descriptively using logistic regression test.

There is no effect of gender and age on patient satisfaction ($p > 0.05$). There is an effect of the level of education on patient satisfaction ($p < 0.05$) with OR = 3.32. There is an effect of work on patient satisfaction ($p < 0.05$) with OR = 0.054, meaning that respondents who work, the chance to feel dissatisfied is 18.5 times greater than respondents who do not work.

KEYWORDS

pandemic, patient's satisfaction, public health center

INTRODUCTION

A public Health Center is at the forefront of breaking the COVID-19 chain. The efforts to prevent the spread of COVID-19 can be carried out by limiting face-to-face health services, using communication and information technology. [1,2] This led a decrease of patient visits due to

the changing flow of the health service process, limiting the number of patients in an effort to avoid crowds, and implementing standard preventive measures, early identification, and controlling the source of the virus.[3]

Patient satisfaction is crucial and is closely related to the rate of patient return visits as an indicator of qualified health services. To assess the level of patient satisfaction,

there are five dimensions of assessment of the health service's quality: (a) reliability; (b) responsiveness; (c) assurance; (d) empathy and (e) tangible. The dissatisfaction of patients visiting health care facilities in North Shoa Ethiopia during the COVID-19 pandemic was 55.4%.[4] 36% of parents with allergic child patients felt that there was no difference between telemedicine examination and direct examination by meeting a doctor, the rest felt that telemedicine examination was not as good as direct examination.[5] According to the research by Astari at the Cicendo Eye Hospital during the COVID-19 pandemic, the empathy dimension shows satisfied results while reliability, responsiveness, assurance and tangible show unsatisfied results.[6]

The patient limitation during a pandemic is thought to affect patient satisfaction on services at public health centers. This is aligned with the research of Pangoempia et al [7] that there is a change in the operational hours of the public health center. In their study there were two open services before pandemic and there was one open service during pandemic. Patient satisfaction can also be influenced by demographic status such as gender, age, education level, and occupation.[8]

Sumbersari is a district with the highest number of COVID-19 cases in Jember Regency.[9] Based on these problems, researchers are interested in knowing the level of satisfaction of patients visiting the health center based on gender, age, education level, and profession during the COVID-19 pandemic in Summersari District.

METHOD

This research used analytical observational research with a cross-sectional approach to the visitors of Summersari public health center during the COVID-19 pandemic in February-March 2021.

The research population was people visiting Summersari public health center in 2020 as many as 126,279. The

sample as many as 100 people were selected by a purposive sampling with Slovin's Formula. The 100 people selected as sample were those who visited the public health center on February-March 2021 and were suitable with the criteria in this research. The inclusion criteria of the respondents were the 12-65 year-old-people visiting Summersari public health center, those who could operate gadget, and those who were willing to be involved in this research. The exclusion criteria were the illiterate visitors and those who had mental disorders.

The selected sample was given a consent form. If they agreed to be the participant by signing the informed consent, they were allowed to answer the questionnaire by filling it in via Google Form. In the process of filling in the questionnaire, the participants were accompanied and guided by the researchers.

The research variables were gender, age, level of education, occupation, and patient's satisfaction. The measuring instrument used is a questionnaire containing 25 items delivered via Google Forms. The questionnaire was adopted from Asres' research.[10] The data were analyzed descriptively and continued with logistic regression to analyze the effect of gender, age, education level, and work on patient satisfaction. The patient's satisfaction was tested by validity tests using Correlation Product Moment and tested by reliability test using Alpha Cronbach's.

This research was approved and managed by the Ethical Committee of Medical Research, Faculty of Dentistry, University of Jember number 1428/UN25.8/KEPK/DL/2021 on 30th January, 2021.

RESULT

The results depict the data based on several characteristics of patients who visited the Summersari Public Health Center. Characteristics of respondents based on gender can be seen in Table 1.

TABLE 1. CHARACTERISTICS OF RESPONDENTS BASED ON GENDER

Gender Category	Frequency	Percentage
Male	40	40.0
Female	60	60.0
Total	100	100.0

The number of female respondents (60%) are more than males (40%). In choosing the sample based on the variable of gender (men and women), it was taken randomly. It does not matter about the number of each gender. The distribution of respondents based on age can be seen in Table 2.

Table 2 shows that most of the visitors of the public health center are teenagers. Another characteristic of

respondents in this study is also seen from the level of education as listed in Table 3.

Table 3 shows that people with bachelor degrees are the majority of visitors. Furthermore, the characteristic of respondents based on profession can be seen in Table 4.

TABLE 2. CHARACTERISTICS OF RESPONDENTS BY AGE

Age Category	Frequency	Percentage
Teenagers (12-25 years old)	44	44.0
Adults (26-45 years old)	30	30.0
Elderly (46-65 years old)	26	26.0
Total	100	100.0

TABLE 3. CHARACTERISTICS OF RESPONDENTS BASED ON EDUCATION LEVEL

Education Level	Frequency	Percentage
Elementary School	10	10.0
Junior High School	2	2.0
Senior High School	30	30.0
Bachelor Degree	58	58.0
Total	100	100.0

TABLE 4. CHARACTERISTICS OF RESPONDENTS BASED ON EMPLOYMENT

Employment	Frequency	Percentage
Does not work	26	26.0
Working	74	74.0
Total	100	100.0

Table 4 shows the patients who visited the Sumbersari Public Health Center during the COVID-19 pandemic were dominated by people who were working (74%). Respondents with various categories mentioned in the previous tables have different satisfaction levels when visiting Sumbersari Public Health Center. Characteristics of respondents based on satisfaction levels can be seen in Table 5.

Table 5 shows that most of respondents (58%) were dissatisfied with the quality of health services at the public health center. A logistic regression test was carried out to analyze the effect of gender, age, level of education and occupation on the satisfaction responses of patients visiting the public health center, which can be seen in Table 6.

TABLE 5. CHARACTERISTICS OF RESPONDENTS BASED ON SATISFACTION VISITING THE HEALTH CENTER

Level of Satisfaction	Frequency	Percentage
Dissatisfied	58	58.0
Satisfied	42	42.0
Total	100	100.0

TABLE 6. TEST OF THE EFFECT OF GENDER, AGE, EDUCATION LEVEL AND OCCUPATION ON PATIENT SATISFACTION VISITING PUBLIC HEALTH CENTER

Variable	Sig	Information	OR
Gender-Satisfaction	.097	No effect	2.324
Age-Satisfaction	.354	No effect	1.377
Level of education-Satisfaction	.005	Effecting	3.321
Occupation-Satisfaction	.000	Effecting	0.054

Table 6 shows that there was no effect of gender (p-value = 0.097 ($p > 0.05$), with OR= 0.354) and age (p-value = 0.354 ($p > 0.05$), with OR= 1.377) on the level of patient satisfaction. There was an effect of the level of education (p-value = 0.005 ($p < 0.05$) with OR = 3.321) and occupation (p-value = 0.000 ($p < 0.05$) with OR = 0.054) on patient satisfaction.

The validity test on the survey data, using Correlation Product Moment of the 25 question items showed the score of r was bigger than r table (0,195). This means that the data instruments were valid. Moreover, the reliability test using Alpha Cronbach's showed that the score was above 0,6 which also means that the data instruments were reliable.

DISCUSSION

The majority of female respondents visiting Summersari Public Health Center is similar to Rahmayanti's research which states that 60.9% of visitors to the Sukmajaya Community Health Center are women. [11] Women use health services more than men because women have a greater health concern, self-care and are more likely to report symptoms of illness.[12] Lim also found that women are more active in seeking treatment than men who can more withstand the pain.[13]

Based on the age category, the elderly were the least number of visitors of the public health center because they were economically dependent, so they tended to avoid visiting health facilities when they were sick. During the COVID-19 pandemic, the Government issued a policy classifying that people under 45 years old can have free activities while those over 45 were limited.[14] The health monitoring of the elderly can be carried out through homecare, thereby minimizing the elderly as a risk group to visit the facilities.[15] The Implementation of health services during the COVID-19 pandemic in Bekasi City Region, Indonesia in 2020 showed that most of the respondents (82.2%) who visited health services during the pandemic

were aged 15-25.[16] The elderly tend to treat themselves with traditional medicine.[17] Siagian said that the low number of visits by elderly respondents could be due to the fact that they are a group at risk of being exposed to COVID-19 so they tend to avoid visits to health facilities.[18]

The next characteristic of the respondent reviewed is the education level. Not only transferring knowledge, but education is also about shaping the awareness and personality of individuals and communities that influences ways of thinking and perceptions of a problem. The higher one's education level is, the more efficient it will be in utilizing health services.[19] People with higher education feels more in need of health service assistance, while someone with low education will endure the pain and prefer to seek traditional medicine.[20] The huge number of Bachelor Degree (BD) respondents in this study was also due to the location of the study where this research was conducted in Summersari district located in the center of the city. This is supported by the statement of Jamaludin that the level of education of urban communities is relatively higher when compared to rural communities.[21]

Occupation is another factor influencing a person in utilizing health services. Hafizurrachman said that along with the increase in the community's economy, it is necessary to improve the quality of health services, so that people who work will have the ability to find qualified health services.[22] The most significant predisposing factor affecting the level of patient satisfaction with health services is the fulfillment of expectations.[23] People who have jobs will have expectations for health services related to satisfaction.[24,25]

The majority of dissatisfied respondents who visited the public health center were motivated by the COVID-19 pandemic which required changes to the flow of the health service process, limiting the number of patients in an effort to avoid crowds, and implementing standard preventive measures, early identification and control of the

source of the virus.[3] At Dangila Primary Hospital, North West, Ethiopia, 59.5% of patients felt that their visiting hours at a health facility were inadequate. 62.5% of patients were dissatisfied with hospital services. 76.6% of patients were not satisfied with the queuing process.[10]

Health services currently follow the first edition of the Guidelines for the Prevention of Corona Virus Disease-19 published by Ministry of Health of Indonesia.[15] Patient satisfaction can be affected by the health protocols and the COVID-19 triage service flow. Encouraging society to obey the health protocols changes the flow of services to patients that can make patients uncomfortable.[6]

Research conducted by Fadila and Zulkarnain stated that there is no effect of age on patient satisfaction.[26] Another study conducted by Kuntoro and Istiono also showed that there was no difference in patient satisfaction with services at outpatient registration sites in terms of patient age characteristics.[27] Every patient wants the same attention and care.

CONCLUSION

There is a correlation between education level and patient satisfaction. [28,29] The level of education is one of the factors influencing a person's expectations and perceptions of health services. Someone with a higher education level is more likely to demand or criticize the health services and high-quality services are needed to achieve user satisfaction. The level of satisfaction of a person with higher education will decrease when expectations are not met.

Most of the visitors of Sumbersari Public Health Center during the pandemic were those who had jobs. The occupation of the head of family greatly affects the satisfaction of receiving health services in the context of treating illnesses of family members.[30]

References

1. Kementerian Kesehatan Republik Indonesia. Penyelenggaraan Pelayanan Kesehatan Melalui Pemanfaatan Teknologi Informasi dan Komunikasi Dalam Rangka Pencegahan Penyebaran Corona Virus Disease 2019 (COVID-19). Jakarta: Kementerian Kesehatan Republik Indonesia; 2020b.
2. Peek N., Sujan M., & Scott P. Digital Health and Care in Pandemic Times: Impact of COVID-19. *BMJ Health Care Inform.* 2020;27:e100166. doi:10.1136/bmjhci-2020-100166
3. Kementerian Kesehatan Republik Indonesia. Petunjuk teknis Pelayanan Puskesmas pada Masa Pandemi COVID 19. Jakarta: Kementerian Kesehatan Republik Indonesia; 2020c.
4. Deriba, Berhanu Senbeta, Tinsae Abeya Geleta, Rebek Shukure Beyane, Ahmed Mohammed, Mengistu Tesema, dan Kemal Jemal. Patient Satisfaction and Associated Factors During COVID-19 Pandemic in North Shoa Health Care Facilities. *Patient Preference Adherence.* 2020;14: 1923-1934
5. Lanier, K., Merin Kuruvilla, dan Jennifer Shih. An Institutional Survey of Patient Satisfaction with Telemedicine Services in Pediatric Allergy During the COVID-19 Pandemic. *The Journal of Allergy and Clinical Immunology.* 2021;147.
6. Astari, Dewanti Widya, Afni Noviantani, dan Rosdiana Simanjuntak. Kepuasan Pasien Terhadap Mutu Pelayanan Keperawatan di Era Pandemi COVID-19 Di RS Mata Cicendo. *Journal of Hospital Accreditation.* 2021;3: 34-38.
7. Pangoempia, Stefanny J., Grace E.C.K., dan Adisty A. Rumayar. Analisis Pengaruh Pandemi COVID-19 terhadap Pelayanan Kesehatan di Puskesmas Ranotana Weru dan Puskesmas Teling Atas di kota Manado. *Jurnal Kesmas* 2021; 10: 40-49.
8. Budiman, Suhayat, dan Herlina. Hubungan Status Demografi dengan Kepuasan Masyarakat Tentang Pelayanan Jamkesmas di Wilayah Puskesmas Tanjungsari Kabupaten Bogor Tahun 2010. *Jurnal Kesehatan Kartika.* 2010;27: 1989-2009.
9. Pemerintah Kabupaten Jember. Peta Sebaran COVID-19 di Kabupaten Jember. https://www.instagram.com/p/CMMYDG0B2_X/?igshid=15kheigaeyjc. 2021. [Accessed on 10 March 2021 at 13.10 WIB].
10. Asres AW., Hunegnaw WA., Ferede AG., and Denekeew. Assessment of Patient Satisfaction and Associated Factors in an Outpatient Department at Dangila Primary Hospital, Awi Zone, Northwest Ethiopia, 2018. *Global Security: Health, Science, and Policy.* 2020;5:57-64.
11. Rahmayanti. S.N., Tri Ariguntar. Karakteristik Responden dalam Penggunaan Jaminan Kesehatan pada Era BPJS di Puskesmas Cisoka Kabupaten Tangerang Januari-Agustus 2015. *Jurnal Medicoeticolegal dan Manajemen Rumah Sakit.* 2017;6: 61-65.

12. Pennebaker J.W., Anna Graybeal. Pattern of Natural Language Use. *Curr Dir in Psychol Sci.* 2011; 10: 90-93.
13. Lim, Ming T., Yvonne Mei Fong Lim, Seng Fah Tong, dan Sheamini Sivasampu. Age, Sex and Primary Care Setting Differences in Patient's Perception of Community Healthcare Seeking Behaviour Towards Health Services. *PloS One.* 2019; 14: 1-18.
14. Hakim, N.L. Pelindungan Lanjut Usia Pada Masa Pandemi COVID-19. *Info Singkat Kajian Singkat Terhadap Isu Aktual dan Strategis.* 2020; 12: 13-18.
15. Kementerian Kesehatan Republik Indonesia. Pedoman Pencegahan Dan Pengendalian Coronavirus Disease (COVID-19) Revisi Ke-5. Jakarta: Kementerian Kesehatan Republik Indonesia; 2020a.
16. Puspita, Nadya R., and Mustakim. Persepsi Pasien dalam Implementasi Pelayanan Kesehatan pada Masa Pandemi COVID-19 di Wilayah Kota Bekasi Tahun 2020. *Jurnal Kedokteran dan Kesehatan* 2021; 17: 99-109.
17. Engeda, Eshetu H., Berihun Assefa Dachew, Hiwot Kassa Woreta, Mengistu Mekonnen Kelkay, dan Tesfaye Demeke Ashenafie I. Health Seeking Behaviour and Associated Factors among Pulmonary Tuberculosis Suspects in Lay Armachiho District, Northwest Ethiopia: A Community-Based Study. *Tuberc Res and Treat*; 2016 : 1-7.
18. Siagian, T.H. Mencari Kelompok Berisiko Tinggi Terinfeksi Virus Corona dengan Discourse Network Analysis. *Jurnal Kebijakan Kesehatan Indonesia.* 2020; 9: 98-106.
19. Gusmawan, F., Haryadi, dan Erman S. Pengaruh Kualitas Pelayanan Dan Karakteristik Sosiodemografi Terhadap Minat Kunjungan Ulang Yang Dimoderasi Oleh Kepuasan Pasien Pada Pelayanan Rawat Jalan Puskesmas Kedungbanteng Kabupaten Banyumas. *Jurnal Ekonomi, Bisnis dan Akuntansi (JEBA).* 2019; 21.
20. Notoadmodjo, S. Ilmu Perilaku Kesehatan. Jakarta: Rineka Cipta; 2010.
21. Jamaludin, A.N. Sosiologi Perkotaan Memahami Masyarakat Kota dan Problematikanya. Bandung: Pustaka Setia; 2017.
22. Hafizurrachman H.M., Laksono, T., dan Adang B. Kebijakan Keperawatan Berbasis Kinerja di RSUD Tangerang. *Jurnal Manajemen Pelayanan Kesehatan.* 2012; 15: 12-19.
23. Zarzycka, D., Elżbieta Bartoń, Anna Mazur, dan Krzysztof Turowski. Socio-demographic and medical factors associated with patients' satisfaction with nursing care and their perception of pain. *Annals of Agricultural and Environmental Medicine.* 2019; 26: 298–303.
24. Djordjevic, Ivana M., & Dragan Vasiljevic. The Effect Of Sociodemographic Factors On The Patient Satisfaction With Health Care System. *Sciend Ser J Exp Clin Res.* 2017: 1-1.
25. Fang, J., Ling Liu, dan Pengqian Fang. What is the most important factor affecting patient satisfaction – a study based on gamma coefficient. *Patient Prefer Adherence* 2019; 13: 515–525
26. Fadila, U.S., & A. Karim Zulkarnain. Analisis Kepuasan Pasien Rawat Inap Pengguna Jaminan Kesehatan Nasional Terhadap Kualitas Pelayanan di Bangsal Kebidanan dan Kandungan RSUD Sleman Yogyakarta. *Majalah Farmaseutik.* 2016; 12: 412-430.
27. Kuntoro, W., dan W. Istiono. Kepuasan Pasien Terhadap Kualitas Pelayanan di Tempat Pendaftaran Pasien Rawat Jalan Puskesmas Kretek Bantul Yogyakarta. *Jurnal Kesehatan Vokasional.* 2017; 2: 140-147.
28. Laith. A., & F. Alkaa'ida. The Mediating effect of patient satisfaction in patients' perceptions of healthcare quality-patient trust relationship. *International Journal of Marketing Studies.* 2011; 3: 103-127.
29. Pinar, Y.O.G., Zehra E., Gulsah, T., & Kose. I. An investigation of Patients' perceptions of Nursing Care; Case of Intensive Care. *Int J of Caring Sci.* 2015; 8: 412.
30. Christie, E.O. Socio-Economic Factors Influencing In Patient Satisfaction With Health Care At The University Of Benin Teaching Hospital (UBTH), Benin City, Nigeria. *International Journal of Nursing, Midwife and Healthcare Related Case.* 2018; 4: 63-80.

UNDERSTANDING THE COMMON RATIONALES ADOPTED IN HEALTHCARE PRICE SETTING ACROSS THE PRIVATE HEALTHCARE SECTOR IN SRI LANKA: A QUALITATIVE STUDY

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ABSTRACT

BACKGROUND / OBJECTIVES

The Sri Lankan healthcare system consists of public and private sectors. In terms of capacity, the public sector dominates the provision of care across curative, preventive and outpatient care. The private sector, too, has grown rapidly in recent years but was mainly confined to providing curative, diagnostic and outpatient care. Since, there are little or no studies conducted in Sri Lanka thus far, the objective of this study was to understand the current approaches adopted in determining the base of healthcare payments. This study also investigated the economic and administrative processes involved in determining the level of healthcare pricing in the private sector healthcare industry in Sri Lanka.

METHOD

This qualitative study investigated the rationales adopted in healthcare pricing by healthcare administrators in the private sector. Structured interviews and thematic analysis were applied for data collection and analysis.

RESULTS

Five key themes which influenced pricing were identified from the interviews. These themes included influence from the practising clinicians, competitor pricing, price adjustment/profit margins, consumables and human resource cost and economic demands. There was a consensus that competitor pricing and seniority of the practicing clinicians had an impact on pricing strategy.

CONCLUSION

This study revealed that the base of payment in private sector healthcare is fees for services (FFS). Adopting popular international approaches such as diagnostic related groups (DRGs) was not evident in this study. Further, it was evident that the Sri Lankan private healthcare sector administrators unilaterally fix pricing based on the identified key themes without adequately consulting the healthcare payers and users.

KEYWORDS

Sri Lanka, Qualitative analysis, Private sector, Healthcare, Economics

INTRODUCTION

HEALTHCARE LANDSCAPE IN SRI LANKA

The health system of Sri Lanka consists of both public and private healthcare sectors. The public sector bears the bulk of the burden on delivering healthcare services to a population of nearly 22 million people. A total of 643 public sector hospitals, with a bed capacity of 86,589, facilitated 7.477 million inpatient admissions in 2019 [1]. Contrastingly, the total number of private medical institutions has grown from 800 in 2015 to 1432 in 2019, out of which 111 are private hospitals, nursing homes and maternity homes [1]. According to the 2017 Annual Health Bulletin issued by the Ministry of Health, Sri Lanka, 106 private hospitals, nursing homes and maternity homes accounted for 4686 beds, which is 5.41% of the public sector bed capacity [2].

HEALTHCARE FINANCING IN SRI LANKA

Healthcare financing in Sri Lanka is predominantly through the government and associated agencies (GAA) and out of pocket payments (self-payments) made by households. The Sri Lankan public health system is fully funded and governed by the state and provincial councils. In 2014 total expenditure on health (TEH), which included funding and maintenance of public and private sector healthcare systems, costed USD 2.86 billion and by 2019 the same increased by 19.7% to USD 3.42 billion. Contribution from government and associated agencies (GAA) was 44% in 2014 and 46% in 2019 respectively. Private sources contribution on TEH was 52% in 2014 and 51% in 2019. TEH was 3.60% of the national GDP in 2014, and in 2019 it rose to 4.05% [3,4,5].

With a national GDP of USD 84.5 billion and a per capita income of USD 3815 in 2021 [4], Sri Lanka has been ranked as a middle-income country [5]. Middle-income countries represent more than 70% of the world's population and a large share of the disease burden [6,7]. As a result, Sri Lanka is experiencing an increase in GAA spending on public sector healthcare, where USD 1.26 billion in 2014 had increased to USD 1.58 billion in 2019 [4].

Internationally many countries are introducing new ways to finance, organize and deliver healthcare. Understanding the methods for price-setting takes on a higher level of importance where systems are rapidly changing to account for increasing levels of resources and changing patient needs [6]. To align payments with the costs healthcare providers are incurring in delivering different

types of healthcare services, many countries are modifying the basis of payments for healthcare providers from line-item budgets to alternatives such as fees for services and diagnosis-related groups [6].

PRIVATE HEALTH SECTOR IN SRI LANKA

The Private health sector in Sri Lanka predominately concentrates on curative services rather than preventive healthcare and outpatient services [8]. Providers range from smaller medical clinics to larger secondary care general hospitals and are heavily concentrated in urban areas. Despite a free public health system, many Sri Lankans seem to be getting more attracted to the services offered by private health institutions. The rapid growth of 800 private medical institutions from 2015 to 1432 in 2019 provides ample evidence of this phenomenon [1].

In 2019, private spending on healthcare was USD 1.76 billion, which is 51.4% of total health spending in Sri Lanka. Out of pocket expenditure (self-payers) is the main source of finance for private health spending in Sri Lanka. In 2014 it accounted for 93.2%, and in 2019 it stood at 88.7% of total private expenditure on healthcare. In addition to the 88.7% contribution from self-payers in 2019, 7.2% contribution came from corporate employers, while private health insurance contribution was only 3.8% [4]. During the year 2019 USD 1.56 billion spent by the out-of-pocket payers accounted for 45.6% of the total health care spending in Sri Lanka.

With the increased utilization of private sector healthcare services, various qualitative factors and service-related issues associated with the healthcare delivery system (within the private sector) have become common debating points among the general public. One of the main concerns patients have expressed in recent years is the price, or the fees patients have to pay out-of-pocket. In middle-income settings, high prices charged in the private sector can undermine universal health care objectives by draining resources allocated for the public sector, where most of the population access services [6,9].

PRICE SETTING IN HEALTHCARE SERVICES

Studies conducted by Reinhardt identified three main dimensions of payment methods for healthcare services [6,10,11,12,13].

- The base or unit of activity upon which prices are defined and paid
- The level of the payment or price per unit of the chosen base

- The administrative and economic process by which that price level is determined

Internationally many common approaches prevail in determining the base of payments. These approaches can be broadly classified as Budgetary, Activity-based, Population-based, Consolidated and Incremental [6,14,15,16]. Under each approach the following categories are commonly used [6,12,13,17,18,19,20,21].

- Budgetary approach
 - line-item budgeting
 - global budgets
- Activity-based approach
 - Fee for service (FFS)- Method pays fixed payment for each unit of service without regarding the outcomes. It is usually paid retrospectively by billing for each service or patient encounter [6].
 - Diagnosis-related groups (DRG) - Where payments paid to hospital per admission or discharge, whereby patients are classified into groups based on diagnosis and procedures [6].
 - Per diem
- Population-based
 - Capitation payments
 - Consolidated approach Bundled episode and global capitation
- Incremental approach
 - Pay for performance

Once the base for payment is established, there is an administrative and economic process by which prices are determined. These processes can be classified under three major groups [6].

- Individual negotiations between providers and payers - Healthcare prices are agreed upon through individual negotiations between health insurers/self-paying patients and providers of healthcare services
- Collective Negotiations - Negotiations between associations of providers and payers
- Unilateral administrative price setting by a regulator

OBJECTIVE OF THIS STUDY

There has been little to no qualitative studies investigating the above approaches in healthcare price setting in Sri Lanka. As a result, it was decided to investigate, the common rationales adopted in healthcare price setting across the private healthcare sector in Sri Lanka.

METHODS

RESEARCH DESIGN

This method followed the consolidated criteria for reporting qualitative research (COREQ) [22]. Since no published Sri Lankan studies discussed the common rationales adopted for healthcare pricing, the methodological orientation was central phenomena [23]. Attitudes were conceptualised along with behaviour, beliefs, experience, and how it affected private sector healthcare.

The principal researcher (a qualified male dentist with experience in health administration in Sri Lanka) undertook one-on-one structured interviews with the respective chief executive officers or medical directors of private hospitals in Sri Lanka. The interviewer did not have any involvement in influencing healthcare pricing in private sector healthcare in Sri Lanka. This did minimise any form of bias when conducting the interviews.

DATA COLLECTION

During the interview, the following open-ended questions were asked:

1. How do you determine pricing in your hospital? [Open-ended]
2. Do you have a pricing list for various procedures, investigations, and room rates within your hospital? [Close-ended]
3. How often do you change pricing within your hospital? [Close-ended]
4. What are the factors that influence price changes? [Open-ended]
5. What is the role played by the practicing doctors in determining the price? [Open-ended]
6. How often do you look at competitor pricing when determining your healthcare pricing? [Close-ended]
7. Do you have a mechanism to determine the relationship between the price charged to the patient and the cost incurred to perform the procedure? [Open-ended]

Each interview took approximately 20-30 minutes and was delivered either by telephone or zoom due to the current coronavirus (COVID-19) pandemic in Sri Lanka. The recordings were transcribed and de-identified. The principal investigator and a co-investigator did the verification of the transcriptions.

SAMPLING AND RECRUITMENT

A purposive sample of health care administrators (chief executive officers or medical directors) at the private hospitals in Sri Lanka was undertaken. Following the informed consent of the participants, structured interviews were carried out. Participants had the choice of withdrawing from the project without any disadvantage to them. There was no pre-existing relationship between the interviewer and the interviewees. The recording was imported to a qualitative data management programme NVivo 12 (QSR International) for analysis.

The information obtained on the frequency of price change and referral to competitor pricing by the Sri Lankan private hospitals was then tabulated as it was mainly close ended. A thematic analysis was conducted following the methodology suggested by Braun & Clarke [24]. The main themes were coded, and the qualitative result was generated to determine potential common factors. Initial quality assurance was undertaken throughout the analysis by both principal and co-investigators. All authors discussed and reviewed the initial analysis and emergence of central themes until a consensus was reached. In addition, a word cloud was generated to create the most utilised words.

ETHICS

Ethical approval for this study was obtained from The University of Western Australia Human Ethics Committee [Reference Number: RA/4/20/5484].

RESULTS

Representatives from nine different private hospitals in Sri Lanka were recruited [H1 to H9]. Since no further information emerged beyond nine representatives, it was apparent that data saturation was achieved. The selected representatives were key decision-makers within these hospitals on healthcare pricing decisions. These nine hospitals represented approximately 54% of the private sector bed capacity in Sri Lanka. [1,2] Also, three of these hospitals have private hospital chains across the country. As a result, these three hospital chains practice a common pricing policy across their own hospitals.

All the representatives stated that they had the pricing list for various procedures, investigations, and room rates within their hospitals. Except for two hospitals [H1 and H9], all the hospitals changed their pricing ranging between every three to twelve months (Table 1). Three hospitals had frequent weekly monitoring of their competitor pricing [H2, H6, H8]. All the other hospitals referred to their competitor's pricing ranging between every six to twelve months.

TABLE 1 - FREQUENCY OF PRICE CHANGE AND REFERRAL TO COMPETITOR PRICING IN SRI LANKA PRIVATE HOSPITALS

Hospital	Frequency of price changing	Frequency of referral to competitor pricing
H1	Periodical	Every year
H2	Every six months	Frequent - Unspecified
H3	Every six months	Every six months
H4	Every three months	Every six months
H5	Every year	Every year
H6	Every six months	Every month
H7	Every six months	Every six months
H8	Every year	Monitoring - Every week Review - Every three months
H9	Periodical	Periodical

THEMATIC ANALYSIS

Five key themes arose from the interviews: influence from the medical practitioners/clinicians, competition, price

adjustment/profit margins, consumables and staff, and economic demands. Words of the most common phrases were highlighted in figure 1.

FIGURE 1 - WORD CLOUD OF THE MOST COMMON PHRASES



INFLUENCE OF PRACTICING CLINICIANS

All the respondents stated that there was little to some influence of practicing clinicians affecting the price. However, it seems to have a more significant influence in terms of seniority.

"Some consultants, especially the top consultants, sometimes request the hospital to keep the prices below certain amounts, and on certain occasions, the hospital decides its price based on the professional fee component of the consultant" [H3]

"Senior consultants have an increased influence on the fees they charge" [H9]

Practicing clinicians who generate more revenue and are involved in surgical procedures exert significant influence on pricing decisions

"High revenue-generating doctors play an important role in determining the prices of surgical or treatment packages" [H5]

Supply and demand also play a crucial factor in the adjustment.

"...demand for the medical consultants' professional services...availability of the medical consultant" [H6]

However, hospitals have flexibility when it is justified to the necessary personnel.

"Generally, very little influence is made to adjust prices unless justified to maintain competitiveness" [H4]

Demand for a practicing clinician would influence their bargaining power on pricing.

"Depending on the demand for the doctor, he or she has the leverage to decide on their fees" [H9]

Some practicing clinicians change the fees without informing the hospitals.

"Sometimes practicing clinicians change their fees without informing the hospital" [H2]

COMPETITOR PRICING

Competition plays a key role in price adjustments within private hospitals. Therefore, certain hospitals refer to their existing competitors to ensure they are within favourable pricing levels.

"Pricing is done based on a competitive study of charges levied by hospitals and other types of healthcare institutions, especially of the same category and scale of operation" [H4]

For certain hospitals, it is not about the competition.

"...complete price list for each procedure, investigation and room rates and these are displayed as per the ministry guidelines" [H3]

It appears that some hospital administrators utilise a business model to engage in price adjustments.

"Overall charge to the patient and the ratio of consultants fees is also frequently analysed to maintain competitiveness and gross contribution" [H4]

PRICE ADJUSTMENTS /PROFIT MARGINS

The majority of the respondents adjust their prices based on the markup to determine the final pricing.

"Price costing formula is carried out and based on the final calculation a percentage markup is added to determine the final price" [H1]

Certain hospitals rely on the profit margins generated by hospitals.

"Profit margins are decided as per hospital policy in line with the revenue target and fixed minimum margins are available for all services" [H5]

Nevertheless, some argue that it only serves as a guide.

"Although various forms of costings are done to ascertain standard margins, this only serves as a guide to arrive at pricing decisions" [H4]

However, some hospitals use arbitrary methodologies to adjust the pricing.

"We do look at our cost base, but methodical scientific calculations are not carried out" [H2]

CONSUMABLES AND HUMAN RESOURCE COST

There was consensus that consumables and human resource cost did have an influence when it came to price adjustments.

"...cost changes of drugs, consumables, capital expenditure, employee-related costs..." [H2]

"...fixed cost of the product and services and the recurrent costs involved..." [H5]

"Common charges including consultation fees, laboratory and other diagnostic charges, inpatient charges are benchmarked regularly" [H4]

"Annual cost verifications are done for the high-priced services and interventions" [H8]

ECONOMIC FACTORS

Some respondents stated that the economic factors and fiscal policies influenced price adjustments within the private hospitals

"Mostly market conditions, price changes in input materials and government policy decisions are the key factors that influence our pricing changes" [H3]

"...foreign exchange rates and the spending power of people" [H5]

"...dollar fluctuation and demand" [H8] Some argued that taxation was an influential factor in price adjustments.

"Any regulatory issues such as taxations" [H8]

DISCUSSION

THE MAIN FINDINGS

Five key themes emerged from this study, namely influence from the practicing clinicians, competitor pricing, price adjustment/profit margins, consumables and human resource cost and economic demands. It is important to review these findings in the light of following established international dimensions on healthcare pricing [6,10,11,12,13]

- The base or unit of activity upon which prices are defined and paid
- The level of the payment or price per unit of the chosen base
- The administrative and economic process by which that price level is determined

THE BASE OR UNIT OF ACTIVITY UPON WHICH PRICES ARE DEFINED AND PAID

This study suggests that the healthcare providers of the Sri Lankan private health system use pricing lists or chargemasters to display various products or services they offer. These chargemasters provide a detailed list of pricing by the product or the services provided to the patient. Therefore, it can be firmly established that FFS is the most established base of payment in Sri Lankan private healthcare services.

Many approaches prevail internationally on determining the base of payments [6,10,16]. This study did not provide evidence to suggest that some of the popular international approaches such as DRG, are being practiced in Sri Lanka. Even though the FFS method has been and continues to be the most prevalent method globally, this system is not without disadvantages [12,14,6]. From a Sri Lankan perspective, the biggest advantage of FFS method would be rewarding the provider directly for the volume and types of services it provides. It forces the providers to describe in detail the offered products and services. However, the major disadvantage would be the strong financial incentive to prescribe for and deliver more healthcare to patients than may be clinically warranted.

There is no mechanism to reward better service or penalize substandard service levels [12]. However, all the above-mentioned notions warrant further investigation within the Sri Lankan context even though international studies have firmly established the same [12,14,6].

Out of pocket expenditure (self-payers) is the main source of finance for private health spending in Sri Lanka. In 2019, out of the total private expenditure on healthcare, 88.7% of the contribution came from self-payers [4]. In this context, the FFS method may not safeguard the interests of fragmented representation of individual payers against unfair pricing imposed by healthcare providers. Also, this study reveals that health service providers enjoy unhindered liberty in determining profit margins for the services offered. Some have indicated they go by revenue targets and costs-based price markups. Absence of a mechanism to determine optimum profit margins would be disadvantageous to the users/patients. Here again, the above-mentioned notions need to be validated through a scientific study carried out within the Sri Lankan context.

DETERMINING THE LEVEL OF PAYMENT OR PRICE PER UNIT OF THE CHOSEN BASE

Based on the main findings of this study, the five key themes are the main influences in determining the pricing decisions. To determine the exact degrees of influence by each factor further studies need to be conducted.

THE ADMINISTRATIVE AND ECONOMIC PROCESS BY WHICH THAT PRICE LEVEL IS DETERMINED

When it comes to administrative and economic processes by which the pricing levels are determined, there is lack of evidence to suggest that common international approaches such as individual negotiations between providers and payers, collective negotiations between associations of providers and payers or unilateral price setting by a regulator [6] are being practiced in the Sri Lankan private healthcare sector. Based on the findings of this study, it is very much evident that the private healthcare providers unilaterally fix pricing primarily influenced by the identified key themes of this study.

Further, there is no evidence to suggest that there exists an organized framework representing the interests of payers/patients when private health sector administrators arrive at pricing decisions. In Sri Lanka in terms of total private health spent, corporate employers and private health insurance contributions are a mere 7.2% and 3.8%, respectively [4]. It appears that the relative bargaining power of these contributors is somewhat weaker in

influencing the pricing decisions of private healthcare administrators.

OTHER FINDINGS THAT INFLUENCED PRICING

The five key themes identified in this study can potentially become detrimental to the common interests of the users of private healthcare. If the influence of practicing clinicians is too strong, it can become a negative influence on safeguarding the interests of users of healthcare services. Allowing healthcare providers to adopt whatever profit margins they wish without proper regulation can become a deterrent to safeguarding patients' rights on healthcare pricing. Exact motives of healthcare providers on considering competitor information in determining pricing is unclear. Further studies are needed to establish the relative merits and the demerits of the above factors.

LIMITATIONS OF THE STUDY

This qualitative study had several strengths and limitations worth noting. One of the strengths included achieving saturation within our dataset. In addition, one interviewer delivered all the interviews to achieve consistency. To achieve consensus, the thematic analysis was undertaken by two independent co-authors. The main limitation was that information was derived from nine different private hospitals in Sri Lanka. However, this represented more than 50% of the total private bed capacity in Sri Lanka [1,2].

CONCLUSION

This study identified that the base of payment in the Sri Lankan private health system is fees for services (FFS). Since the average users of the Sri Lankan private health system are fragmented without being organized into formal user groups, the FFS method might not safeguard the interests of self-payers against healthcare providers all the time. Payer groups are vulnerable to the common weaknesses of the FFS system. The Sri Lankan private health system can benefit from the popular international approaches to determining the base of payment, such as diagnostic related groups (DRG). However, all the above approaches should be investigated further within the Sri Lankan context. This study also provided evidence suggesting private healthcare providers unilaterally fix pricing primarily influenced by the practicing clinicians, competitor's pricing, profit margins, economic demands, and prevailing cost factors such as human resources and consumables. The structure and the depth of this study was inadequate to investigate the exact degrees of influence by those factors on pricing. Based on the findings it appears that the

healthcare providers fix profit margins and general pricing levels based on mechanisms developed by themselves. There is a lack of evidence to suggest that healthcare administrators consulted the healthcare users/patients adequately on pricing decisions. International studies have proven that a collective bargaining framework for healthcare pricing with the participation of payer groups have served the interests of payers/patients better [6].

References

1. Government of Sri Lanka. Annual Health Bulletin. Ministry of Health, Sri Lanka. 2019
2. Government of Sri Lanka. Annual Health Bulletin. Ministry of Health, Sri Lanka. 2017
3. United Nations Population Division. World Population Prospectus. 2019
4. Central Bank of Sri Lanka. Annual Report. 2021
5. World Health Organization. Global health expenditure database. <http://apps.who.int/nha/database/select/indicators/en>. 2019
6. Barber SL, Lorenzoni L, Ong P. Price setting and price regulation in healthcare: lessons for advancing universal health coverage. Geneva: World Health Organization for Economic Co – operation and Development; 2019. License : CC By-NC-SA 3.0 IGO
7. The World Bank. Open data <http://data.worldbank.org/> 2019)
8. Govindaraj R, Navarathne K, Cavagnero E, Seshadri S R. Health Care in Sri Lanka: What can the private sector offer? HNP The World Bank June 2014
9. Barber SL, Kumar A, Roubal T, Colombo F, Lorenzoni L. Harnessing the private health sector by using prices as a policy instrument: Lessons learned from South Africa. Health policy; 2018;122(5):973-81
10. Reinhardt UE. The pricing of US hospital services: Chaos behind a veil of secrecy. Health Affairs. 2006;25(1):57-69
11. Reinhardt UE. The many different prices paid to providers and flawed theory of cost shifting: is it time for a more rational all payer system? Health affairs. 2011;30(11):2125-33
12. Reinhardt UE. The options for payment reform in US. Healthcare. Economics-The New York Times; 2012a (<https://economix.blogs.nytimes.com/2012/02/17>)
13. Reinhardt UE. Determining the level of payments in Healthcare. Economics- The New York Times; 2012b (<https://economix.blogs.nytimes.com/2012/03/02/determining>)
14. Berenson RA, Upadhyay DK, Delbanco S, Murray R. A Typology of payment methods. Urban Institute and the catalyst for payment reform. 2016
15. Miller HD. Creating payment systems to accelerate value- Driven health care: Issues and options for policy reform. New York: The Commonwealth Fund, 2007.
16. Mathauer I, Wittenbecher F. Hospital payment systems based on diagnosis – related groups: experiences in low – and middle – income countries. Bulletin of the WHO. 2013;91(10):746-756A
17. Berenson RA, Ginsburg PB, Christianson JB, Yee T. The growing power of some providers to win steep payment increases from Insurers suggests policy remedies may be needed. Health affairs. 2015; 31(5):973-81
18. Anderson G, Herring B. The All Payer rate setting model for pricing medical services and drugs. AMA journal of ethics. 2015;17(8):770-775
19. Anderson GF. From 'Soak the rich to Soak the poor'. Recent trends in hospital pricing. Health Affairs. 2007; 26(3): 780-89
20. Murray R. Setting hospital rates to control costs and boost quality: the Maryland experience. Health affairs. 2009;28(5):1395-1405
21. Murray R, Berenson RA. Hospital rate setting revisited. Dumb price fixing or a smart solution to provider pricing power and delivery reform? The urban Institute; 2015
22. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Health Care. 2007; 19: 349-57.
23. Groenewald T. A phenomenological research design illustrated. Int J Qual Methods. 2004;3: 42-55.
24. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol. 2006;3: 77-101.
25. Government of Sri Lanka. Ministry of Health, Nutrition and Indigenous Medicine. Basement Report of the Institution Frame of Private Sector of Western Medicine and State Indigenous Medicine Sector http://www.health.gov.lk/moh_final/english/public/elfinder/files/publications/2019/Private%20and%20indigenous%20medicine%20report%202017

YOUNG ADULTS SEARCHING FOR HEALTH-RELATED INFORMATION ON THE INTERNET

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ABSTRACT

This study aimed to examine the use of internet as a source of health-related information (HRI), as well as the change in attitudes following the online search for HRI. The current study sample included 88 participants, randomly divided into two experimental groups. One was given the name of an unfamiliar disease and told to search for information about it using various search engines, and the second was given a text about the disease from a credible scientific source.

The study findings show a large percentage of participants used the internet as a source of HRI. Likewise, no differences were found in the extent to which the internet was used as a source of HRI when demographic were compared. Those who searched for the HRI on the internet had more negative opinions and believed symptoms of the disease were worse than the average opinion among those who obtained the information about the disease from a credible scientific source. Internet clearly influences the participants' beliefs, regardless of demographic differences.

KEYWORDS

healthcare, HRI, COVID-19, disinformation

INTRODUCTION

Since the time of Hippocrates, doctors have had a monopoly on health-related information (HRI), thereby ensuring their professional position and status. Currently, "the internet is now considered as one of the major sources of HRI" [1 p.364]. Most 'surfers' report using the internet to look for information, with the most common tools used by the public for finding information being search engines, particularly Google [2]. Eight of the ten patient health-related consultations were started through search engines such as Google, Yahoo or Bing [3] and, one out of 20 searches on Google is related to health [4].

Studies in the field show that searching for HRI using search engines potentially escalates the searcher's medical concerns, with such escalation directly linked to the

amount of knowledge to which the user is exposed, meaning the more information the user is exposed to, the greater their anxiety and concern [5].

In a seminal work, researchers [6] have examined the effect of the agent of influence's credibility on shaping and changing people's attitudes. They discovered that when the message is transmitted by an authorized source (in their study, a professor of physics), the public views the information as more credible than that originating from a non-expert source, making original attitudes more likely to change. In

other words, when information is provided by an expert and doesn't fit the information seeker's existing views, there is a greater chance the seeker's attitude will change.

Other researchers [7] have found several situations in which a patient began by seeking information on the internet. First, before seeing the physician, the patient will search for information to decide whether to turn to professional help. Secondly, after visiting the professional, they will do so again either because they wish to reduce the tension they feel, or because they remain dissatisfied with the information given by the professional.

Searching for HRI on the internet enables the patient to actively participate in health decisions, with such active participation often encroaching on the doctor's authority and the patient's trust in him or her [9]. Conversely, it should be noted that people diagnosed with a serious disease often refrain from exposing themselves to additional information due to fear or tension [8]. Therefore, the internet can transform patients from passive to active consumers. Patients who use media and feel satisfied after obtaining the information are then motivated to search for further HRI [9]. Moreover, internet health information seeking can improve the patient-physician relationship. As patients have better access to health information through the Internet and expect to be more engaged in health decision making, traditional models of the patient-provider relationship and communication strategies must be revisited to adapt to this changing demographic [10].

The choice of modern media, particularly the internet, to meet needs emanates from various internet characteristics. The internet's most obvious property is the quantity and variety of information it offers, which bridges the difficulty of acquiring information from traditional sources [11]. Likewise, technology enables information to be frequently updated. Information is produced and transferred to the public by various groups of people, including professionals, suppliers, pharmaceutical companies, medical service providers, interest groups, and consumers themselves. Additionally, information is available on the internet in various formats, such as text, video, and audio files, allowing different people to use them in the way that suits users best [12].

We can therefore ask whether searching for HRI on the internet is beneficial or detrimental for the patient. There is no definitive answer to this question in the literature. Sometimes a person cannot get medical treatment due, for example, to financial constraints. Such a situation can lead people to search for HRI and self-diagnosis from the internet instead of going to a doctor. In such a case, the internet provides a reasonable and logical default solution [13]. However, even people who can pay for medical

treatment face circumstances that delay medical treatment, such as long waits for appointments, or overloaded schedules. In such cases, HRI on the internet and virtual communication can be effective. It was also found that an internet portal improves doctor-patient relations and increases patient comfort level, by providing the opportunity to post messages with questions and worries about non-urgent issues, without visiting a clinic [14].

In contrast, although exposure to a very large amount of knowledge can sometimes improve the patient's physical and emotional health, and even the doctor-patient relationship, sometimes exposure to such information can harm that relationship. A patient arriving with information they have found for themselves, may make the doctor feel threatened, forcing doctors to provide the patient with explanations regarding the credibility and appropriateness of the information. Moreover, another disadvantage is that the patient may demand inappropriate clinical intervention, due to the harmful information found online. The doctor may sometimes agree to the patient's requests when there is no real clinical need, fearing refusal will harm doctor-patient relations. Refusal to provide inappropriate treatment can lead to the patient feeling the doctor is motivated by a need for control [15]. Likewise, extensive knowledge can influence and arouse a sense of control that increases confidence and enables the patient to question and criticize the doctor's diagnosis [2]. However, the patient is liable to obtain wrong information about the type and effects of the illness, raising unnecessary anxiety and fear [15].

Researchers [15] conducted a study on internet searches for HRI in the United States. They found that 75% of the participants who searched for HRI looked for information relevant to their own health or that of friends or relatives. The more a person is active and experienced in searching for HRI on the internet, the more they will succeed in finding relevant information. This gap exists even though the public is sometimes better informed of new developments. Medicine is full of changes and new studies, and the newest and most up-to-date information is available firstly to professionals, appearing only later on the internet. Moreover, obtaining HRI from the internet is sometimes uncertain and confusing; users often need a professional to clarify the HRI they found online [13]. The consumer can misinterpret the information, leading to needless worry [7]. As a result, increasing accessibility to HRI on the internet can actually increase frequency of visits to health professionals [13]. Unnecessary visits encroach on effective

and fast service for patients who genuinely require a doctor's attention [7].

An important issue related to searching for information is based on trust and information quality. A range of organizations have developed methods and tools for evaluating and ranking website information quality to help the consumer make informed choices. These tools aim to guide people to screen inaccurate content, to identify key websites, and raise consumer awareness. The consumers are usually familiar with how to identify internet information quality and use a range of tools to evaluate and judge the source. Nonetheless, due to the availability and accessibility of information, curiosity wins, and people feel a strong need to read all the symptoms and possibilities, whether or not the information seems to be of high quality [16].

The frequency of HRI internet searches is also dependent on demographic characteristics. Gender-based differences in the use of the internet as a source of HRI have been found in previous studies. Women were found to see the internet as a tool for social usage and to develop ties with friends and relatives. In contrast, men focus on obtaining information and arranging things, such as using search engines [17],[18]. A US study conducted 15 years ago [19] showed 19% of those using the internet to search for HRI did so at least once a week, whereas 35% did so at least once a month. People with a high income and higher education searched for HRI on the internet more than others.

Studies in Switzerland show only one-third of the participants searched for HRI on the internet. Age, language knowledge, level of English, and the chronic nature or severity of the disease are all connected to frequency of medical internet searches [20],[21]. In Italy, gender, age, education, and marital status, were connected with HRI internet searches. For men, the percentage using the internet use to search for HRI dropped with age, while the highest rate of searching for HRI was among women aged between 30-41 years [22]. A study from Saudi Arabia found that Income and education are almost always the most influential and important factors in everything connected with HRI searches [1]. An Israeli study [23] found that among internet users, 62.3% searched for HRI frequently or very frequently. Women searched for HRI more than men; 69.9% of female internet users searched for information frequently or very frequently, while only 52.4% of male users did so. Likewise, the study

discovered that Arabs use the internet as a HRI source more than native Israelis or immigrants from the former Soviet republics.

Regarding the level of religiosity and internet use, in a study conducted in Israel [24], did not find any differences in electronic media consumption patterns between the religious and secular communities. However, two-thirds of the religious interviewees claimed they don't obtain any information from the internet. Study has found that when people are worried about their health, they will search more frequently for information on the internet [7].

A literature review shows an increasing trend of using the internet as a source of HRI [25] [26]. It would be interesting to examine differences regarding internet use as a source of HRI among different population segments, as well as the influence of internet searches on individuals' attitudes towards a disease as opposed to the attitudes of those who acquired information from a credible source. This study will examine the correlation between various demographic variables and the use of the internet as a source of HRI, as well as the attitudes towards a disease following users' internet searches for HRI about it. Two hypotheses will be examined:

H1: Differences will be found in internet use as a source of HRI by different population sectors. We assume there will be differences between men and women, high-income and low-income populations, and secular and traditional populations, regarding internet use as a source of HRI. Support for this hypothesis can be found in the literature. For example, in the 2009 Annenberg National Health Communication Survey it was found that middle-aged women of high socioeconomic status constitute the highest percentage of those seeking HRI on the internet, and they are the people most influenced by this information [8]. Kim found that young, educated men with high incomes are least likely to be searching for HRI on the internet, and a study from Israel showed religious people claimed they don't obtain information from the internet [24].

H2: Differences will be found in people's attitudes towards the disease, depending on whether knowledge was obtained from internet sources or from a credible source. The attitudes of the former about the disease will be more negative (the disease seen as more serious) than among those of people that obtained their knowledge from a credible source. This finding would concur with earlier research indicating that, in most cases, a search for

apparently innocent symptoms can lead to the patient drawing conclusions that the illness is more serious than in reality; likewise, after an internet search for HRI, a patient is likely to be confused, frustrated, and panic-stricken [7, 5].

METHOD

PARTICIPANTS

This study's population included 88 participants (since we wished to examine how knowledge is learned, one participant was removed from the study since he was familiar with sarcoidosis, the subject of the study). For the purposes of this study, young adults are defined as youth between the ages of 18-40 years ($M=23.3$, $SD=1.22$). The participants were students at "The Max Stern Yezreel Valley College" in Israel (the academic institution ethics committee authorization number 77-19). The research assistants approached the students and asked them to voluntarily fill out a manual questionnaire. Half the participants ($n=40$) formed the experimental group, and half the control group ($n=40$).

TOOLS

This study is a quantitative study using a self-report questionnaire which included 30 closed questions. Most questions were formulated for this study and we conducted an internal reliability test in order to calculate these questions to an index variables. The rest of the questions were taken from a previous study [27] in which their reliability and validity were tested. At the beginning of the questionnaire the participants were informed that the participation in the study was voluntary, the questionnaire is anonymous and no data will be used except for research purposes. Participants signed an informed consent form before completing the questionnaire. The participants were asked to answer questions that examined the following variables:

Internet information search habits. This measure was originally composed especially for this study (e.g., "I regularly search for HRI on the internet"; "I search for HRI on the internet for my personal medical problems"). The scale was composed of five degrees of agreement with the item (1 - do not agree at all and 5 agree to a large extent) and then the answers were classified into three levels of agreement: the two lowest levels - disagree, the two highest levels - agree and the middle level - neutral (In the

original questionnaire the chosen answer was 3, neither positive nor negative regarding the statement).

Perception of internet credibility. This measure was also originally composed for this study (e.g., "I believe HRI that I find on the internet").

Attitudes towards the disease. The attitudes questionnaire included 11 items in total based on Cohen et al questionnaire. Cohen et al questionnaire is a general attitude questionnaire that can be adapted to any subject through small verbal changes (original Cronbach's $\alpha = .75$). [27] We made few adjustments (two items were removed because they did not fit to the context of the study and the wording of the other items was adjusted to examine the topic relevant to this study) created a moderately reliable scale ($\alpha = .77$). This attitude questionnaire was divided into two parts:

- (a) Emotional items ($n=4$, e.g., "I sensed a sudden drop in my mood after reading about the disease")
- (b) Cognitive items ($n=7$, e.g., "The disease is serious") about the disease ($\alpha=0.71$). The attitude questionnaire was answered on a Likert scale (1 - strongly disagree, 7 - strongly agree). A high score for this variable testifies to a more negative attitude about the disease (that is, the disease is perceived as more serious) and a low score testifies to a less negative attitude towards the disease (that is, the disease is perceived as less serious). The questionnaire ended with demographic questions: gender, age, income, and familiarity with the disease.

PROCESS

The participants were randomly divided into two experimental groups (The questionnaires in the different conditions were mixed and distributed to the participants randomly). The researcher alternately distributed a questionnaire from each condition to participants who gave their consent to participate in the study. The first group ($n=41$) was given only the name of the disease and told to search for information about it using the various search engines, without any guidance regarding how to search or for how long. The second group ($n=47$) was given a text from a scientific source regarding the disease. After reading or searching for information, the participants were asked to answer an opinion questionnaire.

FINDINGS

DESCRIPTIVE STATISTICS

participants were assured confidentiality and anonymity. The study included 44 women (55% of participants) and 36 men (45%). There were 77 (96%) who were single, and three (4%) were married. Likewise, 52 participants (65%) were secular Jews and 28 (35%) traditional. According to distribution by monthly income, 52 participants (65%) earned far less than the average wage, 26 (32.5%) less than average, and two participants (2.5%) close to average. Regarding internet information searching habits, it can be clearly seen that most participants – 72 (90%) – reported past HRI searches, as opposed to eight participants (10%) who reported never having searched for HRI on the internet. Of the participants, 81.2% answered that they sometimes searched for HRI for their medical problems on the internet, and 15.3% answered that they didn't do such searches (3.5% neutral); 55.3% noted they do so regularly.

Of the participants who answered that they searched for HRI on the internet, 23.5% answered that they do so to save consulting a doctor, and 58.8% answered that they don't search for HRI to avoid such a consultation (17.6% neutral). Of the participants, 68.2% will not stop with the information they read on the internet and will also consult a doctor and 17.7% answered that they consider what they read on the internet sufficient (14.1% neutral).

Of the participants, 41.5% answered that they believe HRI they obtain from the internet; 16% said they didn't believe this information; and 42.5% were neutral regarding credibility of the information.

Of the participants, 49.4% believed, due to the information they found on the internet, that the disease was more serious than the real problem, but 16.5% did not think so (32.9% neutral).

TABLE 1. PERCENTAGE WHO AGREES OR DISAGREE WITH STATEMENTS CONNECTED TO SEARCHING FOR HEALTH-RELATED INFORMATION (HRI) ON THE INTERNET

Statement	Agree	Disagree	Neutral
"I sometimes search for HRI for my medical problems on the internet"	81.2%	15.3%	3.5%
"I search for HRI on the internet to save myself consulting with a doctor"	23.5%	58.8%	17.6%
"I won't limit myself to the HRI I read on the internet, and will also consult with a doctor"	68.2%	17.7%	14.1%
"I believe the HRI I read on the internet"	41.5%	16%	42.5%
"The HRI I find on the internet shows the problem to be more serious than in actuality"	49.4%	16.5%	32.9%

To learn about the relationship between the research variables we computed Spearman correlations. A positive and significant correlation was found between how much a person believed HRI found on the internet and his actual search ($r_s=.28$, $p<.01$). Thus, the more a person believes in the information, the more he will search for it, and vice versa.

Likewise, a positive correlation was found between searching for HRI on the internet and one's friends recommending use of the internet as a credible information source ($r_s=.30$, $p<.05$), meaning the more a person uses the internet, the more he will recommend doing so to his friends.

A negative and significant correlation was found between how much a person believes the HRI on the internet conveying that a disease is more serious than in actuality, and searches for the HRI ($r_s=.30$, $p<.01$). In short, the more a person believes that the thrust of internet information on a disease is more serious than reality, the less often she will search for HRI in this way.

Additionally, a negative correlation was found between how much a person believes HRI on the internet and regularly searches for it ($r_s=.28$, $p<.01$). In short, the more a person searches for HRI on the internet, the less negative his attitude toward the disease.

EXAMINING THE RESEARCH HYPOTHESES

To examine the first hypothesis (H1), that discussed demographic differences in use of the internet as a focus

of HRI, a t-test for independent samples was conducted. As seen in Table 2, no differences were found for any demographic variable: there were no differences between men and women $t(84) = 0.636, p > .05$, Participants over the age of 23 and participants under the age of 23 $t(86) = -2.080, p > .05$, secular and traditional $t(83) = 0.634, p > .05$, and people with low or high incomes $t(78) = 1.51, p > .05$.

To examine the second hypothesis (H2), that there would be a difference in attitudes toward the disease between those finding information by internet searches and those finding it by reading an authorized source, t-test for independent samples was conducted. The research

hypothesis was confirmed, and a significant difference was found between the groups $t(86) = 2.011, p < .05$. The average opinions among those who searched for HRI on the internet ($M = 3.11, SD = .77$) was higher (that is, more negative) than the average opinion about the disease among those who had gotten their information from a credible source ($M = 2.81, SD = .61$). As seen in Table 3, those independently searching for the information estimated the disease to be generally more serious, harder to diagnose, and rarer. They were also in lower spirits and felt more helpless than those that had gained their information from a credible source, but thought the disease was easier to heal and was less terrible to be diagnosed with.

TABLE 2. DEMOGRAPHIC DIFFERENCES IN USE OF THE INTERNET AS A FOCUS OF HRI: (ON A SCALE OF AGREEMENT 1 -5, WITH 5 - AGREEMENT AND 1 - DISAGREEMENT).

Statement	Group	N	Mean	SD	t(df)
Gender	Men	21	2.95	0.56	0.636 (84)
	Women	61	2.94	0.78	
Age	Under 23	56	2.99	0.77	-2.080 (86)
	Over 23	32	2.89	0.81	
Level of religiosity	Secular	61	2.98	0.78	0.634 (83)
	traditional	27	2.88	0.50	
Income	High	31	2.93	0.71	1.51 (78)
	Low	57	2.97	0.96	

TABLE 3. DIFFERENCES BETWEEN AVERAGES ACCORDING TO STATEMENTS THAT MEASURED ATTITUDES TOWARD THE DISEASE (ON A SCALE OF AGREEMENT 1-5, WITH 5 - AGREEMENT AND 1 - DISAGREEMENT).

Statement	Group	N	Mean	SD	t(df)
"The disease is serious"	Credible source	47	2.06	0.96	2.480 (85)*
	Independent search	40	2.68	1.33	
"The disease is difficult to diagnose"	Credible source	45	2.28	1.17	-1.948 (82)*
	Independent search	39	2.80	1.25	
"The disease is considered easy to cure"	Credible source	45	2.78	0.97	2.687 (81)**
	Independent search	38	3.37	1.02	
"The disease is common"	Credible source	47	3.87	1.17	-3.040 (84)**
	Independent search	39	3.10	1.16	
"It is important to treat an illness as soon as possible after detecting it"	Credible source	45	2.35	0.91	0.236 (82)
	Independent search	39	2.41	1.21	
"Someone can continue living normally even without treating the disease"	Credible source	43	3.12	0.96	0.856 (79)
	Independent search	38	3.31	1.14	
"I suddenly felt in lower spirits after reading about the disease"	Credible source	47	2.77	1.11	2.480 (85)*
	Independent search	38	3.89	1.98	
"I felt helpless after reading about the disease"	Credible source	47	2.91	1.19	3.317 (83)***
	Independent search	35	4.06	1.26	
"It wouldn't be so terrible if I was diagnosed with the disease"	Credible source	47	2.17	1.12	4.185 (80)***
	Independent search	37	2.59	1.04	
	Credible source	47	2.21	1.04	

"If I knew that I would have to be treated for this disease, I would be really depressed"	Independent search	37	2.59	1.19	
"I would prefer to have this disease rather than more severe ones"	Credible source	47	3.51	0.90	1.567 (82)
	Independent search	40	3.85	0.92	

DISCUSSION

The current study explored differences in internet use as a source of HRI among different population segments. Specifically, it examined the influence of internet searches vs. consulting with a credible source on individuals' attitudes towards a disease. Unlike previous studies, which showed relations between internet search habits and demographic characteristics such as gender and education level, no demographic differences were found in this study regarding HRI search habits on the internet.

This finding is supported by an Israeli study on the religious sector's attitudes toward traditional media [24], which found that the religious Jewish population's media usage is similar to that of the secular population. The present study did not include religious participants, but rather secular and traditional participants. The latter are moderately observant Jews who tend to share the norms of secular Israeli society. One of the distinctive characteristics of this group is its positive attitude toward leisure activities, and towards internet use in particular, which is understood as part of social integration [28]. Had religious or even ultra-Orthodox Jewish participants been included in this study, perhaps no difference would have been found in internet use as a source of HRI. Accordingly future studies should examine the attitudes of these groups to internet-enabled HRI searches.

Another key finding is that participants who researched HRI for a disease using the internet had more negative attitudes towards that disease. This supports previous studies that concluded that when users obtain HRI from the internet, they are likely to misinterpret the information, leading to needless worry and extreme feelings about a disease [7]. Additionally, HRI can lead to unfounded assumptions and speculations on the part of the patient [13].

According to the elaboration likelihood model of persuasion (ELM) [29], when information is obtained from a

credible source, it is processed through a central route: the person thoroughly and seriously examines the information, as opposed to processing it on a peripheral track. In a peripheral track, the person examines the information superficially and based on clues. Information from the internet is usually unreliable and therefore processed on the peripheral track. Accordingly, users are greatly influenced by photographs, personal stories, or threatening headlines, and thus the information is seen as more negative. The present study also shows the importance of the source of the message in shaping attitudes to and the interpretation of the message. This reinforces the findings of Hovland et al.'s study [6], according to which the success of information will depend on the credibility of the source that convey messages about the product. If the source is credible, then the person receiving the message will trust it and receive it well. However, if the information is considered incredible, the message will not affect the receiver [30,31].

LIMITATIONS

The current study has several limitations. First, it is based on a small and relatively homogenous sample. This sample comprised "young adults" (aged 18-40) of similar backgrounds, who comprise a homogenous population. Therefore, the study results cannot be generalized to the general population. Future research should include a larger sample and other population sectors (e.g., elderly, religious, ultra-Orthodox) to verify the rationale on which the current study is based.

There may be another limitation caused by the gaps in motivation between the two experimental groups. Since this was a voluntary study and the participants were not compensated for it, it may be that the participants' motivation to read about the disease in depth clearly influenced the results among the group who searched the internet. These participants had to actively look for information, exerting more effort than the group given information from a credible source. These latter participants were only asked to read one paragraph, a much more passive activity.

FUTURE RESEARCH

Future research can increase motivation among the group with internet information and promise some reward to participants who treat the search with seriousness. Another possibility for overcoming this limitation is to enlist participants who have some association with the disease and thus possibly a strong interest in participating more seriously in the study; their motivation levels would not impair the results.

As aforementioned, future research that will deal with the technical limitations of this study but perhaps provide clearer and more unequivocal results.

CONCLUSION AND IMPLICATIONS

This study's theoretical contribution lies in lending support to findings that indicate the importance of the source of the message. Its practical contribution lies in demonstrating that when the message comes from a trusted source the source should be strengthened and emphasized (and vice versa).

It is important that professionals engaged in information sharing and persuasion, as well as people in general, know that unreliable sources (such as search sites such as Google or social networks) may distort the message and this should be noted especially when it comes to health messages as set out in this study.

References

- Alghamdi, K. A., & Moussa, N. A. (2012). Internet use by the public to search for health-related information. *International Journal of Medical Information*, 81 (6), 363-373.
- Reches, A. (2011). From Hippocrates to Facebook. Retrieved from <http://doctorsonly.co.il/2011/04/8493/> on 25 September, 2021. [Hebrew]
- Fox, S., & Duggan, M. (2013). Health online 2013. Health, 2013, 1-55.
- Ramaswami, P. (2015). A remedy for your health-related questions: health info in the Knowledge Graph. Google Official Blog, 2900079-8.
- White, R. W., & Horvitz, E. (2009). Cyberchondria: Studies of the escalation of medical concerns in web search. *ACM Transactions on Information Systems*, 27 (4).
- Hovland, C. I., & Weiss, W. (1951). The influence of source credibility on communication effectiveness. *Public Opinion Quarterly*, 15 (4), 635-650.
- Muse, K., McManus, F., Leung, C., Meghreblian, B., & Williams, J. M. G. (2012). Cyberchondriasis: Fact or fiction? A preliminary examination of the relationship between health anxiety and searching for health information on the Internet. *Journal of Anxiety Disorders*, 26 (1), 189-196.
- Kim, S. (2015). An exploratory study of inactive health information seekers. *International Journal of Medical Information*, 84 (2), 119-133.
- Rider, T., Malik, M. & Chevassut, T. (2014). Haematology patients and the internet – the use of on-line health information and the impact on the patient-doctor relationship. *Patient Education and Counseling*, 97 (2), 223-238.
- Tan, S. S. L., & Goonawardene, N. (2017). Internet health information seeking and the patient-physician relationship: a systematic review. *Journal of Medical Internet Research*, 19 (1).
- Westerman, D., Spence, P. R., & Van Der Heide, B. (2014). Social media as information source: recency of updates and credibility of information. *Journal of Computer-Mediated Communication*, 19 (2) 171–183.
- Jadad, A. R., & Gagliardi, A. (1998). Rating health information on the Internet: navigating to knowledge or to Babel? *Jama*, 279 (8), 611-614.
- Suziedelyte, A. (2012). How does searching for health information on the Internet affect individuals' demand for health care services? *Social Science & Medicine*, 75 (10), 1828-1835
- Bhandari, N., Shi, Y., & Jung, K. (2014). Seeking health information online: does limited healthcare access matter? *Journal of the American Medical Information Association*, 21 (6), 1113-1117.
- Murray, E., Lo, B., Pollack, L., Donelan, K., Catania, J., White, M., ... Turner, R. (2003). The impact of health information on the internet on the physician-patient relationship: patient perceptions. *Archives of Internal Medicine*, 163 (14), 1727-1734.
- Wilson, P. (2002). How to find the good and avoid the bad or ugly: a short guide to tools for rating quality of health information on the internet. *British Medical Journal*, 324 (7337), 598–602.
- Boneva, B., Kraut, R., & Frohlich, D. (2001). Using e-mail for personal relationships: the difference gender makes. *American Behavioral Scientist*, 45, 530-549
- Jackson, L. A., Ervin, K. S., Gardner, P. D., & Schmitt, N. (2001). Gender and the internet: women

- communicating and men searching. *Sex Roles*, 44 (5-6), 363-379.
19. Diaz, J. A., Griffith, R. A., Ng, J. J., Reinert, S. E., Friedmann, P. D., & Moulton, A. W. (2002). Patients' use of the internet for medical information. *Journal of General Internal Medicine*, 17 (3), 180-185.
 20. Jeannot, J. G., Froehlich, F., Wietlisbach, V., Burnand, B., Terraz, O., & Vader, J. P. (2004). Patient use of the Internet for health care information in Switzerland. *Swiss Medical Weekly*, 134 (21-22), 307-312.
 21. Wieser, T., Steurer, M. P., Steurer, M., & Dullenkopf, A. (2017). Factors influencing the level of patients using the internet to gather information before anaesthesia: a single-centre survey of 815 patients in Switzerland. *BMC Anesthesiology*, 17 (1), 39.
 22. Siliquini, R., Ceruti, M., Lovato, E., Bert, F., Bruno, S., De Vito, E., & La Torre, G. (2011). Surfing the internet for health information: an Italian survey on use and population choices. *BMC Medical Informatics and Decision Making*, 11 (1), 21
 23. Mesch, G., Mano, R., & Tsamir, J. (2012). Minority status and health information search: A test of the social diversification hypothesis. *Social Science & Medicine*, 75 (5), 854-858.
 24. Gabel, I. (2006). The media and the National Religious Movement: love-hate relationship. In *Sectorial Communication in Israel*. Tel Aviv: Chaim Herzog Institute. [Hebrew]
 25. Wang Z, Fan Y, Lv H, Deng S, Xie H, Zhang L, Luo A, Wang F. (2022) The Gap Between Self-Rated Health Information Literacy and Internet Health Information-Seeking Ability for Patients With Chronic Diseases in Rural Communities: Cross-sectional Study. *Journal of Medical Internet Research*, 24(1):e26308.
 26. Gowdar IM, Arishi FO, Ateen AM, Alzuabi AA, AL-Ahmari AA, Khojah AB (2022). Use of internet as a source of oral health information in Riyadh Region, Saudi Arabia. *Journal of Pharmacy And Bioallied Sciences*, 14(5):331.
 27. Cohen, J., Weimann-Saks, D., & Mazor-Tregerman, M. (2018). Does character similarity increase identification and persuasion? *Media psychology*, 21 (3), 506-528.
 28. Katz, Y. (2002). Technology use among religious communities in Israel. *Emdot (Nation, State, Torah)*, Vol. 3 (113-134). Elkana: Orot College.
 29. Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In L. Berkowitz (Ed.) *Advances in Experimental Social Psychology* (Vol. 19, pp. 123-205). New York: Academic Press.
 30. Biswas, D., Biswas, A., & Das, N. (2006). The differential effects of celebrity and expert endorsements on consumer risk perceptions. The role of consumer knowledge, perceived congruency, and product technology orientation. *Journal of Advertising*, 35(2), 17-31.
 31. Mittelstaedt, J. D., Riesz, P. C., & Burns, W. J. (2000). Why are endorsements effective? Sorting among theories of product and endorser effects. *Journal of Current Issues & Research in Advertising*, 22(1), 55-65.

OUTPATIENT LETTERS IN REAL TIME FOR BETTER PATIENT OUTCOMES

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ABSTRACT

The Sunshine Coast Hospital and Health Service commenced a six-month proof-of-concept to trial speech recognition and self-type software in 2020. This action was taken in response to an ageing medical transcription workforce; an increase in outpatient letters due to population growth and the novel coronavirus pandemic; and more timely transfer of care communication to GPs.

The proof-of-concept presented the health service with a unique opportunity as no other public hospital in Queensland had leveraged speech recognition or self-type software for the production and distribution of outpatient letters. The proof-of-concept trial provided 18 clinicians with the choice to type or dictate outpatient letters, electronically sign, and distribute to referring general practitioners (GPs) in one transaction.

The results of the proof-of-concept demonstrated a 39% uptake of speech recognition and self-type software, demonstrating an opportunity to supplement the medical transcription workforce to address the rising outpatient activity. The proof-of-concept also demonstrated an average reduction in transaction time of 25% from the baseline measure over the six-month trial period. This finding supports the timely transfer of communication to GPs. However, it will need to be carefully analysed against the participant frustrations of voice to text accuracy to minimise the risk of poor adoption.

KEYWORDS

artificial intelligence, dictation, self-type, medical transcription, outpatients

INTRODUCTION

Healthcare providers are seeking transformational change in the production of clinical documentation to improve workflow efficiencies as the demand for healthcare rises. In 2020, the Sunshine Coast Hospital and Health Service (SCHHS) embarked on a proof-of-concept to demonstrate front end speech recognition capability for the production and distribution of outpatient letters. This proof-of-concept

was initiated to improve the transactional speed in the transfer of clinical information to general practitioners (GPs) and referring specialists to ensure continuity of care following hospital attendance. Delayed communication can lead to a lack of continuity of care and suboptimal care, as well as decreased patient and GP satisfaction levels. [1] A literature review undertaken by Kripalani et al. in 2007 of 753 observational studies and 18 controlled studies identified that 25% of discharge summaries were

never transmitted to the GP or referring specialist. [2] This outcome suggests that patients could be exposed to hospital readmission as a direct consequence of delays, non-transmission, or misplaced discharge summaries, placing unnecessary pressure on the health system.[2]

Whilst interventions to reduce the backlog of letters awaiting transcription, such as overtime, further business process education, and close monitoring and control of activity can relieve the short-term pressure on the health system, these interventions are not sustainable over a long period of time.[3] These interventions can lead to morale problems and are often manifested as an increase in staff absenteeism, low productivity, labour issues, health issues and general staff dissatisfaction.[3] Since the opening of the Sunshine Coast University Hospital in 2017, and its iterative expansion, there has been no increase in the medical transcription workforce despite rising outpatient activity associated with population growth and the novel coronavirus pandemic. With a projected two per cent decline in the medical transcription workforce between 2019 and 2029 due to retirement and a lack of emerging talent to balance this reduction, the future availability of a medical transcription workforce is a cause for concern.[4]

Supplementary to workforce challenges, clinician driven demands for digital health solutions are on the rise.[5] With Millennials and Generation Z (those born after 1980), also known as digital natives, making up a large segment of the medical workforce, the appetite for tech savvy solutions has reinforced this upward trend.[6] This cohort makes up 41% of the Australian working population.[7]

Digital natives born after 1980, have grown up in the digital age, and are attached to their mobile phone contrary to digital immigrants born before 1980 who would prefer to have a conversation in person.[6] Digital natives are exceedingly social online, adopt technology at a faster rate than digital immigrants and are fluent in multi-tasking.[6] By comparison, digital immigrants seek news via traditional channels such as print newspaper and prefer to focus on one task at a time.[6] In a healthcare setting, digital natives have a desire to simplify workflows and practices, connect with patients and healthcare providers using new technology to improve the overall healthcare experience.[6] The mid-point between the two groups has been dubbed by Wang et al. as digital fluency or digital transformation.[6] This is where legacy information communication and technology systems meet the digital age, combining knowledge and experience with innovative and user-friendly technology.

Whilst speech recognition for clinical documentation is increasing at a rapid rate, no public hospital in Queensland leverages speech recognition for the creation of outpatient letters. This gap presented a unique opportunity for the Sunshine Coast Hospital and Health Service to conduct research to understand if front end speech recognition technology could solve these business-based problems before a wide scale rollout was considered. A proof-of-concept trial was developed and implemented from December 2020 to May 2021 (Figure.1).

OBJECTIVES

This case study describes the introduction of a transformational change (the use of front-end speech recognition to produce clinical documentation) to improve workflow efficiencies and to identify the critical success factors likely to support future adoption of and sustained use of this technology. This proof-of-concept included: 1. review of the usability of the software; 2. performance of the software and technology in the healthcare environment; and 3. the method used by clinicians to enter information into the system. Feedback collected from participants about their experience of the trial was designed to identify the likely critical success factors in a wide scale rollout.

SETTING

Outpatients, Sunshine Coast Hospital and Health Service

PARTICIPANTS

The proof-of-concept trial provided 18 clinicians with the choice to type or dictate outpatient letters, electronically sign, and distribute to referring GPs in one transaction. All existing users of the Fluency for Transcription software were considered for inclusion in the proof-of-concept trial. Clinicians were excluded if they did not have a voice profile score of 85% or more based on the software vendors experience in the United States for optimal voice to text conversion accuracy.[8]

Participants completed 'onboarding' (including provision of a software license and handheld microphone) and training in December 2020. During the trial clinicians could choose to type or dictate outpatient letters, electronically sign, and distribute to referring GPs in one transaction and utilised the system for a three-month period (Phase 1). The proof-of-concept was extended for a further three months

(Phase 2) to provide additional technical support and to respond to feedback received during Phase 1 that it was deemed might otherwise prohibit future rollout of the technology.

METHODOLOGY

Measurement of trial outcomes used a mix of research methods including system-based metrics and interviews with participants (Appendix 1). The system-based metrics were extracted from the Fluency for Transcription software and manually cleansed to detect and correct inaccurate records from the data set. Baseline data was collected about clinicians' use of the Fluency for Transcription software six months prior to the trial and during the six-month proof-of-concept trial. A prescriptive analysis was used to understand what action would be undertaken to address problems identified during the trial.

OUTCOMES

SYSTEM USAGE

The proof-of-concept demonstrated that there was a higher uptake of the front-end speech recognition software compared to the self-type option.

Of the 18 participants included in the proof-of-concept; 13 participants chose to use the front-end speech recognition software, 12 used the self-type option, 3 of the 5 who chose not to use the front end speech recognition also did not use

the self-type option (i.e. did not engage with either of the offered technologies) and all participants engaged with the medical transcription service. During the proof-of-concept period, 4,201 letters were produced: 976 (25%) used front end speech recognition, 659 (14%) used self-type and 2,566 (61%) used the medical transcription service. These findings (Table 1) demonstrate that if front-end speech recognition (25%) paired with self-type (14%) functionality was more broadly used across the organisation, it could achieve a 39% reduction in the number of outpatient letters requiring transcription, a positive outcome to address the challenge of the rising volume outpatient letters requiring transcription. The best-case scenario of 100% system usage was calculated by removing the participants who did not attempt to use the front-end speech recognition functionality from the analysis (Table 2), the use of front-end speech recognition is adjusted to 35% and self-type adjusted to 11%. A potential uptake of the technology of 46% would positively contribute to the workload reduction for the transcription workforce.

There are factors which may affect system usage rates. During software downtime associated with the speech recognition functionality, clinicians may revert to using the medical transcription service to ensure continuity of care is maintained in a timely manner. Further scenarios where clinicians may default to using the medical transcription service include low digital literacy levels or negative attitudes towards the technology because of frustrations experienced with using the technology.[9]

TABLE 1: USAGE OF DICTATION METHODS (ORIGINAL PARTICIPANT GROUP) – DECEMBER 2020 TO MAY 2021

participant reference	total jobs produced	number of jobs produced using front end speech recognition	% of jobs produced front end speech recognition	number of jobs typed directly number	% of jobs typed directly	jobs produced by other methods (*)	jobs produced by other methods %
participant 1	95.00	-	0%	-	0%	95.00	100%
participant 2	213.00	163.00	77%	40.00	19%	10.00	5%
participant 3	114	33.00	29%	4.00	4%	77.00	68%
participant 4	364.00	37.00	10%	-	-	327.00	90%
participant 5	236.00	218.00	92%	1.00	0%	17.00	7%
participant 6	47.00	-	-	-	-	47.00	100%
participant 7	102.00	46.00	45%	-	0%	56.00	55%
participant 8	418.00	55.00	13%	2.00	0%	361.00	86%
participant 9	32.00	5.00	16%	-	0%	27.00	84%
participant 10	472.00	20.00	4%	2.00	0%	450.00	95%
participant 11	532.00	63.00	12%	2.00	0%	467.00	88%
participant 12	51.00	-	0%	7.00	14%	44.00	86%
participant 13	198.00	-	0%	192.00	97%	6.00	3%
participant 14	188.00	57.00	30%	38.00	20%	93.00	49%
participant 15	438.00	111.00	25%	257.00	59%	70.00	16%
participant 16	52.00	25.00	48%	1.00	2%	26.00	50%
participant 17	372.00	-	-	-	-	372.00	100%
participant 18	277	143.00	52%	113.00	41%	21.00	8%
	4,201	976	25%	659	14%	2,566	61%

*Other methods may include front end speech recognition or self type where medical transcription service intervention was required.

TABLE 2: USE OF DICTATION METHODS (ADJUSTED TO EXCLUDE PARTICIPANTS WHO DID NOT USE SPEECH RECOGNITION) – DECEMBER 2020 TO MAY 2021

participant reference	total jobs produced	number of jobs produced using front end speech recognition	% of jobs produced front end speech recognition	number of jobs typed directly number	% of jobs typed directly	jobs produced by other methods (*)	jobs produced by other methods %
participant 2	213.00	163.00	77%	40.00	19%	10.00	5%
participant 3	114.00	33.00	29%	4.00	4%	77.00	68%
participant 4	364.00	37.00	10%	-	-	327.00	90%
participant 5	236.00	218.00	92%	1.00	0%	17.00	7%
participant 7	102.00	46.00	45%	-	0%	56.00	55%
participant 8	418.00	55.00	13%	2.00	0%	361.00	86%
participant 9	32.00	5.00	16%	-	0%	27.00	84%
participant 10	472.00	20.00	4%	2.00	0%	450.00	95%
participant 11	532.00	63.00	12%	2.00	0%	467.00	88%
participant 14	188.00	57.00	30%	38.00	20%	93.00	49%
participant 15	438.00	111.00	25%	257.00	59%	70.00	16%
participant 16	52.00	25.00	48%	1.00	2%	26.00	50%
participant 18	277.00	143.00	52%	113.00	41%	21.00	8%
	3,438	976	35%	460	11%	2,002	54%

TRANSACTION TIME

The proof-of-concept demonstrated an improvement in the processing time between outpatient letter creation and GP receipt.

Data on the transaction time per outpatient letter per participant (adjusted to exclude participants who chose not to use the front-end speech recognition software) was analysed for the six-month period (June to November 2020) prior to the proof-of-concept baseline and for the six months (December 2020 to May 2021) of the proof-of-concept trial (Phase 1 and 2) (Figure. 1). Prior to the proof-of-concept participants used only the medical transcription service to produce outpatient letters, however during the trial front-end speech recognition and self-type options were also available for use. The proof-of-concept trial demonstrated an average improvement (i.e., reduction in transaction time) of 25% from the baseline over the six-month trial period (Table 3). This suggests that GPs could receive outpatient letters within hours as opposed to days, emphasising the real time application and capability.

Of the 13 participants, 8 (62%) demonstrated a positive improvement (range 17% to 92%). Participant 5 demonstrated a significant positive improvement of 92% in transaction time by the end of the proof-of-concept trial. This participant used front end speech recognition functionality for 92% of transactions. The overall findings on transaction speed suggests GPs will receive outpatient letters 25% faster when hospital clinicians use front-end speech recognition software. These findings conclude that it is quicker for a clinician to speak and or self-type the letter when compared to using the medical transcription service. This is due to the medical transcription service requiring more workflow process steps (i.e., sending audio, letter is typed and returned to clinician for signing and is then dispatched to the GP and information system), (Figure.1) and subject to delays associated with the workload of the medical transcription service. The improvement in transactional speed could lead to improved patient outcomes through quicker medical reporting to the referring clinician for ongoing care.[1]

FIGURE 1 - PROCESS FLOW

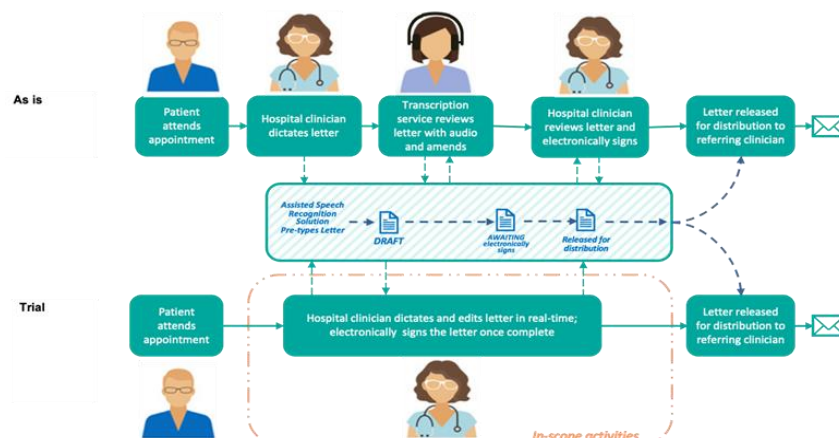


TABLE 3: TRANSACTION SPEED PER PARTICIPANT – BASELINE AND PROOF-OF-CONCEPT – JUNE 2020 TO MAY 2021

participant Reference	variance from pre-trial to trial (numerical)	variance from pre-trial to trial (%)
participant 2	10.08	55%
participant 3	-0.40	-3%
participant 4	1.51	12%
participant 5	24.67	92%
participant 7	2.70	17%
participant 8	-3.04	-19%
participant 9	-3.63	-32%
participant 10	-4.01	-24%
participant 11	-0.26	-2%
participant 14	12.33	61%
participant 15	10.70	72%
participant 16	5.67	32%
participant 18	7.62	73%
	4.03	25%

ADOPTION

A key lesson learned was that if a future rollout is approved, regular contact with clinicians will be required to ensure adoption and uptake rates are sustained.

Implementing new technology in healthcare can be complex and challenging as transformational change cannot occur without the support of the organisation. Therefore, those involved in leading change activities associated with introducing new technology must be prepared with the appropriate tools and change management techniques to ensure adoption of the new technology, processes, and culture. [11] Feedback received from participants through interview during Phase 1 of the proof-of-concept was that more adoption support, including the use of different techniques and approaches would have been beneficial. Suggestions from participants to enhance the adoption package were to include 'cheat sheets' for commonly used system words and establishing an outside of business hours support for clinicians as they often completed letters before or after clinics. As a result of this feedback, a medical transcription resource was deployed as part of Phase 2 of the proof-of-concept to provide additional 'at the elbow' support and adoption services and cheat sheets were developed. An extended hours adoption and support service will be a consideration for a full-scale rollout of the technology.

Two participants who initially used the front-end speech recognition functionality quickly transitioned back to using the medical transcription service due to voice to text conversion issues. The vendor involved in the proof-of-concept confirmed that the product can take up to 90

hours to learn a clinician's voice profile. Participants frequently commented that the translation of scientific words was excellent, however basic language translation was poor by comparison. This demonstrates that even clinicians who have a voice profile within the transcription software of 85% voice to text accuracy may still encounter frustrations.

Most participants agreed that integration with the ieMR system was outstanding as it provided pre-populated patient demographic information directly into the outpatient letter template, and allowed the option for clinicians to cut and paste clinical notes (when using the self-type option). Whilst participants felt that the handheld USB microphone provided quality transcription and was easy to use, many clinicians work across multiple facilities and often forgot to take the handheld microphone with them. Based on this feedback, the project supported clinicians to use the pre-existing vendor developed phone application in Phase 2, allowing clinicians the ability to dictate and process letters 'on the go' from any location.

PARTICIPANT CHARACTERISTICS

The top three (letters produced) participants of the front-end speech recognition functionality during the proof-of-concept were participant 2 (163 letters or 77%), participant 5 (218 letters or 92%) and participant 18 (143 letters or 52%). These participants had the three largest variances from baseline in terms of transactional time. Participant 2 improved by 55%, participant 5 by 92% and participant 18 by 73%. All three participants identify as digital natives. These findings illustrate the strong link between digital natives and adoption of digital technology and the

importance of digital natives to act as change advocates in the event of a future rollout.

CONCLUSIONS

Based on the positive benefits achieved through the proof-of-concept, it is recommended that the health service invest and progress an expansion of the technology to respond to increased healthcare demands associated with population growth. This recommendation includes the engagement of a change management and training focused delivery team to ensure adoption and benefits realisation is achieved.

To achieve digital fluency, the change management strategy will need to consider different strategies to meet different generational needs. Due to the time taken to build an accurate voice profile of 85% or more, hospital clinicians involved in the trial will be encouraged to dictate frequently used words into the software and continue to use the backend speech recognition functionality. Both actions will increase the accuracy of voice profiles to improve speech recognition. As the quality and efficiency of front-end speech recognition grows overtime, it is expected that the workload of the transcription service will reduce, allowing the organisation to manage the predicted decline in the transcription workforce. However, there will always be a need for transcribers to facilitate the delivery of training, support adoption associated with the speech recognition technology and to remediate technology errors.

ETHICS APPROVAL

In preparation of this case study, the following approvals were provided:

- The Prince Charles Human Research Ethics Committee – 20 May 2021 (Reference EC00168/HREC/2021/QPCH/76081)
- Queensland University of Technology Administration Review – 3 June 2021 (Reference 2021000376)
- Site Specific Approval via Sunshine Coast Hospital and Health Service – 16 June 2021 (Reference SSA/2021/QSC/76081).

References

1. Schwarz CM, Hoffmann M, Schwarz P, Kamolz L-P, Brunner G, Sendhofer G. A systematic literature review and narrative synthesis on the risks of medical discharge letters for patients' safety. *BMC Health Services Research*. 2019 March; 19(1): 158.
2. Kripalani S, LeFevre F, Phillips CO, Williams MV, Basaviah P, Baker DW. Deficits in communication and information transfer between hospital-based and primary care physicians: implications for patient safety and continuity of care. *JAMA*. 2007 February; 297(8): 831–41.
3. Wong K, Chan AHS, Ngan SC. The effect of long working hours and overtime on occupational health: A meta-analysis of evidence from 1998 to 2018. *International Journal of Environmental Research and Public Health*. 2019 June; 16(12), 2102.
4. U.S. Bureau of Labor Statistics [Internet]. Occupational Outlook Handbook: Medical Transcriptionists. 9 April 2021 [cited 2021 August 14]; Available from <https://www.bls.gov/ooh/healthcare/medical-transcriptionists.htm>
5. Health Informatics Society of Australia [Internet]. What is Digital Health? And why does it matter? 2 Dec 19 [cited 2021 Aug 14]; Available from https://www.hisa.org.au/wp-content/uploads/2019/12/What_is_Digital_Health.pdf
6. Wang Q, Myers MD, Sundaram D. Digital Natives and Digital Immigrants. *Business & Information Systems Engineering*. 2013 Nov; 5: 409–419.
7. Australian Bureau of Statistics (ABS). Population by age and sex – national. Table 6 – Age distribution by sex – preliminary 30 June 2020. [Internet] Canberra, ACT; 20 Dec 20 [cited 2021 Aug 14]. Available from: <https://www.abs.gov.au/statistics/people/population/national-state-and-territory-population/dec-2020>
8. Sunshine Coast Hospital and Health Service, 2021. Business Case - Front End Speech Recognition.
9. Office of the eSafety Commissioner [Internet]. Understanding the digital behaviours of older Australians. May 2018 [cited 2021 Sept 18]; Available from <https://www.esafety.gov.au/sites/default/files/2019-08/Understanding-digital-behaviours-older-Australians-summary-report-2018.pdf>
10. Poder TG, Fiset JF, Déry V. Speech Recognition for Medical Dictation: Overview in Quebec and Systematic Review. *Journal of Medical Systems*. 2018 April; 42(5), 1–8.
11. Van Zeebroeck N, Kretschmer T, Bughin, J. Digital "is" Strategy: The Role of Digital Technology Adoption in Strategy Renewal. *IEEE Transactions on Engineering Management*. 2021 June; 1–15.

APPENDIX 1: STRUCTURED INTERVIEW QUESTIONS

1. Do you use front end speech recognition software?
2. Have you been using both proof-of-concept functionality and the current business as usual process with the medical transcription service?
3. Do you use self-type software?
4. Do you use your mobile phone via the microphone application for transcription?
5. What is the average time to produce a letter using the front-end speech recognition software?
6. Do you find front end speech recognition more efficient than medical transcription service?
7. What time of the day do you produce your letters?
8. Do you have any issues with the microphone?
9. Has the transcription converted to text accurately when using the front-end speech recognition software?
10. How many corrections are undertaken on average per letter?
11. Do you find the final version (print view) is behaving and appearing as expected?
12. Do you use the patient appointment schedule tab within the ieMR application?
13. Do you cut and paste from the ieMR application?
14. Are you needing to use the service of transcription team (including ability to push as letter to the transcription team)?
15. Is your experience positive with the front-end speech recognition software?
16. How did you find the training? Any feedback?
17. Have you continued to use the front-end speech recognition software or reduced your usage? If you're not using the front-end speech recognition software, why?
18. Did the time to use the front-end speech recognition software incur any impact on your appointments with patients?
19. Do you support the dis-benefit of additional time for the clinician to produce the letters is worth the benefit of letters getting to referring doctors quicker?
20. Are you having any issues with Fluency Flex failing when my Fluency Direct application is not in use?
21. Any issues with letters being produced with spelling errors, missing capitals, missing spaces, dot points (or adding in extra dot points). Do you know about the hold queue?

EMERGENCY MANAGEMENT SYSTEM IN INDONESIA: AN EVALUATION OF EMERGENCY PATIENT MANAGEMENT IN 2020

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ABSTRACT

Indonesia has its emergency patient management system regulated in Public Safety Center (PSC) 119 as stated in Indonesia's Health Ministry Regulation No. 19 (2016). An evaluation to assess the ongoing management of this system is a must to ensure its continuous development.

This study assessed the ongoing emergency patient management system using instrument indicator questionnaires developed by the authors. The questionnaire consists of 28 indicators from 8 assessment aspects including: policy, planning, program implementation, communication, transportation, referral, management reviews, and emergency services. Questionnaires were distributed and completed questionnaires were received from 88 respondents from 21 provinces of Indonesia. Validity test results counted the coefficient correlation of all indicators above r value table (0.2096) and all Alpha Cronbach's indicators value above 0.80. The value indicator is considered poor if its average score is below the average score of the overall indicators and is considered good if it is above the average overall indicator score. The assessment result there is twelve indicators from this study shows a below average value (66). Data acquired in this study can be used as a preliminary reference for continuous improvement of Indonesia's emergency management system operated by the PSC.

KEYWORDS

emergency department; policy; planning; implementation; management review

INTRODUCTION

The 2016 Indonesia's Minister of Health Regulation No. 19 has required that emergency management to be implemented with continuous improvement.[1] Prehospital ambulance services on emergency management begins when a patient is discovered until he or she receives help and further assistance from the emergency personnel of the required health facilities, in accordance with an agreed action algorithm.[2] The success of emergency

management is strongly influenced by the officer's response time, good coordination and communication as well as access to and quality of integrated and affordable services.[3] In managing patients within the scope of the geographic work area of the responders, distance and response time become the main concerns.[4][5] This is the same for the competencies of the responders and facilities, such as ambulances, which require good emergency management planning.[6] Emergency management planning has to ensure that appropriate

actions are taken in the fastest time possible.[7] In terms of the time required to respond an emergency condition, it will very much depend on the patient's case. Apr 2002 average emergency response times needed from the incident until help is acquired from emergency officers was 6.97 minutes, while the effective response time needed for a life threatening call is less than 5 minutes.[3] Deaths due to emergency situations in Indonesia reached 1.3 million cases in 2016 and it is very challenging to reduce this number despite the establishment of the integrated emergency management system.[8] Emergency management requires actions that can ensure targeted activities, especially when an emergency occurs.[9] This emergency action includes the necessary system preparation before the emergency, during the emergency, and after the emergency. There are several aspects to determine whether emergency management is well executed or not, such as policy, planning, program implementation, communication system, transportation system, referral system, management review, and emergency service aspects. These aspects determine the success of emergency management.[10] The response time of this emergency system should be under 15 minutes, which is very difficult to achieve due to various external factors, such as traffic jams or difficult terrain.[3] The communication and coordination system between emergency department organizations is problematic when an integrated call center, which is Call Center 119 in Indonesia, is not used or bypassed and the PSC is not available yet in the area.[3][11]

The different level of competencies of PSC officers also lead to different service system standards in every PSC areas. Inadequate infrastructure for the system because the procurement budget is not yet available, but the system must still be implemented.[12] Indonesia is a very diverse country, consisting of districts and cities with different local government policies, including for the emergency management system. This diversity creates difficulties in the implementation of the emergency management system despite the continuous development of the system.[13] Therefore, system assessment indicators or system standard instruments are required for the PSC 119 to ensure that evaluation can be carried out at the management review stage.

The results of this review will inform the appropriate planning data for the PSCs in the regions. This has encouraged researchers to conduct studies on the development of PSC's measurement instruments system

when handling emergency in Indonesia. Those instruments will be beneficial for improving and evaluating the current system.

METHODS

SAMPLE

At the time of the study, there were 251 PSCs that had been established in Indonesia. In this study, researchers used sampling method so that all PSCs became the study population. Validity of the questionnaire In this studi has been tasted. Validity test results counted the coefficient correlation of all indicators above r value table (0.2096) and all Alpha Cronbach's indicators value above 0,80. All 251 PSC asked to fill in a survey questionnaire, only 88 of the total had responded. The questionnaire respondents are data owners and have been in charge of running clinical emergency services; including managing health personnel and ambulances which enable them to carry out their finction as a PSC. The survey questioanire was delivered online, utilizing Google Forms. This emergency patient management assessment is a self-assessment of the current management using accessed documents as evidence.

Ethics Clearance approval number Ket-724/UN2.F10. D11. /PPM.00.02/2019 was undertake by The Research and Community Engangement Ethical Committee Faculty Of Public Health Universitas Indonesia .

MEASURES

Eight aspects of emergency management were included in the assessment: policy, planning, program implementation, communication system, transportation system, referral system, management review, and emergency services. For these eight aspects, 28 indicators were created based on a literature study on disaster emergency management cycle (DEMC) theory and a scoring system of 1 to 3 was used. Score 1 represents the lack of a program, while score 2 represents that a program was implemented and score 3 represents the implementation of the program added by follow-up activities. For each indicator, the average score was calculated, which was then compared to the average overall values of all indicator score received in this study. Based on this comparison, the achievement of the PSC in each indicator was determined.

DATA ANALYSIS

Data collected from the responses to the online questionnaires as completed by PSCs as a self-assessment of emergency patient management were analyzed and compiled into a Microsoft Excel spreadsheet table and processed using the SPSS (Version 22) as frequency distribution analysis on 28 indicators derived from 88 PSCs. Results were then presented in a table and a cobweb chart to illustrate the current implementation of emergency patient management in PSCs. For each indicator, proportion and average score were calculated. The average score describes the achievement of the indicators of emergency patient management. To

understand the current situation of the PSC, the average score for individual indicators were compared to the average score for the overall indicators. The indicators with an average score below the overall average score were considered to have poor achievement while those with an average score above the overall average score were considered to have good achievement.[14]

RESULTS

Results of the assessment of indicators for the integrated emergency management system of the PSC 119 as distributed scores from 88 respondents for all indicators (28 indicators) are presented in Table 1.

TABLE 1. PSC 119 INTEGRATED EMERGENCY MANAGEMENT ASSESSMENT

Indicator No.	No	Variable	Indicator	Number of Respondents with the compliance score for each indicator						
				1	%	2	%	3	%	Average
	Pre-Accident									
	1	Policy								
1	1.01		Medical emergency regulations are established and disseminated	8	9.1	25	28.4	55	62.5	74,3
2	1.02		Availability of PSC 119 medical emergency organizational structure	10	11.4	32	36.4	46	52.3	70,7
	2	Planning								
3	2.01		Availability of procedures for planning a medical emergency management program	13	14.8	30	34.1	45	51.1	69,3
4	2.02		Identification of potential medical emergencies from medical emergency information data and then risk assessment analysis and determination of medical emergency control	18	20.5	29	33.0	41	46.6	66,3
5	2.03		Availability of management program plan at PSC 119	23	26.1	29	33.0	36	40.9	63,0
6	2.04		Availability of medical emergency decision making algorithm	21	23.9	14	15.9	53	60.2	69,3
7	2.05		Availability of medical emergency patient management system plan and hospital referral system	13	14.8	15	17.0	60	68.2	74,3
8	2.06		Availability of human resources and facilities	21	23.9	28	31.8	39	44.3	64,7

Indicator No.	No	Variable	Indicator	Number of Respondents with the compliance score for each indicator						
				1	%	2	%	3	%	Average
9	2.07		Availability of budget plan	15	17.0	16	18.2	57	64.8	72,7
	3	Emergency response implementation								
10	3.01		Information systems and communication technology as well as effective emergency information systems	19	21.6	34	38.6	35	39.8	64,0
11	3.02		Readiness of infrastructure, technology and transportation facilities	16	18.2	32	36.4	40	45.5	66,7
12	3.04		Documentation and reports	8	9.1	30	34.1	50	56.8	72,7
13	3.05		Community participation	15	17.0	26	29.5	47	53.4	69,3
14	3.06		Training, simulation, and competency certification	25	28.4	30	34.1	33	37.5	61,3
15	3.07		Medical emergency organization cooperation	46	52.3	24	27.3	18	20.5	49,3
	Accident									
	4	Communication and support system								
16	4.01		Sharing information	27	30.7	23	26.1	38	43.2	62,3
17	4.02		Multi-group decision and action algorithm	31	35.2	27	30.7	30	34.1	58,3
18	4.03		Share resources	14	15.9	17	19.3	57	64.8	73,0
	5	Emergency transportation system								
19	5.01		Transport priority	10	11.4	28	31.8	50	56.8	72,0
20	5.02		Troubleshooting Transport	10	11.4	32	36.4	46	52.3	70,7
	6	Referral system			0.0		0.0		0.0	
21	6.01		Comprehensive emergency management	20	22.7	25	28.4	43	48.9	66,3
22	6.02		Hospital response	35	39.8	20	22.7	33	37.5	58,0
	Post-Accident									
	7	Management review								
23	7.01		Recovery response and post-accident reports	28	31.8	35	39.8	25	28.4	57,7
24	7.02		Incident investigation/ analysis and management review	23	26.1	32	36.4	33	37.5	62,0
25	7.03		Continuous improvement with program plan	18	20.5	30	34.1	40	45.5	66,0
26	7.04		Program review and continuous improvement	24	27.3	27	30.7	37	42.0	63,0
	8	Emergency services								
27	8.01		Improving the quality of emergency services	25	28.4	34	38.6	29	33.0	60,0
28	8.02		Speeding up the response time for Emergency Patients	13	14.8	24	27.3	51	58.0	71,3
			Total average of overall indicators							66.0

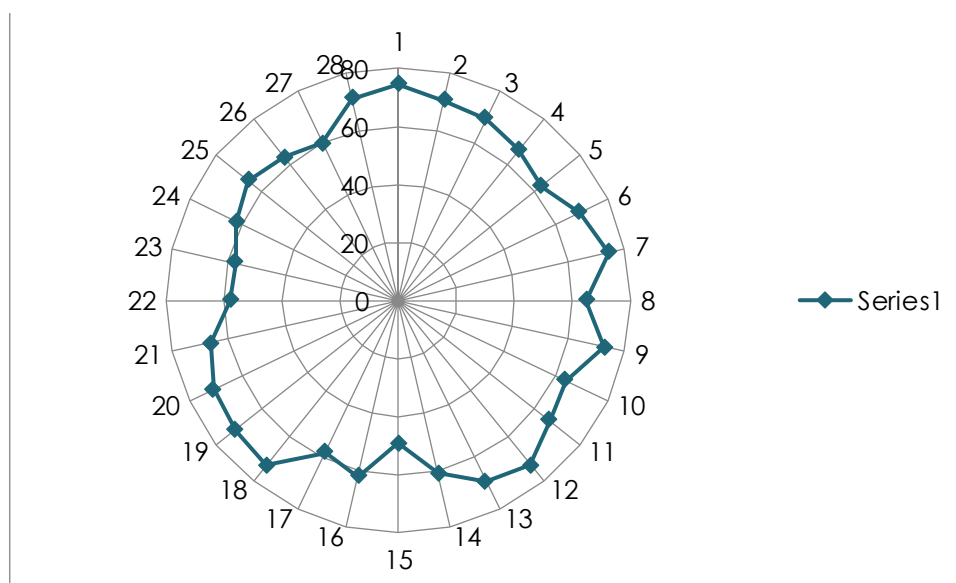
The proportion of each indicator was calculated based on the percentage of the number of PSCs that achieved score 1, 2 and 3 against the overall score of the 88 PSCs while the percentage value was obtained as the proportion of PSC condition for each indicator. The average value of each indicator was calculated by adding the number of PSCs that achieved a score of 1 to the number of PSCs with score 2 and the number of PSCs with score of 3 divided by 3 as reflected in the following formula:

$$\text{National average achievement} = \frac{(n_1 \times 1 + n_2 \times 2 + n_3 \times 3)}{3}$$

The average score of all PSC indicators was 66.0

From the average score of each indicator (Indicators 1 to 28), it was identified that there were several indicators that received a score below the average score of the overall indicators (<66) in the 88 PSCs. Those indicators were indicators 5, 8, 10, 14, 15, 16, 17, 22, 23, 24, 26, and 27. This result is depicted as a chart in Figure 1

FIGURE 1 AVERAGE SCORE ACHIEVEMENT FOR EACH INDICATOR



Those indicators showing that planning activities should be strengthened to ensure the smooth implementation of required actions.[15] The PSCs must have a decision-making algorithm for emergency patient rescue and implement the process of determining or selecting patients who are prioritized to receive treatment first (triage).[16] The PSCs must prepare necessary improvement to support their human resources, including for wage/benefits/insurance; provide training related to emergency patient management; make emergency patient management their main task; and provide facilities needed to manage emergency situation.[17] It is necessary for the PSCs to strengthen the program for the use of these indicators to ensure that programs can be implemented and information can be well-documented. The PSCs need to establish programs for this indicator to ensure the capacity of PSC staff remains good.[18] The small number of PSCs that collaborate with other

institutions may link to the fact that this collaboration is regulated at the national level and it could be that the PSCs feel that they do not need to create their own collaboration network.[19] PSCs need to strengthen programs related to this indicator to ensure that all medical emergency information can be shared to other medical emergency organizations to increase effectiveness and response time.[20] The PSCs need to strengthen programs related to these indicators to ensure that all algorithms can be used in various PSCs to ensure that their actions will be the same in all regions.

PSC 119 should improve its collaboration to coordinate with the emergency service in hospitals through the Public Health Office.[21] PSCs should conduct monitoring evaluations for continuous improvement. Collaborations have been arranged at the national level and PSCs feel that they do not need to collaborate on their own. PSC

119 should improve their medical emergency recovery program, starting from receiving report to the ambulance trip to take patients to health facilities and ensure that patient's medical report is made for medical emergency recovery.[22] It is also important to ensure that reports are complete and standardized in all PSCs. PSC 119 should conduct investigations/analysis of emergency patient cases and use the results of the investigation/ analysis to improve the emergency system. PSC 119 should conduct reviews on emergency management activities and make program follow-up plans for continuous improvement.[23] PSC 119 should have a program to improve the quality of medical emergency services and improve the service system performance audits that are currently not done by most PSCs. Structured program plans for handling high risk cases can ensure that all risks are identified and rated so that correct methods of conduct can be decided and made into an implementation program. This identification can be utilized as information in developing an appropriate emergency guide.[24] Identification for emergency patient care of certain conditions are a concern in planning rescue actions.[25] Appropriate written controls listed as guidelines can reduce death and disability risk in patients.[12] Emergency patient management handling and hospital referral systems need other integrated systems such as communication; , ambulance transporting systems; as well as hospital referral systems that require comprehensive coordination.[11]

CONCLUSION

From this study, based on the implementation of emergency management in 88 PSCs in 21 provinces in Indonesia, there are still gaps that should be addressed to achieve good emergency management systems. The results of this assessment study on the 8 aspects and 28 management criteria, demonstrate it is apparent that improvements should be made in emergency management to achieve continuous improvements. This is especially true for indicators that have an average value below the overall average value for all study participating organizations, which includes collaboration among medical emergency collaboration (49.3), multi-group decision and action algorithm (58.3), hospital response (58.0), and recovery response and post-accident reporting (57.7). These indicators need special attention to enable continuous improvement.

In addition, data collected in this study can be used as the reference for initial identification of the parts of the emergency management system that still need to be improved in other PSCs.

A limitation in this study is the number of respondents that represents only 88 PSCs from all 251 PSCs available. For future research, more data is essential in order to have a more appropriate and comprehensive picture of the current state of the implemented management systems.

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References

- 1 Larsson P, Dekker SWA, Tingvall C. The need for a systems theory approach to road safety. *Saf Sci*. 2010. <https://doi.org/10.1016/j.ssci.2009.10.006>
- 2 Singletary EM, Zideman DA, De Buck EDJ, Chang WT, Jensen JL, Swain JM, et al. Part 9: First Aid: 2015 international consensus on first aid science with treatment recommendations. *Circulation*. 2015. <https://doi.org/10.1016/j.resuscitation.2015.07.047>
- 3 Blackwell TH, Kaufman JS. Response time effectiveness: Comparison of response time and survival in an urban emergency medical services system. *Acad Emerg Med*. 2002. <https://doi.org/10.1197/aemj.9.4.288>
- 4 Paciarotti C, Cesaroni A, Bevilacqua M. The management of spontaneous volunteers: A successful model from a flood emergency in Italy. *Int J Disaster Risk Reduct*. 2018. <https://doi.org/10.1016/j.ijdrr.2018.05.013>
- 5 Pal I, Ghosh T, Ghosh C. Institutional framework and administrative systems for effective disaster risk governance – Perspectives of 2013 Cyclone Phailin in India. *Int J Disaster Risk Reduct*. 2017. <https://doi.org/10.1016/j.ijdrr.2017.01.002>
- 6 Hambridge NB, Howitt AM, Giles DW. Coordination in crises: Implementation of the national incident management system by surface transportation agencies. *Homel Secur Aff*. 2017. <https://www.hsaj.org/articles/13773>

- 7 Bachmann DJ, Jamison NK, Martin A, Delgado J, Kman NE. Emergency preparedness and disaster response: There's an app for that. *Prehospital and Disaster Medicine*. 2015. <https://doi.org/10.1017/S1049023X15005099>
- 8 WHO. NONCOMMUNICABLE DISEASES. 2018. https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=WHO.+NONCOMMUNICABLE+DISEASES.+2018&btnG=
- 9 Othman SH, Beydoun G. A metamodel-based knowledge sharing system for disaster management. *Expert Syst Appl*. 2016. <https://doi.org/10.1016/j.eswa.2016.06.018>
- 10 Roberts PS, Wernstedt K. Decision Biases and Heuristics Among Emergency Managers: Just Like the Public They Manage For? *Am Rev Public Adm*. 2019;49(3):292–308. <https://doi.org/10.1177/0275074018799490>
- 11 Power N. Extreme teams: Toward a greater understanding of multiagency teamwork during major emergencies and disasters. *Am Psychol*. 2018. <https://doi.org/10.1037/amp0000248>
- 12 McGrady E, Blanke SJ. Twelve Best Practices to Mitigate Risk Through Continuity Planning and a Scorecard to Track Success. *J Manag Policy Pract*. 2014. http://www.digitalcommons.www.na-businesspress.com/JMPP/McGradyE_Web15_3_.pdf
- 13 Mojtahedi M, Oo BL. Critical attributes for proactive engagement of stakeholders in disaster risk management. *International Journal of Disaster Risk Reduction*. 2017. <https://doi.org/10.1016/j.ijdrr.2016.10.017>
- 14 Lestari F, Bowolaksono A, Yuniutami S, Wulandari TR, Andani S. Evaluation of the implementation of occupational health, safety, and environment management systems in higher education laboratories. *J Chem Heal Saf*. 2019 <https://doi.org/10.1016/j.jchas.2018.12.006>
- 15 Üster H, Wang X, Yates JT. Strategic Evacuation Network Design (SEND) under cost and time considerations. *Transp Res Part B Methodol*. 2018 <https://doi.org/10.1016/j.trb.2017.11.010>
- 16 Li N, Sun M, Bi Z, Su Z, Wang C. A new methodology to support group decision-making for IoT-based emergency response systems. *Inf Syst Front*. 2014. <https://link.springer.com/article/10.1007/s10796-013-9407-z>
- 17 Bachman SL, Demeter NE, Lee GG, Burke R V., Valente TW, Upperman JS. The impact of trauma systems on disaster preparedness: A systematic review. *Clin Pediatr Emerg Med*. 2014. <https://doi.org/10.1016/j.cpem.2014.09.004>
- 18 Khazai B, Anhorn J, Burton CG. Resilience Performance Scorecard: Measuring urban disaster resilience at multiple levels of geography with case study application to Lalitpur, Nepal. *Int J Disaster Risk Reduct*. 2018. <https://doi.org/10.1016/j.ijdrr.2018.06.012>
- 19 McGuire M, Silvia C. The effect of problem severity, managerial and rrganizational capacity, and agency structure on intergovernmental collaboration: Evidence from local emergency management. *Public Adm Rev*. 2010;70(2):279–88. <https://doi.org/10.1111/j.1540-6210.2010.02134.x>
- 20 Brennan RJ. Rapid health assessment in Aceh Jaya District, Indonesia, following the December 26 tsunami. *Emerg Med Australas* [Internet]. 2005;17(4):341–50. Available from: <http://doi.wiley.com/10.1111/j.1742-6723.2005.00755.x>
- 21 Holgersson A. Review of On-Scene Management of Mass-Casualty Attacks. *J Hum Secur*. 2016 <https://doi.org/10.12924/johs2016.12010091>
- 22 Sabra JP, Cabañas JG, Bedolla J, Borgmann S, Hawley J, Craven K, et al. Medical support at a large-scale motorsports mass-gathering event: The inaugural formula one united states grand prix in Austin, Texas. *Prehosp Disaster Med*. 2014 <https://doi.org/10.1017/S1049023X14000636>
- 23 Hu J, Chen C, Kuai T. Improvement of emergency management mechanism of public health crisis in rural china: A review article. *Iranian Journal of Public Health*. 2018. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5810378/>
- 24 Paton, D. (2003) 'Disaster preparedness: A social-cognitive perspective', *Disaster Prevention and Management: An International Journal*. <https://doi.org/10.1108/09653560310480686>
- 25 Thaler, T. and Seebauer, S. (2019) 'Bottom-up citizen initiatives in natural hazard management: Why they appear and what they can do?', *Environmental Science and Policy*. <https://doi.org/10.1016/j.envsci.2018.12.012>

THE TRANSMOGRIFICATION OF SURGICAL TELEHEALTH: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Telehealth has been used to care for patients at a distance in specific clinical and demographic situations, but the demand for physical isolation during the COVID-19 pandemic has expanded its application to the broader community. This systematic literature review, of very recent publications, elucidates the new ways telehealth has been implemented, confirms its acceptability, accessibility and safety by collating reviews, trial and cohort studies from peer reviewed journals meeting defined risk of bias criteria.

Five literature reviews, three qualitative studies and 22 quantitative studies were included, which confirmed that telehealth is a safe medium for delivery of surgical health care, is accessible and efficient for the majority of patients and clinicians across the age and socioeconomic spectrum. It is time and resource efficient for providers and recipients and improves the delivery of patient-centred care. Many providers have published innovative solutions to the difficulties of telehealth, such as conducting a physical examination or technological limitations at the remote site. Health care can now be delivered directly to the home or the workplace.

Routine in-person postoperative review of patients should be replaced by patient-led telehealth unless there is a specific reason for face-to-face review. Assessment and management of new cases could be managed more efficiently if a carefully planned digital referral process is developed and adopted.

KEYWORDS

telehealth surgery; PRISMA review

INTRODUCTION

Telehealth is a broad term including a wide variety of remotely delivered healthcare (Greek *tele*: far), but usually refers to telephone and video consultation for inpatients and outpatients. Prior to the COVID-19 pandemic, its use was mainly limited to rural or military patients and although

it has been demonstrated to be safe, efficient and cost effective, legislative and remunerative barriers have limited more widespread use.[1]

These barriers were rapidly dismantled in early 2020 and the spate of publications reporting the benefits and improved outcomes can guide policy and protocols as we redefine

"normal" medicine. The COVID-19 pandemic lockdown has affected many nations, attitudes and regulations pertaining to telehealth have changed dramatically, and many studies have documented the local experiences of surgical units adopting to the rapid changes and large-scale adoption of telehealth. These more recent publications explore the application of telehealth to an unselected surgical population and therefore deserve the narrow timeframe focus.

Surgery is primarily procedural therefore might be considered impractical for remote care. This review therefore explores the extent to which surgical care can be provided using telehealth technology.

This Systematic Literature Review, in accordance with PRISMA guidelines, seeks answers to the questions:

1. What have we learned about the role of telehealth in assessing and following up surgical patients since COVID-19 encouraged us to minimise face-to-face appointments?
2. How has outpatient workflow been revised to make best use of telehealth for surgical patients?

METHODS

A broad search of the literature using diverse search tools for studies involving surgical patients was devised. The years of publication was limited to 2019 and 2020 because there have been many Literature reviews published just prior to the sudden changes in health care provision brought about by the COVID-19 pandemic. The safety and cost-efficiency of telehealth consultations has already been established in the narrow fields studied.[2-4] Use of Telehealth for initial surgical assessment, preoperative investigations and preparation, home monitoring after early discharge, and remote postoperative consultations were included. The studied intervention was outpatient consultation using telehealth (telemedicine / telecare / digital health) compared with face-to-face appointments. Outcomes of interest were chosen based on relevance to planning widespread changes to workflows in hospital health care delivery: Guidelines for patient selection, patient satisfaction, clinician satisfaction and clinical outcomes were of primary interest.

Study designs included were systematic literature reviews, controlled trials, cohort studies, cross-sectional studies, participatory action research and case reports. Articles

which were primarily ideas, editorial or opinions were excluded.

Eligibility criteria: Information Sources which returned results were CINHAL, Clinical Key, Joanna Briggs Institute and Medline (EBSCO). No additional results were found in other sources. The search strategy was modified to suit the platform vernacular, as exemplified by the formula used in Medline for words in title, keywords or abstract:

(tele* OR "remote consultation" OR "video consultation" OR mhealth OR ehealth)

AND

(surg* OR preoperat* OR postoperat* OR perioperat*)

Expanders: Apply equivalent subjects

Limiters: Date of Publication: 2019-2020, Human, English

Figure 1 provides a summary of the selection process after results from searches numbered CINHAL: 103, Clinical Key: 378, Joanna Briggs Institute: 2350 and Medline (EBSCO): 5032. After using the "Remove Duplicates" function in EndNote X9, 3564 citations were listed. The first author (SFT) reviewed each title for inclusion criteria:

- Surgical AND Telehealth AND Adult
- Systematic review OR Validation study OR Cohort study OR Case study

Exclusion criteria:

- Mobile apps
- other primary focus (mental health, evolution of clinical course)
- Book chapters, cost-benefit analysis, editorials, opinion and consensus statements.

The remaining 109 citations were reviewed independently and blinded by both the first and second authors (SFT, SL) according to the Kmet protocol devised for the Alberta Heritage Foundation for Medical Research for a broad range of literature types beyond randomised controlled trials.[5] Inclusion required a Kmet score of at least 80% by either reviewer. Where there was disagreement about whether an article met the requirement or not, an independent blinded decision was made by the third author (RO).

A data collection spreadsheet was developed to classify and summarise the diverse methodologies employed and piloted. After discussion and refinement of this spreadsheet, a single author performed the initial data extraction, which was reviewed by all corresponding authors.

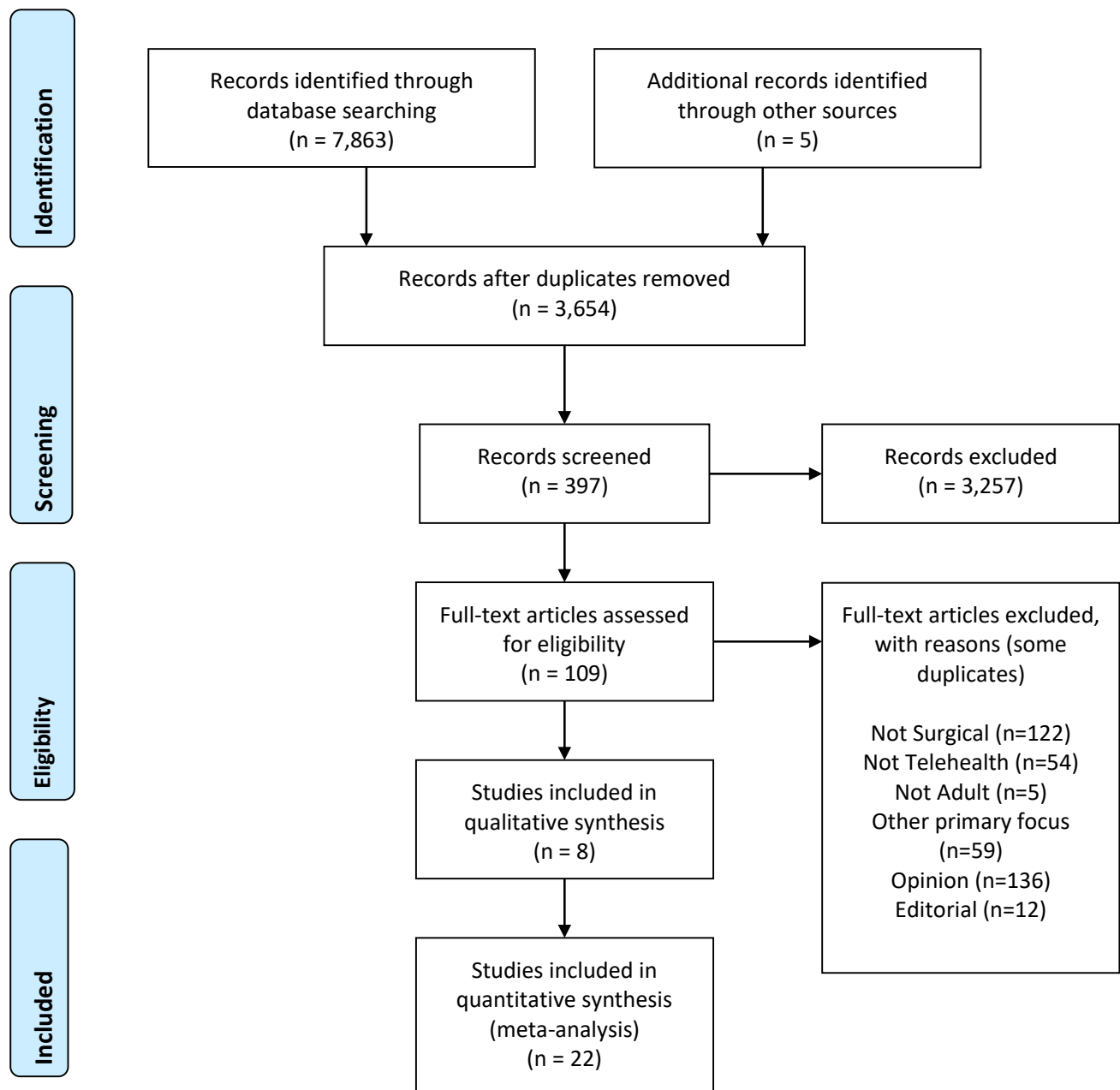
Measures included in the spreadsheet were:

- Study design (categorised as Literature Review, Randomised Controlled Trial, Case Study, Cohort Study or Validation Study)
- Surgical specialty
- Role of telehealth (categorised as Initial assessment, Hospital at home, Additional follow-up contact, Replace face-to-face follow-up visits)
- Patient Satisfaction
- Clinician Satisfaction
- Compliance with protocol (non-attendance)
- Clinical outcome
- Kmet score [5] for risk of bias

RESULTS

The process and results of the review are illustrated in Figure 1. The studies spanned various surgical specialties and application of the telehealth model and are summarised in **Error! Reference source not found..** The results are summarised in **Error! Reference source not found..**

FIGURE 1. FLOW DIAGRAM OF STUDY SELECTION [6]



Study characteristics are shown in Table 1. Five Literature reviews were included [7-11], three qualitative studies [12-14] and 22 quantitative studies [15-37].

A quality (risk of bias) assessment [5] was performed on all studies, and only those which met the 80% criteria were included for review. Results of individual studies are shown in Table 2.

TABLE 1 STUDY CHARACTERISTICS

Study	Design	Specialty	Telehealth Role
Qaderi, SM [8]	Literature Review	Colorectal	Follow-up
van den Bosch, SC [9]	Scoping Review	ENT	Initial assessment, follow-up
Grandizio, LCD [11]	Literature Review	Plastics	Initial assessment. Follow-up
Murphy, EP.[7]	Literature Review	Orthopaedics	Initial assessment
Wallis, CJD [10]	Literature Review	Urology	Assessment, hospital at home, follow-up
Danielsen, SO [12]	Case	Cardiothoracic	Additional follow-up
Gadjradj [14]	Case	Neurosurgery	Initial assessment, follow-up
Zhang, J [13]	Case	Orthopaedics	Follow-up
Goldstein, Y [16]	Validation study	Orthopaedics	Initial assessment
Kummerow Broman, K [15]	Validation study	Wounds	Follow-up
Lonergan, PE [17]	Matched cohort	Oncosurgery	All
Iwanoff, C [19]	Matched cohort	Urology	Additional follow-up
Siow, MY[35]	Matched cohort	Orthopaedics	Initial assessment. Follow-up
Dahlberg, K [21]	Cohort study		Follow-up
Kemp, MT [23]	Cohort study	General Surgery	Follow-up
Takchi, R.[36]	Cohort study	General Surgery	Hospital at Home
Fieux, M [18]	Cohort study	ENT	Follow-up
Mouchtouris, N [25]	Cohort study	Neurosurgery	
Olldashi [34]	Cohort study	Neurosurgery	Initial assessment
Lafaro, KJ [26]	Cohort study	Oncosurgery	Prehabilitation
von Glinski, A.[37]	Cohort study	Orthopaedics	Additional follow-up
Lee, S [20]	Cohort study	Plastics	Initial assessment
Andino, JJ [22]	Cohort study	Urology	Initial assessment
Cremades, M [28]	Randomised Controlled Trial	General Surgery	Follow-up
Hou, J [27]	Randomised Controlled Trial	Orthopaedics	Hospital at Home
Kane, L [30]	Randomised Controlled Trial	Orthopaedics	Follow-up
Vance, S [32]	Randomised Controlled Trial	Plastics	Additional follow-up
Thompson, JC.[29]	Randomised Controlled Trial	Urology	Follow-up
Mousa, AY [31]	Randomised Controlled Trial	Vascular	Follow-up
Luo, J [33]	Controlled Trial	Orthopaedics	Rehabilitation

TABLE 2 RESULTS OF STUDIES

K score	Patient Satisfaction	Clinician Satisfaction
	Protocol Compliance	Clinical Outcome
Qaderi, SM [8]	Patients preferred GP follow-up but had some concerns about lack of specialist knowledge.	Specialists and nurses believed that they were best for follow-up. GPs reported barriers: workload, access to results, access to specialists, UpToDate CPD.
80-90%		Follow-up by nurse (50%), GP (23%), surgeon (18%), oncologist (5%), gastroenterologist (4%). Specialist follow-up was not superior but was more expensive. Survivorship Care Plans enabled patient-led telehealth follow-up.
van den Bosch, SC [9]	Support for ENT oncology patients and those with craniofacial abnormalities. Caregiver involvement is important. 75% said they would like to have peer support, but no study has shown significant uptake.	82% of oral lesions assessed by WhatsApp were confirmed at f2f examination.
80-90%	Video consultations, online gaming. Most papers were feasibility and pilot studies. Consider the platform carefully. Include stakeholders/champions early, assess quality and impact using a mix of qualitative and quantitative studies	
	No studies mapped successes, failures or barriers.	Web education and self-help, human-supported web intervention, online counselling, therapeutic software, other.
Grandizio, LCD [11]	Sufficient access to technology. Patients report high satisfaction (but selection bias).	Images can be viewed on PACS. 88-98% of surgeons are satisfied with ability to examine using video call.
90-93%		Confidentiality risks can be managed with good policy. 2/3 hand trauma transfers to tertiary hospitals can be avoided by use of telehealth. No adverse clinical outcome in video consultations.

	Cost of visit is 45% more than telehealth. Also costs to patient for travel, lost work time.	
Murphy, E.[7]	75% would like to use again	6-100% managed by VFC alone. 1-70% required f2f clinic
91-100%	<p>17/18 studies reported that adverse outcomes were indicative of safety of this model</p> <p>18 studies (30,512 virtual fracture clinic encounters). Clear pathways and eligibility criteria. 7/18 clinics dealt with single defined injury. 2/18 assessed PROM (439 pts). Requires clear protocols, good communication between departments.</p>	Adverse outcomes (complication, operation, re-referral, deviation from protocol), cost reductions, efficiency (#patients, waiting times, #radiographs)
Wallis, CJD [10]	Easier access, but breaking bad news is compromised	Need more study into patient comprehension and engagement
80-95%	<p>Challenges in education of students and trainees. Use of eMDT, eConsults, web-based teaching and conferences, Twitter journal clubs. COVID-19 may increase the use of non-operative management and improve awareness of low-value care.</p>	Telemedicine used to support patient decisions, or to replace post-resection cancer surveillance visits. Value of DRE is limited for cancer assessment, but penile and testicular cancers must be examined. Reduced LOS and improved HRQOL and functional outcomes
Danielsen, SO [12]	46% used the hotline, rated it good, safe and trustworthy. Those who did not call reported that they were satisfied with the scheduled calls, were in a healthcare facility or felt they did not have sufficient concerns to warrant a call.	Nurses were satisfied with the manual and the team meetings, but felt more training was needed

90%		30-day readmission rate not changed in RCT of telephone hotline and scheduled calls but 81% were unavoidable in the intervention group of 69% in controls: ns.
Gadjradj [14] 73-86%		87% of neurosurgeons were using telemedicine, 60% of consultations had switched to telehealth. 75% thought the patients preferred TH, but only 52% of surgeons were comfortable with it. Concerns: 41% physical exam capability, 20% elderly, 20% privacy.
Zhang J [13]	69% of patients logged into the platform. 82% used email, 45% used SMS, 20% downloaded the phone app. 42% patients sent a message, 6% sent an image.	
73-85%	Demographics of users not different to non-users in age, sex or insurance status mHealth platform offered to all patients after hip/knee arthroplasty - rehabilitation videos, patient progress questionnaires, opportunity for 2 way communication and image upload	
Goldstein, Y [16]		
72-96%	8% unable to participate	Variability between video exam and direct exam of shoulder using one of several scoring systems shows video call gives reliable result
Kummerow Broman, K [15]		
89-90%		Sensitivity and specificity of wound assessment based on clinical information with or without photographs: pictures increased confidence, but decreased sensitivity

	Important for clinicians interpreting patient photographs to account for poor lighting, angles and white balance to minimise errors.	
Loneragan, PE [17]		
86-91%	Telehealth utilisation increased with COVID-19 from <20% to 72% of consultations. Well established clinic protocols	
Iwanoff, C [19]		
90-91%	Reduction in patient-reported complaints, but satisfaction not measured.	20% reduction (P=0.04) patient-initiated calls, but an increase by 10% (p=0.014) in office visits
Siow, MY[35]		
80%	63% of patients elected for f2f visit: by the end of the third week, 33% were f2f. 13% non-attendance before and after change in policy. Reduction in orthopaedic trauma by 31% during COVID-19. Changes to management (absorbable sutures) and policy (aim for zero f2f visits, delay non-urgent visits)	Image quality on platform was not always adequate. Patients can send photo.
Dahlberg, K [21]		
68-86%	17% initiated contact, 62% were in the first week and were mostly related to the wound or pain	Most of the patient concerns were resolved by nurses, but almost half required a visit to the clinic for dressing changes, medication or review. No emergency visits were recorded.
Kemp, MT [23]		
61-83%	4% cancelled for f2f preference, despite preference being an exclusion criterion 21% non-attendance. Non-Caucasian or single patients were less likely to attend.	6.5% were inappropriately referred for telehealth No emergency re-presentation that would have been prevented by f2f appointment

Patient selection is important

Takchi, R.[36]	10% of planned follow-up calls were not performed. Calls identified need for early intervention in 17%	Written information does not adequately provide for patients' needs. No difference in complication or readmission rates (insufficient power)
80-82%		
Fieux, M [18]	100 questionnaires=80% response rate: 94% communicated easily, 90% not nervous, 98% had all their questions answered but 49% felt it was not as good as f2f and 64% were concerned by lack of physical examination	100% satisfied, 50% saved time, 100% wished to continue using it after pandemic
77-91%	45% were scheduled for subsequent f2f consultation Senior clinicians given training on the platform, developed specific questionnaire for patient satisfaction. Looked for predictive factors for dissatisfaction, but did not find any - not age, technical difficulty, need for examination	(9% initial assessment)
Mouchtouris [25]	N. Operations dropped from 91 to 39 per week. TH increased from 4.5 to 180 per week, new patient TH assessment rose from 0 to 8 per week	Built on existing TH experience in the telestroke program. Need development of TH neurological examination and artificial intelligence to improve diagnostic ability. Noted benefits to patients and carers and added efficiency for hospital and clinicians.
95-100%		
Olldashi [34]	90-100%	
	The low operative rate might indicate an opportunity for more use of remote management by telehealth? Remote neurosurgical ward rounds?	International Virtual eHospital: neurotrauma: 84% asynchronous (store and forward), 15% included video consultation. 31% required transfer to tertiary hospital, but of these 9% required surgery.

Lafaro KJ. [26]	High satisfaction. Functional capacity and mobility improved but did not reach statistical significance. Symptom severity scores were low, but no comparator cited.	
78-85%	25% declined to participate. 18% dropped out of study. Small pilot study: worth exploring with larger numbers.	1 personalised preoperative TH physical therapy sessions (walking, self-efficacy CBT), 4 postop. Fewer daily steps correlated with postoperative complications.
von Glinski A.[37]	Most patients used the app at least twice. 71% rated satisfaction: 84% were satisfied and would recommend.	
80-85%	4% chose not to use the app but contact care provider directly. First 55 patients to use the postop App were reviewed. - pilot study.	11% readmission required revisional surgery. 7.3% had change in management resulting from use of app. Severity of surgery did not impact patient's perceived value of the app. Elderly used it more than expected.
Lee S [20].	Saved 162 minutes per patient, 145 miles per patient. 2 weeks less wait time for surgery. TH did not allow for patient-clinician discussion.	
71-82%	Consult Failure Rate 3x higher for f2f (p=0.0032). Lost to follow-up 4x higher for TH (p=0.024). Overall success rate same, but success rate of completed consults lower for TH	Asynchronous (store-and-forward) modality.
Andino JJ [22]	no difference in the rate of re-visits	Median age of TH patient 51 cf f2f 61 (p<0.0001). Post op reviews in 13%: same as f2f. Main initial assessments were for the same diagnoses, although more calculi had TH, more patients with lower urinary tract symptoms had f2f.
82-85%	Medicare beneficiaries (>65) are not eligible for TH, which explains age difference.	

Cremades, [28] 86-96%	M. Same satisfaction as f2f, all TH patients would recommend to others. 90% attendance f2f, 74% attendance in TH (technical difficulties, patient preference). P=0.003 Mainly gallstones, inguinal hernia, appendicitis. Noted that video calls take longer than telephone calls.	No increase in complications
Hou, J. [27] 86-95%	Follow-up of both groups 71% at 24 months. Essentially, this study demonstrated that the TH application improved compliance, which improved results.	Functional and pain indices were not different between the groups until 24 months post op, when the TH group showed an improvement, and quality of life was superior from 6 months. The subgroup of TH who were highly compliant with the exercises has significantly improved functional and pain scores from 3 months.
Kane, L. [30] 71-96%	Satisfaction was equal in each group but time in the appointment was 21.5 minutes TH, 37.8 minutes f2f.(p<0.001), 78% found it easy to set up the appointment Dropout rate 12% in both groups The postoperative protocols used by surgeons vary considerably. Selection bias.	Satisfied, less time in TH visits 9.5 minutes vs 11.3 for f2f. 89.6% of surgeons found it easy Pain, immobilisation, range of motion were uniform in each group. No complications in either group
Vance, S., [32] 73-93%	Likert satisfaction scale and Patient and Observer Scar Assessment Scale did not differ between telephoned and naïve patients Although randomised, the two groups were not equivalent for gender or time spent in the surgery.	All patients reviewed f2f but randomised to receive additional day 0 telephone call or not.

Thompson JC.[29]	Consumer Assessment of Healthcare Providers and Systems Surgical Care Survey (S-CAHPS) questionnaire 92% perfect for f2f, 88% perfect for TH, demonstrating non-inferiority. F2f patients attended a mean of 2.9 times per patient, TH patients attended mean od 0.7 times	No difference in Pelvic floor distress inventory-20 score
79-83%	Potential for selection bias Lower rating for TH was because score required rating of surgeon communication and TH was conducted by nurses.	No difference in adverse events, GP or ED presentations. Pelvic Floor Distress Inventory-20 same for each group.
Mousa, A. Y [31]	No difference in mental health, the physical-function, role-physical and role-emotional scores were higher for TH than standard care. Difference in overall Quality of life and satisfaction were not significant.	
86-88%	27.5% of patients refused to participate Daily weight, HR, BP, temp, O2 saturation, questions. Recruitment numbers too small to reach adequate Power.	No difference in 30-day readmission, surgical site infection. Wound reviews and treatments could be conducted without visits to healthcare sites.
Luo J [33]	Hip function questionnaire, SF36, functional independence measure. Initial scores similar initially, but statistically better after 3 months post op for all three parameters	
67-86%		No discussion of randomisation or allocation to groups (seemed equivalent). No mention of power calculation

The literature on telehealth in surgery has confirmed that telehealth approaches are popular with patients, [7, 11, 12, 18, 26, 28-31, 37] reduce costs and time required for patients to travel and attend to their healthcare [2, 10, 11, 20] and is clinically safe [7-9, 16, 23, 27, 29-31] for the studied applications. Prior to the COVID-19 pandemic, five review studies were spread across different surgical specialties

and focussed largely on outpatient assessment of new patients or replacing routine postoperative review in narrowly defined subsets of patients, selected for their suitability for remote assessment. Since the "shelter-in-place" has forced healthcare to embrace telehealth outside these carefully selected clinical scenarios the demographics reported here demonstrate that although

there was initial mistrust of the medium, patients and clinicians were satisfied after the experience. Notably, the elderly utilised the telehealth media more competently and more frequently than anticipated. [13, 14, 17, 18, 37] Concerns about privacy and confidentiality can be managed with appropriate policies and protocols. [7, 9, 11, 14, 23]

Additional study of the value of remote education and inter-professional consultation [8, 10] can be readily extrapolated to other specialties. It is clear that when enrolment in telehealth initiatives is enshrined in a well-defined and well publicised protocol, compliance, satisfaction and safety can be ensured. [7, 9, 11, 14, 23]

The addition of telephone or platform support for patients to the normal protocol has not been shown to have any significant benefit [12, 19, 26, 31-33]. However, there was no loss of clinical accuracy or satisfaction when the telehealth modality replaced what previously required travel to the clinic or hospital [14, 17, 18, 20, 22-25, 28, 30, 35]. The potential for synchronous or asynchronous clinical support may enable routine appointment protocols to be abandoned in favour of patient-centred "care on demand" models, which may result in a decrease in clinical workload for simple operations. [8, 9, 12, 13, 20, 21, 27, 34, 37] The papers examined showed a wide variation in postoperative care regime. [7, 10, 14, 21, 38]

The ability to conduct an examination by video consultation relies on careful preparation of the clinical and patient. Most clinicians felt confident of their ability to assess wound healing using patient-generated photographs, but Kummerow Broman et al [15] raised concerns about the reliability of this medium without some correction. Accuracy of video examination findings in oral surgery, orthopaedics, urology, neurosurgery and plastic surgery has mostly been measured using clinician satisfaction. [12, 14, 30, 38] However, with improved protocols, such as published for shoulder assessment by Sprowls, [39] confidence and reliability of telehealth assessment can be assured.

The value of developing complex clinic protocols specific to each clinical entity is critical to success of the telehealth program but these will require numerous flow charts, or an electronic platform for the referral process to make this practical. Artificial intelligence or machine learning may have a role to play. [8, 9, 13, 15, 25] Electronic referral

platforms enable improved communication between primary and specialist providers and may allow the patient's problem to be managed without any direct specialist contact. [20] The use of telehealth could reduce the opportunities for teaching medical students and trainee doctors, but thoughtful planning could enhance the potential for remote learning. [8, 10]

The pre-COVID studies all suffer from a risk of bias due to patient selection and limited clinical field. The post-COVID reports mostly considered demographic changes, and assessment of outcomes would be premature. Further evaluation of these cohorts will be very informative in this regard.

DISCUSSION

All surgical specialties had some previous reports of small trials of telehealth outpatient and hospital-at-home solutions. The Royal Australasian College of Surgeons published a Rapid Literature Review spanning 2015 to September, 2020. [40] However, the COVID-19 pandemic threw surgical services into the digital age at a rapid pace, and participants were no longer carefully selected, but spanned all the specialties and clinical problems. Patients and clinicians rose to the challenge with excellent results, and publications in this limited timeframe illuminate the changing socio-political circumstances which have accelerated experience and understanding exponentially.

Many of the publications during this period were opinion-based and lacked scientific rigour but brought new insights into this evolving field. Only those meeting our criteria were included in our summary, but many useful insights were included in the other publications. For example, Dunkerley [41] describes the closed loop audit of their clinical guidelines for management of orthopaedic fractures, which informed the implementation of a virtual fracture clinic. Hakim [42] describes innovative protocols to allow on-demand assessment and treatment of patients remotely, resulting in direct contact with the surgeon and hospital only for the operative procedure.

It is expected that policy changes (such as the provision of federal funding of telehealth) will persist [40] after the pandemic crisis and once clarification and certainty are established, we will need to address the limitations and the changes in workflows and governance which result and for careful protection of confidentiality, privacy and

accuracy. Clinical practice will fundamentally change because of the challenges of developing rapport and trust over the video consultation platform, and specific training may be required to develop clinical skills such as those required to ensure appropriate and empathetic Open Disclosure. It will be helpful to validate and disseminate inventive methods of remote examination. A greater use of medical imaging may result, which could undermine the cost-efficiency of telehealth. Medicolegal questions about the recording of such consultations should be addressed, such as how these recordings ought to be stored, who has responsibility and accountability, and how can we be assured that quality is maintained?

The limitations experienced while deploying PRISMA guidelines for this review are the short timeframe deliberately chosen and the Kmet quality restrictions. The limitation of review period allows rapid review of the dramatic changes facing our health system in the light of the COVID-19 pandemic. Studies that were scientifically strong did not always seek important clinical or governance information. For example, the demographic changes during the COVID-19 lock-down are interesting but the results are not necessarily generalisable. Other peer reviewed articles included consensus opinions, or publication of locally developed guidelines that were very helpful for a service seeking to inform their own implementation but had not been subjected to verification or audit (yet). There are no global protocols for management and postoperative care of patients and existing guidelines for such care are localised and based on low-level evidence.

Further development of standardised video examination protocols, remote digital measurement of vital signs and development of symptom-specific protocols is required. Surgical specialties may benefit from using protocols from fields unrelated to their own, and a template for development of such policy could provide scaffolding to assist development of these protocols. Qaderi's [8] work may prove to be a sentinel paper in this regard.

Platforms with digital algorithms to enable primary care physicians to manage simple problems or arrange appropriate investigations prior to specialist review may further streamline efficiency. eReferral platforms have been in use in various establishments but reports on these did not feature in the short timeframe of this study.

CONCLUSION

The global disruption of COVID-19 has provided an opportunity for wide-ranging reconsideration of healthcare provision, in which the substance remains unchanged, but the shape is altered.

What have we learned about the role of telehealth in assessing and following up surgical patients since COVID-19 encouraged us to minimise face-to-face appointments? Telehealth consultations are safe, accessible to a wide range of patients and clinicians using existing and ubiquitous software and hardware. Barriers which were previously cited, such as the elderly or homeless have been remarkably overcome. Clinical problems were previously carefully selected for suitability for telehealth management. Now it is apparent that postoperative review is best managed primarily with telehealth, with careful selection of cases for face-to-face review.

How has outpatient workflow been revised to make best use of telehealth for surgical patients? Most reports are of maintaining existing protocol-driven appointments, but the opportunity to enhance patient-centred care with support on-demand has been highlighted by the reports of the telehealth explosion of 2020.

Further work is now required to support digitally assisted referral processes, which may enable automated responses, asynchronous consultation and enable more efficient workflows for health services, clinicians and patients.

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No funding was provided or sought for this project.

ABBREVIATIONS

CBT	Cognitive behavioural therapy
COVID-19	Severe Acute Respiratory Syndrome caused by SARS-CoV-2
DRE	Direct rectal examination
eMDT	Electronic multidisciplinary team meeting
ENT	Ear, Nose and Throat
f2f	Face to face consultation
HRQoL	Health related quality of life
LOS	Length of stay (admission days)
PROM	Patient Reported Outcome Measures
RCT	Randomised controlled trial
SMS	Short message (text) sending

TH Telehealth consultation
VFC Virtual Fracture Clinic

References

- Purnell SMDMS, Zheng FMDMBA. Safety of Surgical Telehealth in the Outpatient and Inpatient Setting. *Surgical Clinics of North America*, The. 2021;101(1):109-19.
- Miah S, Dunford C, Edison M, Eldred-Evans D, Gan C, Shah TT, et al. A prospective clinical, cost and environmental analysis of a clinician-led virtual urology clinic. *Annals of the Royal College of Surgeons of England*. 2019;101(1):30-4.
- Paquette S, Lin JC. Outpatient Telemedicine Program in Vascular Surgery Reduces Patient Travel Time, Cost, and Environmental Pollutant Emissions. *Annals of vascular surgery*. 2019;59:167-72.
- Zheng F, Park KW, Thi WJ, Ro CC, Bass BL, Yeh MW. Financial implications of telemedicine visits in an academic endocrine surgery program. *Surgery*. 2019;165(3):617-21.
- Kmet LM, Lee RC, Cook LS. Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields. *Alberta Heritage Foundation for Medical Research: Alberta Heritage Foundation for Medical Research*; 2004.
- Moher D, Liberati A, Tetzlaff J, Altman D. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS med*. 2009;6:e1000097.
- Murphy EP, Fenelon C, Murphy RP, O'Sullivan MD, Pomeroy E, Sheehan E, et al. Are Virtual Fracture Clinics During the COVID-19 Pandemic a Potential Alternative for Delivering Fracture Care? A Systematic Review. *Clinical orthopaedics and related research*. 2020;478(11):2610-21.
- Qaderi SM, Swartjes H, Custers JAE, de Wilt JHW. Health care provider and patient preparedness for alternative colorectal cancer follow-up; a review. *European Journal of Surgical Oncology*. 2020;46(10, Part A):1779-88.
- van den Bosch SC, van de Voort NEM, Xi T, Kool RB, Bergé SJ, Faber MJ. Oral & Maxillofacial surgery is ready for patient-centred eHealth interventions – the outcomes of a scoping review. *International Journal of Oral & Maxillofacial Surgery*. 2019;48(6):830-40.
- Wallis CJD, Catto JWF, Finelli A, Glaser AW, Gore JL, Loeb S, et al. The Impact of the COVID-19 Pandemic on Genitourinary Cancer Care: Re-envisioning the Future. *European Urology*. 2020;78(5):731-42.
- Grandizio LCDO, Foster BKMD, Klena JCMD. Telemedicine in Hand and Upper-Extremity Surgery. *Journal of Hand Surgery*. 2020;45(3):239-42.
- Danielsen SO, Moons P, Leegaard M, Solheim S, Tønnessen T, Lie I. Facilitators of and barriers to reducing thirty-day readmissions and improving patient-reported outcomes after surgical aortic valve replacement: a process evaluation of the AVRre trial. *BMC health services research*. 2020;20(1):256.
- Zhang J, Dushaj K, Rasquinha VJ, Scuderi GR, Hepinstall MS. Monitoring Surgical Incision Sites in Orthopedic Patients Using an Online Physician-Patient Messaging Platform. *The Journal of arthroplasty*. 2019;34(9):1897-900.
- Gadjradj PS, Matawlie RH, Harhangi BS. Letter to the Editor: The Use of Telemedicine by Neurosurgeons During the Covid Era: Preliminary Results of a Cross-Sectional Research. *World Neurosurgery*. 2020;139:746-8.
- Kummerow Broman K, Gaskill CE, Faqih A, Feng M, Phillips SE, Lober WB, et al. Evaluation of Wound Photography for Remote Postoperative Assessment of Surgical Site Infections. *JAMA surgery*. 2019;154(2):117-24.
- Goldstein Y, Schermann H, Dolkart O, Kazum E, Rabin A, Maman E, et al. Video examination via the smartphone: A reliable tool for shoulder function assessment using the constant score. *Journal of Orthopaedic Science: official journal of the Japanese Orthopaedic Association*. 2019;24(5):812-6.
- Lonergan PE, Washington Iii SL, Branagan L, Gleason N, Pruthi RS, Carroll PR, et al. Rapid Utilization of Telehealth in a Comprehensive Cancer Center as a Response to COVID-19: Cross-Sectional Analysis. *Journal of medical Internet research*. 2020;22(7):e19322.
- Fieux M, Duret S, Bawazeer N, Denoix L, Zaouche S, Tringali S. Telemedicine for ENT: Effect on quality of care during Covid-19 pandemic. *European Annals of Otorhinolaryngology, Head and Neck Diseases*. 2020;137(4):257-61.
- Iwanoff C, Giannopoulos M, Salamon C. Follow-up postoperative calls to reduce common postoperative complaints among urogynecology patients. *International urogynecology journal*. 2019;30(10):1667-72.
- Lee S, Dana A, Newman J. Teledermatology as a Tool for Preoperative Consultation Before Mohs Micrographic Surgery Within the Veterans Health Administration. *Dermatologic surgery: official*

- publication for American Society for Dermatologic Surgery [et al]. 2020;46(4):508-13.
21. Dahlberg K, Jaensson M, Nilsson U. "Let the patient decide" – Person-centered postoperative follow-up contacts, initiated via a phone app after day surgery: Secondary analysis of a randomized controlled trial. *International Journal of Surgery*. 2019;61:33-7.
 22. Andino JJ, Lingaya M-A, Daignault-Newton S, Shah PK, Ellimoottil C. Video Visits as a Substitute for Urological Clinic Visits. *Urology*. 2020;144:46-51.
 23. Kemp MT, Williams AM, Sharma SB, Biesterveld BE, Wakam GK, Matusko N, et al. Barriers associated with failed completion of an acute care general surgery telehealth clinic visit. *Surgery*. 2020;168(5):851-8.
 24. Lin JC, McLaughlin D, Zurawski D, Kennedy N, Kabbani L. Comparison of virtual visit versus traditional clinic for management of varicose veins. *Journal of telemedicine and telecare*. 2020;26(1-2):100-4.
 25. Mouchtouris N, Lavergne P, Montenegro TS, Gonzalez G, Baldassari M, Sharan A, et al. Telemedicine in Neurosurgery: Lessons Learned and Transformation of Care During the COVID-19 Pandemic. *World Neurosurgery*. 2020;140:e387-e94.
 26. Lafaro KJ, Raz DJ, Kim JY, Hite S, Ruel N, Varatkar G, et al. Pilot study of a telehealth perioperative physical activity intervention for older adults with cancer and their caregivers. *Supportive care in cancer: official journal of the Multinational Association of Supportive Care in Cancer*. 2020;28(8):3867-76.
 27. Hou J, Yang R, Yang Y, Tang Y, Deng H, Chen Z, et al. The Effectiveness and Safety of Utilizing Mobile Phone-Based Programs for Rehabilitation After Lumbar Spinal Surgery: Multicenter, Prospective Randomized Controlled Trial. *JMIR mHealth and uHealth*. 2019;7(2):e10201.
 28. Cremades M, Ferret G, Pares D, Navines J, Espin F, Pardo F, et al. Telemedicine to follow patients in a general surgery department. A randomized controlled trial. *American Journal of Surgery*. 2020;219(6):882-7.
 29. Thompson JC, Cichowski SB, Rogers RG, Qeadan F, Zambrano J, Wenzl C, et al. Outpatient visits versus telephone interviews for postoperative care: a randomized controlled trial. *International urogynecology journal*. 2019;30(10):1639-46.
 30. Kane LT, Thakar O, Jamgochian G, Lazarus MD, Abboud JA, Namdari S, et al. The role of telehealth as a platform for postoperative visits following rotator cuff repair: a prospective, randomized controlled trial. *Journal of shoulder and elbow surgery*. 2020;29(4):775-83.
 31. Mousa AY, Broce M, Monnett S, Davis E, McKee B, Lucas BD. Results of Telehealth Electronic Monitoring for Post Discharge Complications and Surgical Site Infections following Arterial Revascularization with Groin Incision. *Annals of vascular surgery*. 2019;57:160-9.
 32. Vance S, Fontecilla N, Samie FH, Patel V, Lewin JM. Effect of Postoperative Telephone Calls on Patient Satisfaction and Scar Satisfaction After Mohs Micrographic Surgery. *Dermatologic surgery: official publication for American Society for Dermatologic Surgery [et al]*. 2019;45(12):1459-64.
 33. Luo J, Dong X, Hu J. Effect of nursing intervention via a chatting tool on the rehabilitation of patients after Total hip Arthroplasty. *Journal of orthopaedic surgery and research*. 2019;14(1):417.
 34. Ollidashi F, Latifi R, Parsikia A, Boci A, Qesteri O, Dasho E, et al. Telemedicine for Neurotrauma Prevents Unnecessary Transfers: An Update from a Nationwide Program in Albania and Analysis of 590 Patients. *World neurosurgery*. 2019;128:e340-e6.
 35. Siow MY, Walker JT, Britt E, Kozy JP, Zanzucchi A, Girard PJ, et al. What Was the Change in Telehealth Usage and Proportion of No-show Visits for an Orthopaedic Trauma Clinic During the COVID-19 Pandemic? *Clinical orthopaedics and related research*. 2020;478(10):2257-63.
 36. Takchi R, Williams GA, Brauer D, Stoentcheva T, Wolf C, Van Anne B, et al. Extending Enhanced Recovery after Surgery Protocols to the Post-Discharge Setting: A Phone Call Intervention to Support Patients after Expedited Discharge after Pancreaticoduodenectomy. *The American surgeon*. 2020;86(1):42-8.
 37. von Glinski A, Ishak B, Elia CJ, Goodmanson R, Pierre C, Norvell DC, et al. Emerging Insight in the Use of an Active Post Discharge Surveillance Program in Spine Surgery: A Retrospective Pilot Study. *World neurosurgery*. 2020;139:e237-e44.
 38. Feldacker C, Holeman I, Murenje V, Xaba S, Korir M, Wambua B, et al. Usability and acceptability of a two-way texting intervention for post-operative follow-up for voluntary medical male circumcision in Zimbabwe. *PloS one*. 2020;15(6):e0233234.
 39. Sprowls GRMD, Brown JCMD, Robin BNMD. The Shoulder Telehealth Assessment Tool in Transition to Distance Orthopedics. *Arthroscopy Techniques*. 2020;9(11):e1673-e81.

40. Smith S, Jacobsen JH, Tivey d, Babidge W. Review of telehealth Services. Royal Australasian College of Surgeons; 2020.
41. Dunkerley S, Kurar L, Butler K, James M, Lowdon I. The success of virtual clinics during COVID-19: A closed loop audit of the British orthopaedic association (BOAST) guidelines of outpatient orthopaedic fracture management. Injury. 2020.
42. Hakim AA, Kellish AS, Atabek U, Spitz FR, Hong YK. Implications for the use of telehealth in surgical patients during the COVID-19 pandemic. American Journal of Surgery, The. 2020;220(1):48-9.

EVALUATION OF RESEARCH CAPACITY IN A STATE HEALTH DISTRICT

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ABSTRACT

OBJECTIVE

To describe the perceived research capacity and support at the individual, department and organisation levels among clinicians in a state funded health district in Sydney, Australia.

METHODS

We asked allied health, medical, nursing, management and administrative staff across Nepean Blue Mountains Local Health District to fill in the Research Capacity in Context survey online. The survey includes questions about individual skills and capacity regarding research, available support and encouragement for research from the department and organisation, and motivators and barriers to involvement in research. Descriptive analyses (means and proportions) were reported separately for each staff category.

RESULTS

Four hundred and thirty-nine people responded, approximately 7% of total staff, of whom around 80% were clinicians. Response rate was highest from allied health clinicians (approx. 26%), rates were 4-6% for the other staff categories. Participants rated their individual research capacity as poor to good for most aspects, medical staff rated themselves higher than allied health and nursing. Respondents identified the lack of quarantined time and necessity to prioritise clinical duties as the key barriers to engaging with research. The most identified motivators were desire to improve services and outcomes for patients and resolving clinical problems.

CONCLUSIONS

Clinicians in the public health service are motivated to engage with research to improve services for their patients but they lack the time and support. If health services wish to encourage research activity among clinicians, they need to free up time from delivering clinical care and provide access to training and operational support.

KEYWORDS

research capacity; health professionals; clinical research

INTRODUCTION

BACKGROUND AND RATIONALE

Research capacity building in health care has been the subject of increasing interest over the past two decades[1]. Given that research is the foundation of clinical practice guidelines and evidence-based practice, the ability of health professionals to find, appraise, integrate, and conduct research is critical. Activities in many countries demonstrate the perceived importance of research capacity building among health care professionals[2-4]. In Australia, research capacity building activities have accelerated recently due to the Australian federal government allocating substantial capital through the Primary Health Care Research, Evaluation & Development Strategy[5] and the Medical Research Future Fund for clinician-led research[6]. These large public investments reflect recognition of the need for the health system to produce relevant and applicable research to inform delivery of best-practice care to the population. To do this there needs to be adequate capacity within the system itself to propose, design and conduct research, as opposed to in universities and medical research institutes. The starting point for building research capacity in any jurisdiction is to map the current context. This includes currently available capabilities and stakeholder perspectives regarding barriers and enablers to engagement in research among healthcare professionals. Some similar work has been undertaken in Australian systems previously and indicates shortcomings in individual skills, departmental and organisational support. This study adds a further jurisdiction and expands the scope beyond community health, nutrition and dietetics, podiatry and allied health which formed the populations of interest for many of these previous studies[7-10]. Understanding barriers and enablers is critical as a basis for designing strategies to increase research engagement and activity. Identifying variations across different sectors within a large organisation is also important to determine the need, if any, for tailoring and targeting of solutions.

SIGNIFICANCE

The project identifies current levels of research skill and support for health professionals in Nepean Blue Mountains Local Health District (NBMLHD). The findings of this project will contribute to the body of knowledge quantifying research capacity within the public health sector in Australia. The findings will inform future research support and education programs, service planning and policy

initiatives to build research capacity in NBMLHD and beyond.

OBJECTIVES

This project describes research capacity among health professionals in NBMLHD. A survey based on the Research Capacity in Context (RCC)[11] tool was distributed to staff to measure, it included:

1. Research involvement,
2. Self-rated research expertise,
3. Barriers and motivators of research at
 - a. individual,
 - b. department and
 - c. organisational levels.

METHOD

STUDY SETTING / ELIGIBILITY CRITERIA

Health professionals including allied health (largest representation: Physiotherapy, Occupational therapy, Radiation Therapy, Radiography, Psychology), clinical support, management, medical and nursing staff working in NBMLHD were invited to complete the survey. This was a convenience sample in that participation was voluntary. The survey was distributed to all staff from June to October 2019. Recruitment, participant information, consent procedures and study methods were provided with the email invitation and approved by the Apollo sub-committee of the NBMLHD Human Research Ethics Committee on 16 May 2019 (#12-19(A)).

DATA COLLECTION

Staff were made aware of the survey via various means:

- Promotion by department heads across medical, nursing and allied health.
- An invitation letter through email using the hospital staff email system.
- Advertisement in NBMLHD website and newsletter.
- A reminder email sent 2 weeks after opening of the survey.

An invitation email contained a website link to the online survey and study information sheet and researcher contact information. Participant consent was provided online prior to accessing the survey. The survey was run using Qualtrics, a secure web application for building and managing online surveys and databases. Participants were able to go back via a back button while still in the survey.

The survey included self-rated research skill/success, research involvement, the barriers and motivators to research involvement at individual, department and organisational levels. The survey comprised four parts; i; participant and workplace characteristics, and parts ii; (individual research capacity), iii; (department research capacity) and iv; (organisation research capacity) The survey was adapted from the Research Capacity in Context (RCC) tool developed by Queensland Health and Griffith University, a validated tool to measure clinician research capacity[11] (Appendix 1).

The RCC tool includes six questions about an individual's own research capacity, research involvement, research support, and barriers and motivators to involvement in research. Participants were then asked to rate their individual success/skill level on 14 items using a 4-point Likert scale: 1 'no knowledge', 2 'poor', 3 'good' and 4 'excellent'. After completing questions at individual level, participants were asked 19 questions about research capacity in their department with 5 response options: 'nil', 'some/a little', 'moderate', 'extensive', and 'unsure'. And 18 questions about the research capacity of the organisation with 4 response options: 'no', 'yes – to some extent', 'yes – definitely', and 'unsure'. Surveys also included questions about enablers and barriers to research activity at each level.

STATISTICAL ANALYSIS

Survey data were exported from Qualtrics to SPSS for analysis. Descriptive analyses were conducted to describe participant demographics such as age, gender,

geographic location, and education level. Mean scores of all items pertaining to self-rated research success/skill and capacity were calculated. Open-ended questions exploring barriers and motivators were coded into meaningful categories. Responses were divided by professional grouping for all questions. All available data were analysed regardless of whether surveys were filled in completely.

RESULTS

PARTICIPANTS

There were approximately 6,178 staff members in 2019 in NBMLHD, including; 655 in allied health, 1,556 in clinical support and management, 1,003 medical staff and 2,827 nursing staff[12]. There were 439 respondents to all or part of the survey, a response rate of 7%, we note that the total staff numbers are estimates so there is some imprecision in calculation of response proportions. By professional group, response rates were 26% for allied health, 6% for clinical support and management, 6% for medical, and 4% for nursing. Gender distribution in the sample was representative of the LHD staff profile (70-75% female), over half the sample were between the ages of 35 and 55 years, >3/4 of the sample had a primary role as a clinician, and years of professional experience was evenly split between <10 years, 10-20 and 20+ years. Just over half the sample had postgraduate qualifications (beyond bachelor degree) and 50 respondents were currently enrolled in postgraduate training (Table 1).

TABLE 1. SAMPLE CHARACTERISTICS - PARTICIPANTS

Number	Age	Role	Highest education
Total*	439	18-24 15	Senior clinician 187
Allied Health	170	25-34 84	Junior clinician 119
Clinical Services	19	35-44 107	Manager 36
Management	69	45-54 116	Researcher 15
Medical	57	55-64 74	Educator 14
Nursing	119	65+ 5	Executive 8
Female	301		Other 2
Male	89		
Not specified	8		
			Leaving certificate 2
			Cert I-IV 21
			Bachelor (+/- hon) 145
			Grad Dip/Adv Dip 73
			College Fellowship 7
			Masters coursework 94
			Masters research 26
			Doctorate 30
			Other 3

* totals may not add up due to missing responses for individual questions

RESEARCH PROVISIONS

Thirty-three percent of respondents stated that research was part of their job, but less than half of them identified

provisions that enabled research in the workplace. Of those with research as part of their job, 47% percent had quarantined time to conduct research, 17% and 16%

reported that they had research supervision and research training respectively, and 4% had access to funds to support research. Notwithstanding small numbers, provisions to support research did not differ substantially between professional groups (Table 2).

INDIVIDUAL RESEARCH SKILLS

Respondents rated their individual skill as either 'no knowledge', 'poor' (I have heard of this but I have had no experience), 'good' (I have done this but I require assistance), or 'excellent' (I have done this many times and

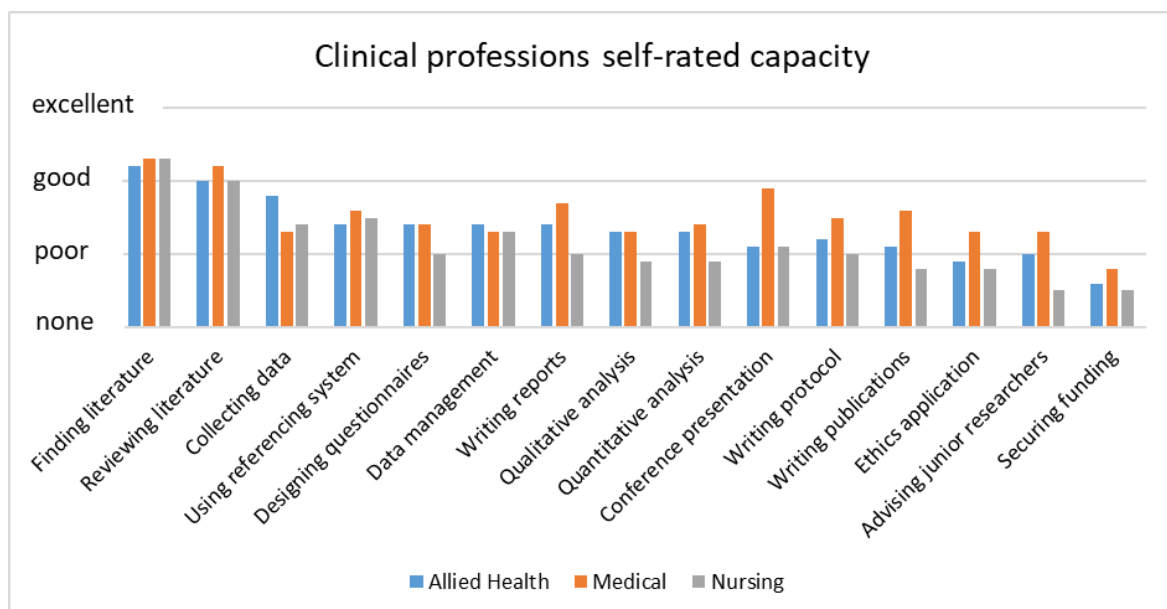
require no assistance) for various aspects of the research process. Staff reported their individual capacity as low for most aspects with mean values typically between poor and good. Highest scores were for finding and reviewing literature (mean ~ good) and lowest for securing funding, ethics applications and advising junior researchers (mean ~ poor) (Figure 1). In general, nursing staff rated themselves lower than allied health staff who in turn rated themselves lower than medical staff for most aspects.

TABLE 2. RESEARCH PROVISIONS

	All	Allied Health	Clinical support	Management	Medical	Nursing
Part of job	146	62	9	18	28	29
%	33%	36%	47%	26%	49%	24%
Provisions						
Quarantined time	47%	48%	78%	56%	46%	34%
Library access	34%	34%	33%	33%	50%	31%
Software	27%	23%	67%	44%	21%	28%
Supervision	17%	19%	11%	17%	14%	24%
Training	16%	19%	0%	22%	11%	24%
Admin support	13%	8%	22%	22%	25%	10%
Funds	4%	2%	0%	11%	7%	7%
Other	13%	5%	0%	11%	21%	31%

*Percentage of people who have research as part of their job

FIG 1. RATINGS OF INDIVIDUAL RESEARCH CAPACITY



DEPARTMENT RESEARCH CAPACITY

Respondents rated capacity within their department to support various aspects of the research process as 'unsure',

'nil', 'some/a little', 'moderate', or 'extensive', the total percentage that responded moderate or extensive are reported (Table 3). Respondents reported limited capacity

at the department level to support research activities. For all aspects less than half of the staff reported moderate or extensive capacity within the department, for most the figure was less than 30%. Nursing staff typically rated department-level research capacity lower than other groups but the ranking of different aspects was similar across groups.

ORGANISATIONAL RESEARCH CAPACITY

Respondents rated the capacity in the organisation (NBMLHD) to support various aspects of the research process as 'unsure', 'no', 'yes, to some extent', or 'yes, definitely', the total percentage that responded 'yes, to some extent' or 'yes, definitely' are reported (Table 4). Generally, around 30-60% of staff answered yes to capacity for the specific aspects within the health district, an

exception was 70% endorsement of the statement that the LHD promotes evidence-based practice.

BARRIERS AND MOTIVATORS

Participants chose from a pre-determined list of barriers to conducting research at an individual, and department level, and list of motivators to conducting research at an individual level. The 10 most often endorsed barriers and motivators are reported along with the percentage of respondents (Table 5). Lack of time, and other priorities were by far the most common barriers. There were no major discrepancies between professional groups regarding barriers at individual or department level. The prospect of developing skills and increasing job satisfaction were the most common personal motivators for conducting research, a finding common to all groups.

TABLE 3. DEPARTMENT RESEARCH CAPACITY

	All	Allied Health	Clinical support	Management	Medical	Nursing
Evidence guides planning	45%	54%	56%	44%	45%	25%
Team leaders' support	40%	43%	33%	39%	50%	28%
Practice relevant research	39%	44%	67%	33%	44%	24%
Supports multidisc. Research	33%	38%	33%	26%	44%	17%
Supports research publication	32%	36%	25%	23%	46%	18%
Disseminates research	30%	34%	44%	21%	46%	15%
Accessible research experts	30%	29%	33%	26%	37%	28%
Research opportunities	29%	33%	11%	26%	41%	16%
Supports HDR scholarships	29%	34%	33%	21%	34%	21%
External research partners	25%	22%	50%	23%	34%	21%
Research training	25%	28%	22%	28%	26%	19%
Monitors research quality	23%	25%	33%	13%	29%	18%
Consumer involvement	20%	18%	33%	26%	22%	18%
Plans/policies for research	20%	22%	11%	13%	38%	7%
Research mentoring	19%	21%	22%	18%	20%	14%
Staff involved in research plans	19%	20%	11%	18%	29%	12%
Funding, equipment, admin	17%	19%	22%	15%	26%	9%
Applies for funding	16%	16%	11%	5%	32%	13%
Software available	16%	16%	33%	21%	15%	9%

Percentage rating 'moderate' or 'extensive' capacity

TABLE 4. NEPEAN BLUE MOUNTAINS LOCAL HEALTH DISTRICT RESEARCH CAPACITY

	All	Allied Health	Clinical support	Management	Medical	Nursing
Promotes EBP	70%	71%	78%	57%	74%	74%
Managers' support	58%	63%	67%	57%	50%	49%
Encourages relevant research	56%	60%	67%	46%	53%	52%
Accessible research experts	51%	49%	56%	43%	63%	52%
Supports multidisc research	51%	54%	67%	41%	58%	41%
External research partners	51%	49%	78%	53%	58%	44%

Plan/policy research development	50%	54%	56%	51%	50%	40%
Supports HDR scholarships	49%	51%	56%	49%	47%	47%
Evidence guides planning	48%	49%	78%	51%	47%	38%
Supports research publication	48%	48%	56%	46%	58%	40%
Forums to present research	47%	53%	44%	36%	50%	37%
Research training	40%	43%	44%	38%	32%	39%
Consumer involvement	38%	41%	44%	38%	35%	32%
Monitors research quality	37%	37%	33%	32%	45%	36%
Applies for funding	36%	37%	56%	35%	38%	28%
Funding, equipment, admin	32%	36%	33%	35%	24%	28%
Software available	31%	30%	56%	27%	41%	26%
Research career pathways	29%	29%	33%	27%	22%	34%

Percentage 'yes, to some extent' or 'yes, definitely'. EBP = evidence-based practice

TABLE 5. BARRIERS AND MOTIVATORS TO CONDUCTING RESEARCH

	All	Allied Health	Clinical support	Management	Medical	Nursing
	n=140	n=9	n=59	n=43	n=66	
Personal barriers						
Other priority	71%	81%	44%	45%	71%	68%
Time	65%	73%	44%	38%	80%	56%
Research skills	34%	33%	0	40%	34%	36%
Work/life balance	33%	36%	11%	23%	27%	39%
Management support	31%	26%	67%	20%	43%	35%
Funds	27%	26%	44%	10%	41%	26%
Backfill	27%	29%	11%	10%	18%	39%
Personal commitment	24%	24%	11%	23%	32%	24%
Software	21%	22%	33%	10%	18%	26%
No coordinated approach	17%	15%	22%	15%	27%	14%
Department barriers						
	N=103	N=9	N=25	N=29	N=40	
Time	54%	62%	11%	39%	68%	45%
Other priority	22%	22%	11%	35%	21%	17%
Management support	12%	9%	11%	12%	7%	24%
Backfill	10%	12%	11%	4%	0	12%
Funds	9%	8%	11%	4%	14%	10%
Research skills	8%	6%	0	27%	7%	5%
Resources	7%	6%	22%	8%	14%	2%
Mentoring	6%	6%	0	0	7%	10%
Opportunities	5%	4%	0	4%	4%	10%
Other	21%	15%	33%	23%	36%	21%
Personal Motivators						
Develop skills	74%	74%	90%	78%	67%	47%
Job satisfaction	62%	65%	80%	63%	57%	36%
Clinical/service problems	46%	51%	40%	35%	43%	29%
Keep brain stimulated	46%	50%	60%	45%	38%	27%
Career advancement	46%	48%	70%	38%	48%	26%

Prove theory or hunch	30%	28%	30%	38%	40%	15%
Mentors available	28%	28%	20%	25%	33%	18%
Opportunities available	27%	30%	30%	30%	19%	15%
Increased credibility	26%	23%	10%	28%	36%	18%
Encouraged by managers	25%	30%	10%	25%	14%	15%

Department-level motivators for conducting research were elicited in an open question. By far the most common motivators were to conduct research aimed at providing the best possible services and outcomes for patients and resolving clinical and service problems. This suggests that clinicians are mainly interested in research that is directly applicable to patients. Other commonly mentioned motivators (in order of frequency) included career development and advancement, academic or professional interest, and for acknowledgement /recognition. Responses were selected from a list of options, along with a free-text alternative. These latter responses were endorsed by approximately one-third of participants. Respondents were also motivated by departmental and management support, by colleagues doing research, and by availability of external resources and personnel.

DISCUSSION

STATEMENT OF MAIN FINDINGS

Approximately 7% of NBMLHD staff responded to a survey asking about research capacity which indicates either low overall interest in the topic among clinical staff or poor appetite for surveys. Allied health was a notable outlier with more than a quarter (26%) of staff completing the survey. Respondents identified securing funding, obtaining ethics approval, and advising junior researchers as most challenging. Staff rated department level capacity as lacking; fewer than half the respondents rated their department as having moderate or extensive capabilities in the aspects explored, in general nursing staff rated capacity lower than other professions. More than two-thirds of staff agreed that NBMLHD as an organisation promotes evidence-based practice, but other key aspects of research capacity in the organisation were endorsed by only 30-60% of staff.

Lack of dedicated time for research and other priorities was consistently identified as the main barrier to conducting research at all levels. Respondents also reported lack of

individual research skills, funding and mentoring, as deficiencies in departmental and organisational capacity. Large proportions of NBMLHD staff were motivated by the possibility to improve clinical outcomes for their patients through research involvement, as well as develop skills, increase job satisfaction, and progress their careers.

INTERPRETATION IN CONTEXT OF LITERATURE

The most directly comparable data come from a study that assessed research capacity in Western Sydney Local Health District, NSW using similar methods and with a very similar response rate [13]. While the individual skills questions were asked on a different scale, the pattern of results was very similar, in terms of generally higher scores for medical staff compared to allied health and nursing (Fig 1), and lowest scores for securing funding, advising junior researchers and applying for ethics. A strength of our study and that of Lee et al [9] was collection of data from all clinical professions, as opposed to Allied Health only, which enabled comparison of research capacity between professions. Despite the broader scope, our results are also similar to those in studies conducted in Allied Health in other Australian health services [10, 14-18]. These studies also identified challenges with securing funding and gaining ethics and highlighted the key barriers of time and competing clinical priorities.

There has also been recognition of the potential benefits of developing research capacity among clinicians in other parts of the world. In the UK, identification of similarly low levels of research capacity in the National Health Service, and in low and middle income countries generally [19] has led to significant efforts to increase activity [20, 21]. There is a body of research that recognises the issue of low research capacity in nursing and midwifery, with a systematic review having identified eight studies that aimed to increase capacity [22].

Findings regarding the most important barriers i.e. the lack of time for research and prioritisation of other (clinical) duties is common to this and research in other jurisdictions [9, 12-15]. Motivators such as the desire to develop skills,

improve job satisfaction are similarly ubiquitous. Of note though, Nepean Blue Mountains staff also explicitly identified research as a method to improve the quality of services and outcomes for their patients, few previous studies report this [23]. The finding is significant because it points to recognition by respondents of the fact that clinical practice and research can be complementary rather than discreet activities.

STRENGTHS AND LIMITATIONS

Strengths of this study include wide distribution across all staff in the health district, supported by encouragement from managers and use of a validated survey to collect data. The study collected data using a questionnaire validated for the purpose. Concordance of these results with other studies aimed at the same purpose increases the likelihood that successful strategies to increase research engagement are likely to generalise across jurisdictions. The most important limitation is the response rate of 7% which invites cautious interpretation as to generalisability. However, it is likely that respondents were staff with a greater degree of interest in research than the norm for the population. If we assume that those people are also more likely to be involved in research in future, then description of barriers and enablers from these people will be of most benefit in designing strategies to increase research activities and engagement.

IMPLICATIONS

The most important finding from this study is the consistent identification by all professional groups of lack of time and other clinical priorities as a barrier to research engagement. This lies outside the control of clinical staff. The implication is that if health service executive and management want to support research among clinical staff, they need to ensure that time is made available through relief from direct clinical duties. Without addressing this issue, it is unlikely that other supportive actions will lead to widespread increase in research activity. Secondary supportive actions would be best directed towards identified barriers of low research skills, access to mentoring and expert guidance, resources for administrative support, equipment, software and funding.

Clinicians stated that the desire to improve clinical services and patient outcomes were motivators to engage in research, this represents an untapped opportunity for health service leadership. Identifying research-practice gaps and areas of poor service performance, and resourcing and supporting clinicians to conduct research

addressing these questions offers a way for the health service to better meet their obligations to their patients.

In general, while nurses had slightly lower ratings of individual and departmental capacity there were not large differences in patterns of responses between professional groups. This suggests that strategies to address barriers and poor capacity can be designed at a district level, adaptations for delivery need only address operational and work-flow differences rather than professional area.

CONCLUSION

Over 400 staff from Nepean Blue Mountains Local Health District in Sydney, Australia responded to a survey about research capacity. Most respondents were clinicians involved in delivering allied health, medical or nursing services. Staff identified lack of time and competing clinical priorities as the key barrier to engaging with research and desire to improve patient outcomes, build skills and increase job satisfaction as key motivators. Increase in clinician-driven research activity will likely require top-down approaches to release clinicians from clinical duties. Staff rated their individual research capacity as low and identified important gaps in capacity and support at the department and organisational level. Key gaps included availability of funding and resources to support research, mentoring and training.

DATA AVAILABILITY STATEMENT:

Data may be available on request subject to conditions from the ethics committee.

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DISCLOSURE OF POTENTIAL CONFLICTS OF INTEREST:

All authors declare no conflicts of interest.

References

1. Matus J, Walker A, Mickan S. Research capacity building frameworks for allied health professionals – a systematic review. *BMC Health Services Research*. 2018;18:716.
2. Hulcombe J, Sturgess J, Souvlis T, Fitzgerald C. An approach to building research capacity for health practitioners in a public health environment: an

- organisational perspective. *Australian Health Review*. 2014;38(3):252-8.
3. Rowley E, Morriss R, Currie G, Schneider J. Research into practice: Collaboration for Leadership in Applied Health Research and Care (CLAHRC) for Nottinghamshire, Derbyshire, Lincolnshire Implementation science. 2012;7:40.
 4. Stewart M, Wuite S, Ramsden V, Burge F, Beaulieu MD, Fortin M. Transdisciplinary understandings and training on research: successfully building research capacity in primary health care. *Canadian Family Physician Medecin de Famille Canadien*. 2014;60(6):581-2.
 5. Australian Government. Primary Health Care Research, Evaluation and Development (PHCRED) Strategy. In: Department of Health, editor. <https://www1.health.gov.au/internet/main/publishing.nsf/Content/pcd-programs-phcred2014>.
 6. Australian Government. Clinician Researchers initiative. In: Department of Health, editor. <https://www.health.gov.au/initiatives-and-programs/clinician-researchers-initiative2021>.
 7. Friesen E, L, Comino EJ. Research culture and capacity in community health services: results of a structured survey of staff. *Australian Journal of Primary Health*. 2017;23(2):123-31.
 8. Howard AJ, Ferguson M, Wilkinson P, Campbell KL. Involvement in research activities and factors influencing research capacity among dietitians. *Journal of Human Nutrition and Dietetics*. 2013;26(Suppl1):180-7.
 9. Lazzarini PA, Geraghty J, Kinnear EM, Butterworth M, Ward D. Research capacity and culture in podiatry: early observations within Queensland Health. *Journal of Foot and Ankle Research*. 2013;6:1.
 10. M. M, Tearne JE, Blyth K, Coates S, Pearson S, Cavalheri V. An evaluation of research capacity and culture in a sample of Western Australian Allied Health professionals *Tasman Medical Journal*. 2021;3(1):23-9.
 11. Holden L, Pager S, Golenko X, Ware RS. Validation of the research capacity and culture (RCC) tool: measuring RCC at individual, team and organisation levels. *Australian journal of primary health*. 2012;18(1):62-7.
 12. Nepean Blue Mountains Local Health District. Year in Review. 2018-2019.
 13. Lee SA, Byth K, Gifford JA, Balasubramanian M, Fozzard CA, Skapetis T, et al. Assessment of Health Research Capacity in Western Sydney Local Health District (WSLHD): A Study on Medical, Nursing and Allied Health Professionals. *Journal of Multidisciplinary Healthcare*. 2020;13:153-63.
 14. Alison J, Zafiroopoulos B, Heard R. Key factors influencing allied health research capacity in a large Australian metropolitan health district. *Journal of Multidisciplinary Healthcare*. 2017;10:277-91.
 15. Borkowski D, McKinstry C, Cotchett M. Research culture in a regional allied health setting. *Australian Journal of Primary Health*. 2017;23:300-6.
 16. Lazzarini P, Geraghty J, Kinnear E, Butterworth M, Ward D. Research capacity and culture in podiatry: early observations within Queensland Health. *Journal Foot and Ankle Research*. 2013;6:1-11.
 17. Williams C, Miyazaki K, Borkowski D, McKinstry C, Cotcher M, Haines T. Research capacity and culture of the Victorian public health allied health workforce is influenced by key research support staff and location. *Australian Health Review*. 2015;39:303-11.
 18. Raschke N. The Perceived Research Capacity and Culture within Non Metropolitan Local Health Districts in NSW. *NSW Health: Mid North Coast Local Health District*; 2017.
 19. Ekeroma A, Kenealy T, Shulruf B, Hill A. Educational and Wider Interventions that Increase Research Activity and Capacity of Clinicians in Low to Middle Income Countries: A Systematic Review and Narrative Synthesis. *Journal of Research and Development*. 2015;3(1):1000120.
 20. Pickstone C, Nancarrow S, Cooke J, Vernon W, Mountain G, Boyce RA, et al. Building research capacity in the allied health professions. *Evidence & Policy*. 2008;4(1):53-68.
 21. Gimeno H, Alderson L, Waite G, Chugh D, O'Connor G, Pepper L, et al. Frontline Allied Health Professionals in a Tertiary Children's Hospital: Moving Forward Research Capacity, Culture and Engagement. *International Journal of Practice-Based Learning in Health and Social Care*. 2021;9:29-49.
 22. Lode K, Sørensen E, Salmela S, Holm A, Severinsson E. Clinical Nurses' Research Capacity Building in Practice—A Systematic Review. *Open Journal of Nursing*. 2015;5:664-77.
 23. Pager S, Holden L, Golenko X. Motivators, enablers, and barriers to building allied health research capacity. *Journal of Multidisciplinary Healthcare*. 2012;5:53-9.

APPENDIX

ADAPTED RESEARCH CAPACITY IN CONTEXT SURVEY

Part I

Questions about your background:

1.1 Which of the following profession best describes your current work role and experience?

(Please select a **single response that best fits**)

- ☐ Medical staff
 - ☐ Staff Specialist
 - ☐ Senior Registrar
 - ☐ Registrar
 - ☐ Resident Medical Officer
 - ☐ Junior Medical Officer
 - ☐ Other: _____

- ☐ Nursing and Midwifery staff
 - ☐ Nurse Manager
 - ☐ Clinical Nurse Consultant
 - ☐ Clinical Midwifery Consultant
 - ☐ Clinical Nurse Specialist
 - ☐ Clinical Midwifery Specialist
 - ☐ Registered Nurse
 - ☐ Registered Midwife
 - ☐ Nurse Educator
 - ☐ Midwifery Educator
 - ☐ Clinical Nurse Educator
 - ☐ Clinical Midwifery Educator
 - ☐ Enrolled Nurse
 - ☐ Other: _____

- ☐ Allied health staff
 - ☐ Dietetics/Nutrition
 - ☐ Occupational Therapy
 - ☐ Pharmacy
 - ☐ Physiotherapy
 - ☐ Psychology/clinical psychology
 - ☐ Podiatry
 - ☐ Speech Pathology
 - ☐ Social Work
 - ☐ Radiography
 - ☐ Radiation Therapy

- ☐ Nuclear Medicine Technology
- ☐ Sonography
- ☐ Exercise Physiology
- ☐ Other: _____

- ☐ Dental/Oral health
 - ☐ Dental officer
 - ☐ Oral Health Therapist
 - ☐ Other: _____

- ☐ Clinical Support
 - ☐ Aboriginal Health Worker/Practitioner
 - ☐ Hospital Assistant
 - ☐ Wardsperson
 - ☐ Hospital Assistant
 - ☐ Allied Health Assistant
 - ☐ Health Education, Health Promotion, and Health Protection
 - ☐ Interpreters and Liaison Officers
 - ☐ Technician/Technologist
 - ☐ Hospital Scientist/Biomedical Engineers
 - ☐ Cleaning, Linen and Food
 - ☐ Other: _____

- ☐ Management and Administration
 - ☐ Information management (e.g. librarian, medical records, and data manager)
 - ☐ Clinical Support Executive (e.g. Hospital Executive)
 - ☐ Administrative and Executive Assistant
 - ☐ Corporate Services
 - ☐ Senior Manager/Executive
 - ☐ Data Analyst
 - ☐ Researcher
 - ☐ Project Director
 - ☐ Project Manager
 - ☐ Project Officer
 - ☐ Security Services, Fire Safety
 - ☐ Maintenance or Tradesperson
 - ☐ Other: _____

1.2 Your gender

- ☐ Female
- ☐ Male
- ☐ Prefer not to say

1.3 Your age

- ☐ 18-24 years
- ☐ 25-34 years
- ☐ 35-44 years
- ☐ 45-54 years
- ☐ 55-64 years
- ☐ 65-74 years
- ☐ 75 years and over

1.4 Please indicate your highest professional qualification (Australian qualifications framework)

- ☐ Certificate I-IV
- ☐ Diploma, Advanced diploma, Associate degree
- ☐ Bachelor degree
- ☐ Bachelor degree with honours
- ☐ Graduate diploma, Graduate certificate
- ☐ Masters degree (coursework)
- ☐ Masters degree (research)
- ☐ Doctoral degree
- ☐ Other, specify_____

1.5 Are you currently enrolled in any higher degree study or other professional development related to research?

- ☐ Yes
- ☐ No

If yes, please indicate what level of study you are enrolled in

- ☐ Certificate I-IV
- ☐ Diploma, Advanced diploma, Associate degree
- ☐ Bachelor degree
- ☐ Bachelor honours degree
- ☐ Graduate diploma, Graduate certificate
- ☐ Masters degree (coursework)
- ☐ Masters degree (research)
- ☐ Doctoral degree

1.6 Which of the following best describes where you work?

- ☐ Nepean Hospital
- ☐ Nepean Cancer Care Centre
- ☐ Nepean Centre for Oral Health
- ☐ Blue Mountains District ANZAC Memorial Hospital
- ☐ Lithgow Hospital
- ☐ Springwood Hospital
- ☐ Mental Health Services (Inpatient)
- ☐ Mental Health Services (Community outpatient)

- ☐ Primary Care and Community Health Services (Chronic and Complex)
- ☐ Primary Care and Community Health Services (Child and Family)
- ☐ Primary Care and Community Health Services (IVPRS)
- ☐ Population Health Services
- ☐ Drug & Alcohol Services
- ☐ District offices (Station Street Penrith)

Other: _____

1.7 Which of the following best describes your role in the team based on your position grade/level?

- ☐ Junior Clinician/staff member
- ☐ Senior Clinician/staff member
- ☐ Executive
- ☐ Manager
- ☐ Educator
- ☐ Researcher

1.8 In total, how many years have you been working as a health professional?

- ☐ <1 year
- ☐ 1-5 years
- ☐ 6-10 years
- ☐ 11-15 years
- ☐ 16-20 years
- ☐ >20 years

Research translation questions

Research translation as creation of knowledge through research followed by translation of knowledge into changes in clinical practice and policy that underpin improvements in Australia's health care. **1.9 Have you implemented any research knowledge/findings into your clinical practice?**

- ☐ Yes
- ☐ No
- ☐ Unsure

If YES,

Which of the following research knowledge/findings did you implement in your clinical practice?

- ☐ Findings from clinical efficacy studies (in which new interventions are trialled under optimal conditions)
- ☐ Findings from clinical effectiveness studies (in which new interventions are trialled in "real world" settings)
- ☐ Evidence based on a systematic review or meta-analysis
- ☐ Established evidence-based guidelines and policy
- ☐ Your own research findings

1.10 How often has your research been successfully translated into clinical practice?

- ☐ I have not completed any research

- ☐ Never
- ☐ Sometimes
- ☐ Mostly
- ☐ Always

1.11 Which setting did you perform the research translation process (tick multiple that apply)?

- ☐ Clinical
- ☐ Community/population health
- ☐ Other _____

Parts I-IV

Research Capacity in Context Tool

Developed by Queensland Health and Griffith University

The following survey is modified from Research Capacity in Context (RCC) Tool developed by Queensland Health and Griffith University

This tool operates on the premise that research capacity building occurs within the context of the organisation. For that reason we ask questions of your perceptions of the research capacity and its supports on three levels: organisation, team and individual level.

1. INDIVIDUAL LEVEL

1.1 Please rate your own current success or skill level for each of the following aspects by circling a response.

Poor = I have heard of this but I have had no experience

Good = I have done this but I require assistance

Excellent = I have done this many times and require no assistance

i) Finding relevant literature	No knowledge	Poor	Good	Excellent
iii) Critically reviewing the literature	No knowledge	Poor	Good	Excellent
iii) Using a computer referencing system (eg Endnote)	No knowledge	Poor	Good	Excellent
iv) Writing a research protocol	No knowledge	Poor	Good	Excellent
v) Securing research funding	No knowledge	Poor	Good	Excellent
vi) Submitting an ethics application (Apollo, LNR, Full Ethics)	No knowledge	Poor	Good	Excellent
vii) Designing questionnaires	No knowledge	Poor	Good	Excellent
viii) Collecting data e.g. surveys, interviews	No knowledge	Poor	Good	Excellent
ix) Using computer data management systems	No knowledge	Poor	Good	Excellent
x) Analysing qualitative research data	No knowledge	Poor	Good	Excellent
xi) Analysing quantitative research data	No knowledge	Poor	Good	Excellent

xii) Writing a research report	No knowledge	Poor	Good	Excellent
xiii) Writing for publication in peer-reviewed journals	No knowledge	Poor	Good	Excellent
xiv) Providing advice to less experienced researchers	No knowledge	Poor	Good	Excellent
xv) Conference Presentations (Abstract/Poster/Oral)	No knowledge	Poor	Good	Excellent

1.2 Please indicate any research activity you are currently (within the last month) involved with. Tick (☐) as many as apply

- ☐ Writing a research report or thesis, presentation or paper for publication
- ☐ Writing a research protocol
- ☐ Submitting an ethics application (Apollo, LNR, Full Ethics)
- ☐ Collecting data eg surveys, interviews
- ☐ Analysing qualitative research data
- ☐ Analysing quantitative research data
- ☐ Writing a literature review
- ☐ Applying for research funding
- ☐ Not currently involved in research
- ☐ Other __

1.3 Please state whether you are involved in research related activities as part of your job?

- ☐ Yes
- ☐ No

If yes, what provisions are made for you to conduct research as part of your role? Tick (☐) as many as apply

- ☐ Software
- ☐ Research supervision
- ☐ Time
- ☐ Research funds
- ☐ Administrative support
- ☐ Training
- ☐ Library access
- ☐ Other __

1.4 Please indicate if you have completed any of the following research activities in the past 12 months. Tick (☐) as many as apply

- ☐ No research activity completed in the past 12 months
- ☐ Secured research funding
- ☐ Submitted a thesis as part of a research degree (e.g., Masters, PhD)
- ☐ Co-authored a paper for publication

- ☐ Presented research findings at a conference
- ☐ Writing a research report or thesis, presentation or paper for publication
- ☐ Writing a research protocol
- ☐ Submitting an ethics application (Apollo, LNR, Full Ethics)
- ☐ Collecting data e.g. surveys, interviews
- ☐ Analysing qualitative research data
- ☐ Analysing quantitative research data
- ☐ Writing a literature review
- ☐ Applying for research funding
- ☐ Other _____

1.5 What are the barriers to research for you personally? Tick (☐) as many as apply

- | | |
|--|--|
| <input type="checkbox"/> Lack of time for research | <input type="checkbox"/> Lack of library/internet access |
| <input type="checkbox"/> Lack of suitable backfill | <input type="checkbox"/> Not interested in research |
| <input type="checkbox"/> Other work roles take priority | <input type="checkbox"/> Other personal commitments |
| <input type="checkbox"/> Lack of funds for research | <input type="checkbox"/> Desire for work / life balance |
| <input type="checkbox"/> Lack of support from management | <input type="checkbox"/> Lack of a co-ordinated approach to research |
| <input type="checkbox"/> Lack access to equipment for research | <input type="checkbox"/> Lack of skills for research |
| <input type="checkbox"/> Lack of administrative support | <input type="checkbox"/> Intimidated by research language |
| <input type="checkbox"/> Lack of software for research | <input type="checkbox"/> Intimidated by fear of getting it wrong |
| <input type="checkbox"/> Isolation | <input type="checkbox"/> Other ____ |

1.6 What are the motivators to do research for you personally? Tick (☐) as many as apply

- ☐ To develop skills
- ☐ Career advancement
- ☐ Increased job satisfaction
- ☐ Study or research scholarships available
- ☐ Dedicated time for research
- ☐ Research written into role description
- ☐ Colleagues doing research
- ☐ Mentors available to supervise
- ☐ Research encouraged by managers

- ☐ Grant funds
- ☐ Links to universities
- ☐ Forms part of Post Graduate study
- ☐ Opportunities to participate at own level
- ☐ Problem identified that needs changing
- ☐ Desire to prove a theory / hunch
- ☐ To keep the brain stimulated
- ☐ Increased credibility
- ☐ Other __

2. DEPARTMENT LEVEL

2.1 Please rate your department's current success or skill level for each of the following aspects by circling a response.

i) has adequate resources to support staff research training	Nil	some/little	moderate	Extensive	Unsure
ii) has funds, equipment or admin to support research activities	Nil	some/little	moderate	Extensive	Unsure
iii) does team level planning for research development	Nil	some/little	moderate	Extensive	Unsure
iv) ensures staff involvement in developing that plan	Nil	some/little	moderate	Extensive	Unsure
v) has team leaders that support research	Nil	some/little	moderate	Extensive	Unsure
vi) provides opportunities to get involved in research	Nil	some/little	moderate	Extensive	Unsure
vii) does planning that is guided by evidence	Nil	some/little	moderate	Extensive	Unsure
viii) has consumer involvement in research activities/planning	Nil	some/little	moderate	Extensive	Unsure
ix) has applied for external funding for research	Nil	some/little	moderate	Extensive	Unsure
x) conducts research activities relevant to practice	Nil	some/little	moderate	Extensive	Unsure
xi) supports applications for research scholarships/ degrees	Nil	some/little	moderate	Extensive	Unsure
xii) has mechanisms to monitor research quality	Nil	some/little	moderate	Extensive	Unsure
xiii) has identified experts accessible for research advice	Nil	some/little	moderate	Extensive	Unsure
xiv) disseminates research results at research forums/seminars	Nil	some/little	moderate	Extensive	Unsure
xv) supports a multi-disciplinary approach to research	Nil	some/little	moderate	Extensive	Unsure
xvi) has incentives & support for mentoring activities	Nil	some/little	moderate	Extensive	Unsure
xvii) has external partners (eg universities) engaged in research	Nil	some/little	moderate	Extensive	Unsure
xviii) supports peer-reviewed publication of research	Nil	some/little	moderate	Extensive	Unsure
xix) has software available to support research activities	Nil	some/little	moderate	Extensive	Unsure

2.2 What are the biggest barriers to research in your department?

2.3 What are the biggest motivators to research in your department?

1. ORGANISATION LEVEL

1.1 Please rate your organisation's (NBMLHD) success or skill level for each of the following aspects by circling a response.

i) has adequate resources to support staff research training	No	Yes – to some extent	Yes - definitely	Unsure
ii) has funds, equipment or admin to support research activities	No	Yes – to some extent	Yes - definitely	Unsure
iii) has plans/policies for research development	No	Yes – to some extent	Yes - definitely	Unsure
iv) has senior managers that support research	No	Yes – to some extent	Yes - definitely	Unsure
v) ensures staff career pathways are available in research	No	Yes – to some extent	Yes - definitely	Unsure
vi) ensures organisation planning is guided by evidence	No	Yes – to some extent	Yes - definitely	Unsure
vii) has consumers involved in research	No	Yes – to some extent	Yes - definitely	Unsure
viii) accesses external funding for research	No	Yes – to some extent	Yes - definitely	Unsure
ix) promotes clinical practice based on evidence	No	Yes – to some extent	Yes - definitely	Unsure
x) encourages research activities relevant to practice	No	Yes – to some extent	Yes - definitely	Unsure
xi) has software programs for analysing research data	No	Yes – to some extent	Yes - definitely	Unsure
xii) has mechanisms to monitor research quality	No	Yes – to some extent	Yes - definitely	Unsure
xiii) has identified experts accessible for research advice	No	Yes – to some extent	Yes - definitely	Unsure
xiv) supports a multi-disciplinary approach to research	No	Yes – to some extent	Yes - definitely	Unsure
xv) has regular forums/bulletins to present research findings	No	Yes – to some extent	Yes - definitely	Unsure
xvi) engages external partners (eg universities) in research	No	Yes – to some extent	Yes - definitely	Unsure
xvii) supports applications for research scholarships/ degrees	No	Yes – to some extent	Yes - definitely	Unsure
xviii) supports the peer-reviewed publication of research	No	Yes – to some extent	Yes - definitely	Unsure

Please comment on any of the above issues indicating the item you are commenting on.

HOSPITAL PREPAREDNESS ASSESSMENT INSTRUMENTS IN CHEMICAL INCIDENTS: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

BACKGROUND:

Chemical incidents are among the most frequent technological disasters that have occurred frequently in recent years. Among the organizations operating in a disaster response, hospitals, as the primary unit of care, play the greatest and most critical role. Therefore, providing appropriate measures that lead to minimizing the effects of these events is raised as one of a health system's priorities. This study was carried out with the aim of undertaking a systematic review of the literature on hospital preparedness instruments in chemical incidents.

METHODS:

This systematic review was carried out according to the Systematic Reviews and Meta-Analyses guidelines. In line with this aim, in December 2020, six electronic databases were searched in MEDLINE (PubMed, Scopus, ISI Web of Science, ProQuest, Embase, and Cochrane) with the following key words: hospital, preparedness, chemical incidents, instrument.

RESULTS:

Out of 7,794 articles that were screened, 13 articles meet the inclusion criteria for the process of final analysis. Most studies were cross-sectional, two were cohort, and three studies were conducted by a qualitative method. The result showed that none of the evaluated checklists and tools included all dimensions required for an appropriate hospital preparedness evaluation in the event of chemical incidents.

CONCLUSION:

Based on the results of this investigation, there is no comprehensive tool for assessing hospital preparedness in chemical incidents. However, the data from this survey can be employed as guidelines for policymakers and managers of medical centers for planning in dealing with potential chemical incidents.

KEYWORDS

Chemical Incidents, Hospital, Instrument, Preparedness

INTRODUCTION

Contact with hazardous material takes place in a variety of ways, including at the Industrial sites responsible for the production and storage of these materials; during the transportation of these materials through the land, rail, sea, and air ways; or as a result of deliberate release of chemicals by terrorist organizations. [1, 2] Chemical incidents are among the most frequent technological disasters that have occurred in recent years. [3] In accordance with the results of the Center for Research on the Epidemiology of Disasters, 5,143 technological disasters (accidents or unexpected and uncontrolled emissions of explosives and dangerous substances) have happened from 2000 to 2019 and has impacted approximately 1.4 million people. [4] The worst chemical disaster in history took place in Bhopal, India, in 1985, which led to the deaths of 2,500 people and injuring 150,000 people. [5] In Iran, the explosion of a train carrying sulfur, ammonium nitrate, cotton, and oil at Khayyam station in Neyshabur, led to the death of over 300 people and injuring of more than 450 people. [6] In addition, the explosion of ammonium nitrate in the port of Beirut on August 4, 2020, influenced more than 300,000 people and resulted in the death of 220 people. Moreover, it consequentially caused social unrest and a sharp drop in economic conditions in the region. [4]

Although chemical incidents may happen in a limited way, they generate numerous physical and psychological effects on people in the community [7] and cause hospitals to be faced with a large number of injured persons. [8] Injuries caused by chemical incidents need special medical care and management such as triage, decontamination, administration of antidote, attention to trauma for the injured, suitable exploitation of personal protective equipment, and prevention of secondary contamination of health care personnel. [9] Therefore, providing appropriate measures that lead to minimizing the effects of these events is raised as one of the health system's priorities. [10]

Among the organizations operating in disaster response, healthcare organizations, particularly hospitals, as the primary unit of care, play the greatest and most critical

role. [11, 12] Maintaining the functionality and performance of the hospital in times of disaster enables hospitals to have the ability to respond to the high volume of patients and injured while conducting their current duties. [13] Thus, in the preparation stage before disasters, assessing the preparedness of hospitals against all kinds of disasters is taken into account as one of the concerns of health system managers. [14, 15] The results of investigations in different countries indicate the lack of preparedness of hospitals and health-care personnel in chemical incidents. [16-18]

Assessing the hospital's preparedness for disasters is very important to understand the strengths and weaknesses of the hospital in terms of disaster management before the occurrence of events. This contributes to authorities upgrading hospital preparedness through decreasing vulnerability and increasing capacity. [19] To this end, diverse tools were designed to maintain hospital preparedness in relation to chemical incidents; however, there is still no consensus on which tools are beneficial in preserving hospital preparedness in these events. [20] Therefore, evaluating the existing tools and extracting the effective factors in hospital preparedness has a crucial role for policymakers in this field. The present study systematically reviewed the instruments available in this field. The results of this study can play an essential role as a guide in designing and developing standard instrument for hospital preparedness in chemical incidents.

METHODS

DATABASES AND SEARCH STRATEGY

This study is a systematic literature review in which investigations and data extraction were conducted according to the Preferred Reporting Items for Systematic reviews and Meta-Analysis protocol (PRISMA). [21] In this study, an extensive search was conducted to achieve articles associated with the research question in the databases of PubMed, Scopus, ISI Web of Science, ProQuest, Embase and Cochrane databases from 1970 to 2020, with the keywords in the form of MESH terms. The searching strategy of PubMed was used as a model for searching other databases while others were modified according to the requirement (Appendix 1).

INCLUSION AND EXCLUSION CRITERIA

Studies that were included in the study were those that were conducted using quantitative and qualitative methods; were relevant to the research question; focused on tools for assessing hospital preparedness in chemical incidents; enabled access to the full text of the article; and were published in the English language. Exclusion criteria applied to studies with no abstracts; where there were no full-text articles available; and duplicate articles.

Two reviewers (FT and AZ) independently assessed the eligibility of studies by screening titles and abstracts according to the inclusion criteria. After the initial selection, fulltext articles were retrieved and assessed again independently by the authors (FT, AZ, AHP and HB). Discrepancies were solved by discussion. (Figure 1)

The quality of the articles was assessed with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Checklist and Consolidated criteria for Reporting Qualitative research (COREQ) Checklist.

The data extraction form was grouped into two sections. The first section was related to the characteristics of the included studies such as the first author, year of publication, Participants, type of tool, study design/methods, evaluation dimensions, validity and reliability of the instrument (Table 1). The second section was related to the key findings of the studies (Table 2)

RESULTS

The initial search, with the specified search strategies, resulted in 8,303 documents (PubMed (1,733), ISI Web of

Science (446), Scopus (3,202), ProQuest (682), Embase (677), Cochrane (1398) Conference (69), Thesis (n=96) of which 509 were duplicated. After reviewing titles, 468 were selected for an abstract check. Then after reviewing abstracts, 136 papers were selected. Finally, 13 papers were selected through the full text of the selected articles.

The data gained from the reviewed articles are demonstrated in Table 1 and is based on the first author, date of publication, the title of the study, research units, type of instrument, evaluation method and technique, evaluation dimensions, validity and reliability of the instrument.

The majority of the articles that were included in the study were from the USA (46.1%, n = 6) and then the United Kingdom (23%, n = 3) and one article each from Italy, Canada, the Netherlands, and Israel were included in the study. Most studies were cross-sectional (61.5%, n = 8), two were cohort, and three studies were conducted by a qualitative method.

All 13 papers were subjected to qualitative content analysis of data and based on the results from the analysis of these articles, factors affecting the preparedness of hospitals in chemical incidents were identified. The assessment tools reported in this study considered various subcategories for each of the hospital preparedness elements.

Table 2 shows the factors extracted from articles regarding hospital preparedness in chemical incidents.

FIGURE 1: PRISMA FLOW DIAGRAM FOR THE SYSTEMATIC REVIEW PROCESS

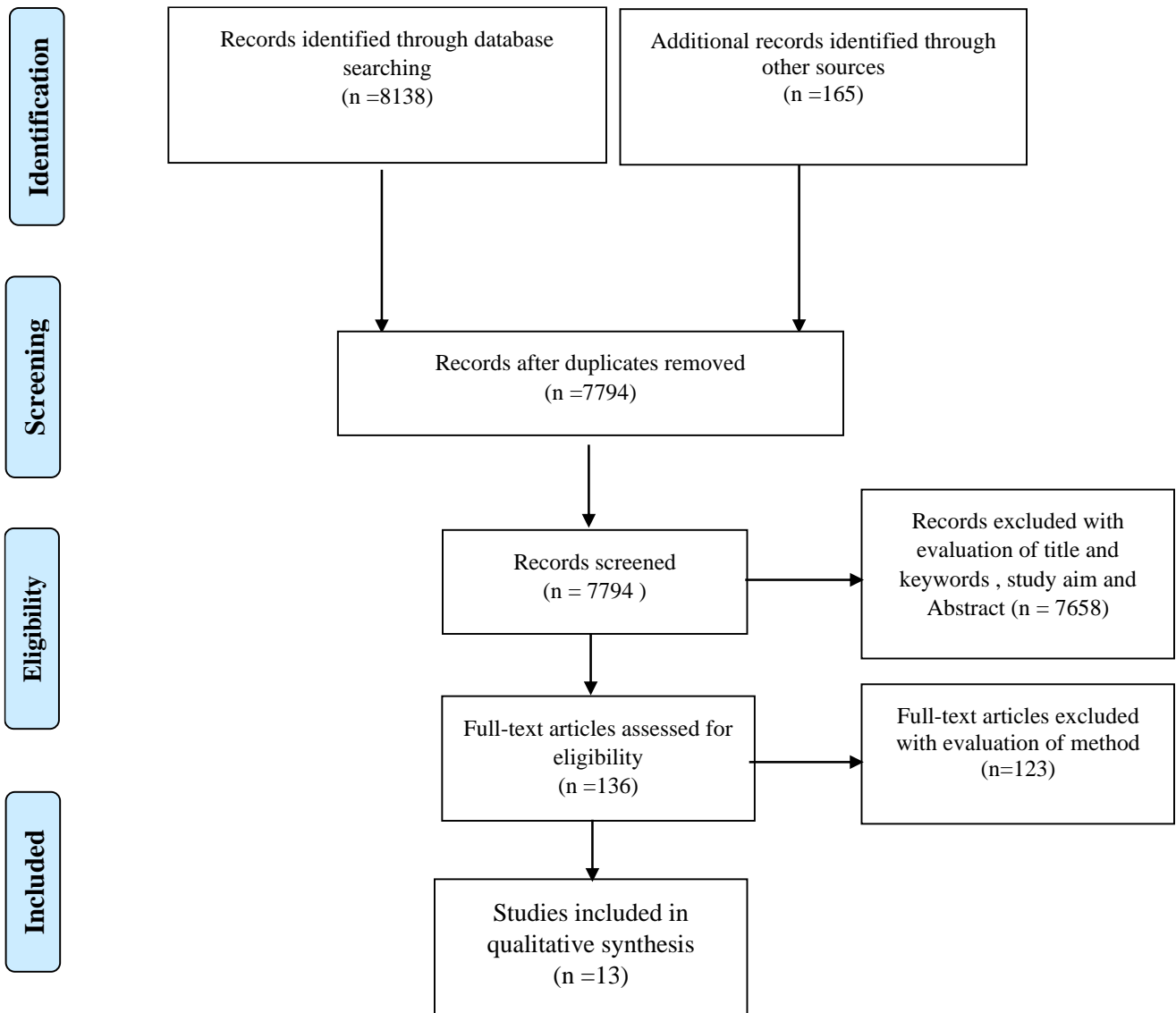


TABLE 1: AN OVERVIEW OF CHARACTERISTICS OF ARTICLES INCLUDED

Author, date of publication and place of study	Title of the study	Participants	Type of tool	Study design/Methods	Evaluation dimensions	Validity and Reliability
Burgess, 1997 USA (22)	Hospital Preparedness for Hazardous Materials Incidents and Treatment of Contaminated Patients	95 hospitals	Hospital self-assessed capability, including physical facilities and existing policies, to care for persons contaminated with hazardous materials.	Cross-sectional / A questionnaire was designed based on The Joint Commission on Accreditation of Healthcare Organizations standards and experiences gained from chemical exposures.	Three dimensions (Facilities for radioactive or chemical isolation and decontamination, A plan for evacuating the facility for sources of contamination, including spills or contaminated patients, or both, A written protocol for the treatment of patients exposed to hazardous materials)	Validity No Reliability No
Horby, 2000 United Kingdom (23)	The capability of accident and emergency departments to safely decontaminate victims of chemical incidents	154 hospitals	A questionnaire on decontamination of casualties exposed to hazardous chemicals	Cross-sectional / The questionnaire was designed by the authors and administered as a pilot	Four dimensions (chemical incident plan, staff training, decontamination equipment including personal protective equipment (PPE), and indoor and outdoor decontamination facilities)	Validity No Reliability No
Case, 2001 USA (24)	Hospital Preparedness for Biological and Chemical Terrorism in Central New Jersey	11 hospitals	Hospital preparedness Inventory to care for victims of biological and chemical terrorist incidents	Cross-sectional / A questionnaire consisting of 20-item was emailed to the hospital emergency manager and completed by those responsible for planning chemical and biological incidents	Five dimensions (training of personnel, logistical support of these patients, laboratory diagnosis, incident-control mechanisms, and pertinent information system)	Validity No Reliability No
Greenberg, 2002 USA (25)	Emergency department preparedness for the evaluation and treatment of victims of biological or chemical terrorist attack	54 hospitals	Preparation of the emergency department instrument to evaluate and treat victims of a biological or chemical terrorist attack	Cross-sectional / 38-item tool design by authors based on Domestic Preparedness Hospital provider Course Syllabus version 8.0	Five dimensions (physician training and education, antidote stocking, written policies, interagency agreements, and decontamination)	Validity No Reliability No

Author, date of publication and place of study	Title of the study	Participants	Type of tool	Study design/Methods	Evaluation dimensions	Validity and Reliability
Keim, 2003 USA (26)	Lack of hospital preparedness for chemical terrorism in a Major US City: 1996–2000	21 hospitals	Hospital preparedness for chemical terrorism	Cross-sectional questionnaire A questionnaire consisting of 7 questions was emailed to the responsible for the hospital's emergency	Four dimensions (antidote stocks, institutional response capabilities including the number of showers for decontaminating patients, the level of worker protection, and the number of staff trained to decontaminate)	Validity No Reliability No
Kollek, 2003 Canada (27)	Canadian emergency department preparedness for a nuclear, biological or chemical event	59 hospitals	Emergency preparedness against chemical, biological, nuclear, and radiological accidents	Cross-sectional / The questionnaire was designed based on a review of literature	Four dimensions (risk assessment, general disaster preparedness, preparedness for a biological event, and preparedness for a chemical or nuclear event)	Face validity Yes Reliability No
Crawford, 2004 United Kingdom (1)	Delphi based consensus study into planning for chemical incidents	39 experts from specialties involved in the management of chemical incidents	chemical incident planning and response	Qualitative study /183 statements were generated on the basis of three Delphi rounds	Preparation dimension, including three categories (planning, equipment, training) Pre-hospital response dimension, including seven categories (incident assessment, leadership, safety, communications, triage, treatment, and transfer) Hospital response dimension, including three categories (triage, treatment, and transfer)	Validity No Reliability No

Author, date of publication and place of study	Title of the study	Participants	Type of tool	Study design/Methods	Evaluation dimensions	Validity and Reliability
Bennett, 2006 USA (28)	Chemical or Biological Terrorist Attacks: An Analysis of the Preparedness of Hospitals for Managing Victims Affected by Chemical or Biological Weapons of Mass Destruction	102 Hospitals	A self-administrated questionnaire specific preparedness for managing victims of an attack involving Chemical or Biological Weapons of Mass Destruction	Cross-sectional / The questionnaire were developed based on review of literature	Six dimensions (documented and functional preparedness plans; specific preparedness education/training; decontamination facilities; surge capacity; pharmaceutical procedures and supplies; and laboratory diagnostic capability)	Validity Yes Reliability Yes
Williams, 2007 United Kingdom (29)	Preparedness of emergency departments in northwest England for managing chemical incidents: a structured interview survey	18 head nurses in the emergency department	Emergency preparedness for the management of chemical accidents	Qualitative study/ Semi-structured interview based on the analysis of interviews, a 34-item questionnaire was designed by one of the authors.	Four dimensions (Planning and training, Facilities and equipment, Water supply and disposal, Patient privacy, dignity and comfort)	Validity No Reliability No
Belsky, 2016 USA (30)	Survey of Emergency Department Chemical Hazard Preparedness in Michigan, USA: A Seven Year Comparison	120 emergency departments in 2005 and 99 emergency departments in 2012	MCEP (Michigan College of Emergency Physicians) disaster preparedness survey	longitudinal survey / The questionnaire was designed based on a review of the literature	Three dimensions (including decontamination, Supplies, Staffing)	Validity No Reliability No

Author, date of publication and place of study	Title of the study	Participants	Type of tool	Study design/Methods	Evaluation dimensions	Validity and Reliability
Oliveri, 2017 Italy (13)	Hospital preparedness and response in CBRN emergencies: TIER assessment tool	18 experts from European and non-European countries	Hospital preparedness assessment tool in CBRN emergencies	Qualitative study / Design of tool by Delphi technique and expert panel	Seven dimensions (Planning and organization, Safety and security, Standard Operation Procedures, Resources, Communication, Decontamination, Medical Management)	Validity No Reliability No
Mortelmans, 2017 Netherlands (31)	Are Dutch Hospitals Prepared for Chemical, Biological, or Radionuclear Incidents? A Survey Study	93 hospitals	Hospital preparedness of the Netherlands to deal with chemical, biological and nuclear accidents	Cross-sectional	Eight dimensions (Risk perception for CBRN incidents, hospital disaster planning, decontamination procedures and installations, availability of PPE, staff training and antidote use, availability of radio-detection equipment, isolation resources, nuclear medicine specialists, and infectiologists)	Validity No Reliability No
Siman-Tov, 2020 Israel (20)	Maintaining Preparedness to Severe Though Infrequent Threats—Can It Be Done?	24 hospitals	evaluation tool to measure readiness for toxicological/chemical events	longitudinal survey / Design of tool by Delphi technique	Four dimensions (standard operating procedures, equipment and infrastructure, knowledge of medical personnel, training and exercises)	Validity Yes Reliability No

TABLE 2: CATEGORIES AND SUBCATEGORIES OF HOSPITAL PREPAREDNESS IN CHEMICAL INCIDENTS

categories	Subcategories
Planning and organizing	A plan for evacuating the facility for sources of contamination[22], chemical incident plan (23, 31), isolation plan(26), planning(1), planning and organization(13), incident-control mechanisms(24), documented and functional preparedness plans (28), Standard operation procedures(13, 20), A written protocol for the treatment of patients exposed to hazardous materials(17, 22, 25, 28), special team for hazardous materials(20, 30, 31)
Empowerment of staff	Training of personnel(1, 23, 24, 26, 28, 30, 31), training and exercise(20, 31), Drill Experience with Regard to Biological and Chemical Scenarios(25)
Resource and facility management	Resources and equipment(1, 13, 17), logistics support(23), antidote storage(25, 27, 28, 30, 31), increase in surge capacity(28, 31), communication equipment(30)
Decontamination	Decontamination program(17, 27) planning for the exploitation of dry decontamination(30), isolation and decontamination facilities for chemical and radioactive materials(22), decontamination facility(20, 28), decontamination site(17, 23, 27, 31), decontamination shower(26, 30), internal and external decontamination equipment(23), water supply and disposal(17)
Coordination and communication	Coordination with local and regional resources(30), communications(13), Internet information systems(24)
Safety and security	Safety and security(13, 31), decontamination capability of the victims(25), personal protective equipment(20, 23, 26, 27, 30, 31), laboratory diagnosis of risk factors(24, 28, 31)

DISCUSSION

Various studies have been conducted about instruments used to identify factors affecting the readiness of hospitals in chemical incidents. Mass casualty incidents resulting from hazardous materials cause dysfunction in the activities of the emergency department, confusion, impaired communication, and lack of coordination. In the absence of immediate detection of the chemical incidents at the time of admission of victims, the incident may lead to secondary contamination of hospital personnel and infrastructure. [20] Hospital preparedness plays a vital role in the diagnosis and management of chemical victims,

and policymakers are seeking novel instruments that could promote hospital preparedness. [32]

The results of this study showed that several factors are effective in hospital readiness in chemical incidents. These factors were classified into six categories: planning and organization, empowerment of staff, resource and facilities management, decontamination, coordination and communication, safety and security.

Planning and organizing is the basis of hospital preparedness and has a great impact on the capacity of the hospital to respond to disasters. [13] Special planning for chemical incidents is needed at all levels of health services (1). An appropriate plan for this incidents includes

all essential dimensions, examination and identification of hazardous material, [23, 24, 27] isolation and prevention of secondary contamination of personnel and infrastructure, [26] decontamination facilities, [22, 25] a protocol for assessment and treatment of victims, [22, 25] emergency department evacuation program and other wards of the hospital in contamination with hazardous materials. [22]

Among the most critical dimensions of hospital preparedness to respond to chemical incidents is the empowerment of staff. Healthcare personnel should have suitable training so that they have the capability of assessing and treating chemical victims. [33] Training of personnel should be in accordance with their role and responsibilities in the disaster management program. [34] Although increasing knowledge and awareness is an important factor for performance, it is not sufficient to ensure good performance. Hence, assessment of knowledge and performance of personnel through holding various maneuvers is essential. [20] The goal of holding drills is the evaluation and improvement of hospital preparedness policies and programs and to upgrade the performance of personnel. [20] Besides, it causes the reassurance in personnel for reception and treatment of chemical victims. [24]

One of the other important factors in hospital preparedness for chemical incidents is resource and facilities management. In order to provide logistical resources and equipment, the hospital encounters challenges. Since hospitals have to bear costs despite the low occurrence of chemical incidents, including drugs required for the treatment of chemical victims, they are expensive and can only be stored for a short time, [24, 35] In this respect, experts insist that hospitals should have cooperation agreements with other hospitals and organizations, including the fire services, emergency medical services for joint use of resources and equipment at the time terrorist attacks. [25]

Decontamination is one of the contributing factors in hospital preparedness for chemical incidents. In order to prevent the contact of hospital personnel and facilities with chemical agents, all infected patients should be decontaminated before admission to the emergency department or at least at the entrance to the emergency department. [35] The decontamination process typically needs equipment, access to trained personnel as a decontamination team, and decontamination facilities such as showers and water with the appropriate

temperature. Some experts recommend dry decontamination as a first step. [13]

Coordination and Communication is considered as one of the main challenges in disasters, [36] especially in chemical incidents and these events are capable to create many psychological and physical problems for the general public as well as the medical staff exposed to the victims. [2] Each hospital should have a coordinator for mobilizing hospital resources at the time of disasters. [30] The complex and dynamic nature of disasters often generates problems in the coordination between the activities of emergency medical services and hospitals. [24] The lack of informed and timely communication between hospitals causes an increase in confusion in disaster response. Thus, the relationship between the hospital and the scene of the events should be strengthened so that hospitals could provide more resources in these circumstances. [37] During chemical events, providing detailed and reliable information is raised as a necessity for healthcare providers, firefighters, police, officials, and even victims. [13]

Safety and security is the first priority for personnel providing medical services in times of disaster. In order to ensure safe conditions, a number of procedures, personal protective equipment, pollution control, and close supervision of security officers are required. [13] Considering that the chemical incident can take place anywhere, so the chemical victims are transferred to the nearest hospital. The experience of the Tokyo incident indicates that most of the victims themselves were referred to the hospital before decontamination. [27] This causes contamination of hospital personnel and facilities. Hence, the hospital security and safety forces should not allow the victims to enter the emergency department before decontamination; in the meantime, the personnel should use suitable personal protective equipment. [5] Protection of the hospital personnel has priority over the treatment of the victims. If personnel are not safe, they quickly become injured, causing complex problems for the hospital. [24]

STRENGTHS AND LIMITATIONS OF THE STUDY

There is an extensive list of related keywords to search in several high-quality databases. Moreover, a search in the gray literature and accurate screening of studies using standard criteria are the study's strengths. One of the limitations of the research was that only articles published in English were included in the study.

CONCLUSION

In this study, 13 articles that involved both quantitative and qualitative research approaches were investigated and analyzed. The results revealed that there is no comprehensive instrument for assessing hospital preparedness in chemical incidents, and none of the studies employed the standard method of tool making and psychometrics to prepare the tool, and none of the tools had all the dimensions related to assessing the hospital preparedness for chemical incidents.

Any organization and country exploited criteria and an approach consistent with their cultural background to assess the hospital preparedness for chemical events. Tools associated with medical centers and health care personnel should be designed based on a systematic review and using the experience of experts. The data of this study could be applied as a valuable resource for planning to upgrade hospital emergency programs in chemical incidents at the regional, local, and national levels.

References

1. Crawford IW, Mackway-Jones K, Russell DR, Carley SD. Delphi based consensus study into planning for chemical incidents. *Emerg Med J*. 2004;21(1):24-8.
2. Clarke SA, Weir AGA. UK resilience to a chemical incident. *Journal of the Royal Army Medical Corps*. 2019.
3. Koenig KL, Schultz CH. Koenig and Schultz's Disaster Medicine Comprehensive Principles and Practice. 2 ed. New York: Cambridge University Press 2016.
4. EM-DAT, CRED/UCLouvain, Brussels, Belgium [Internet]. Available from: www.emdat.be (D. Guha-Sapir).
5. Chan J, Yeung R, Tang S, . Hospital preparedness for chemical and biological incidents in Hong Kong. *Hong Kong Med J*. 2002;8(6):440-6.
6. Jahangiri K, Ghodsi H, Khodadadizadeh A, Nezhad SY. Pattern and nature of Neyshabur train explosion blast injuries. *World journal of emergency surgery*. 2018;13(1):1-5.
7. Moradi Majd P, Seyedin H, Bagheri H, Tavakoli N. Hospital Preparedness Plans for Chemical Incidents and Threats: A Systematic Review. *Disaster Med Public Health Prep*. 2019;1-9.
8. Razak S, Hignett S, Barnes J. Emergency Department Response to Chemical, Biological, Radiological, Nuclear, and Explosive Events: A Systematic Review. *Prehospital and Disaster Medicine*. 2018;33(5):543-9.
9. Hasani-Sharamin P, Bagheri H, Salesi M, Dadashi F, Rouhollahei M, Poorheidary G, et al. Necessary Indicators for Developing a Hazmat Response Team of the Iranian Health System. *Advanced Journal of Emergency Medicine*. 2020.
10. Ghaedi H, Nasiripour A, Tabibi SJ. Hospital Preparedness in Radiation Crisis in Selected Countries and Developing a Conceptual Model for Iran. *ISMJ*. 2018;21(5):393-408.
11. Sharififar S, Jahangiri K, Zareiyani A, Khoshvaghti A. Factors affecting hospital response in biological disasters: A qualitative study. *Medical journal of the Islamic Republic of Iran*. 2020;34:21.
12. Azarmi S, Pishgooie AH, Sharififar S, Khankeh HR, Hejrypour SZ. Challenges of Hospital Disaster Risk Management: A Systematic Review Study. *Disaster Medicine and Public Health Preparedness*. 2021:1-8.
13. Olivieri C, Ingrassia PL, Della Corte F, Carenzo L, Sapori J-M, Gabilly L, et al. Hospital preparedness and response in CBRN emergencies: TIER assessment tool. *European Journal of Emergency Medicine*. 2017;24(5):366-70.
14. Barbera JA, Yeatts DJ, Macintyre AG. Challenge of Hospital Emergency Preparedness: Analysis and Recommendations. *Disaster Medicine and Public Health Preparedness*. 2009;3:S74-S82.
15. Aminizadeh M, Farrokhi M, Ebadi A, Masoumi GR, Kolivand P, Khankeh HR. Hospital management preparedness tools in biological events: A scoping review. *Journal of Education and Health Promotion*. 2019;8.
16. Jama TJ, Kuisma MJ. Preparedness of Finnish emergency medical services for chemical emergencies. *Prehospital and disaster medicine*. 2016;31(4):392-6.
17. Williams J, Walter D, Challen K. Preparedness of emergency departments in northwest England for managing chemical incidents: a structured interview survey. *BMC Emergency Medicine*. 2007;7(1):20.
18. Azeem AR, Sharif MW, Akhtar A, Sohail CS, Dar AA, Khan M, et al. Perception of Preparedness of Health Care Professionals in Case of a Nuclear, Chemical, Biological Attack/Emergency in a Tertiary Care Hospital. *Cureus*. 2019;11(5).
19. Heidarlanlu E, Ebadi A, Khankeh HR, Ardalan A. Hospital disaster preparedness tools: a systematic review. *PLoS currents*. 2015;7.

20. Siman-Tov M, Davidson B, Adini B. Maintaining Preparedness to Severe Though Infrequent Threats—Can It Be Done? *International Journal of Environmental Research and Public Health*. 2020;17(7):2385.
21. Moher D, Shamseer L, Clarke M, Ghera D, Liberati A, Petticrew M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic reviews*. 2015;4(1):1-9.
22. Burgess JL, Blackmon GM, Brodtkin CA, Robertson WO. Hospital preparedness for hazardous materials incidents and treatment of contaminated patients. *Western Journal of Medicine*. 1997;167(6):387-91.
23. Horby P, Murray V, Cummins A, Mackway-Jones K, Euripidou R. The capability of accident and emergency departments to safely decontaminate victims of chemical incidents. *J Accid Emerg Med*. 2000;17(5):344-7.
24. Case GG, West BM, McHugh CJ. Hospital preparedness for biological and chemical terrorism in central New Jersey. *N J Med*. 2001;98(11):23-33.
25. Greenberg MI, Jurgens SM, Gracely EJ. Emergency department preparedness for the evaluation and treatment of victims of biological or chemical terrorist attack. *J Emerg Med*. 2002;22(3):273-8.
26. Keim ME, Pesik N, Twum-Danso NAY. Lack of hospital preparedness for chemical terrorism in a major US City: 1996-2000. *Prehospital and Disaster Medicine*. 2003;18(3):193-9.
27. Kollek D. Canadian emergency department preparedness for a nuclear, biological or chemical event. *Cjem*. 2003;5(1):18-26.
28. Bennett RL. Chemical or biological terrorist attacks: An analysis of the preparedness of hospitals for managing victims affected by chemical or biological weapons of mass destruction. *International Journal of Environmental Research and Public Health*. 2006;3(1):67-75.
29. Williams J, Walter D, Challen K. Preparedness of emergency departments in northwest England for managing chemical incidents: a structured interview survey. *BMC Emerg Med*. 2007;7:20.
30. Belsky JB, Klausner HA, Karson J, Dunne RB. Survey of Emergency Department Chemical Hazard Preparedness in Michigan, USA: A Seven Year Comparison. *Prehosp Disaster Med*. 2016;31(2):224-7.
31. Mortelmans LJM, Gaakeer MI, Dieltiens G, Anseeuw K, Sabbe MB. Are Dutch Hospitals Prepared for Chemical, Biological, or Radionuclear Incidents? A Survey Study. *Prehospital and Disaster Medicine*. 2017;32(5):483-91.
32. Asch SM, Stoto M, Mendes M, Valdez RB, Gallagher ME, Halverson P, et al. A review of instruments assessing public health preparedness. *Public Health Reports*. 2005;120(5):532-42.
33. Wanner D, Gregory K, Atti M, Jasper M. Chemical Disaster Preparedness for Hospitals and Emergency Departments. 2019.
34. Greenberg MI, Hendrickson RG. Report of the CIMERC*/Drexel University Emergency Department Terrorism Preparedness Consensus Panel. *Academic Emergency Medicine*. 2003;10(7):783-8.
35. Mortelmans LJM, Van Boxstael S, De Cauwer HG, Sabbe MB. Preparedness of Belgian civil hospitals for chemical, biological, radiation, and nuclear incidents: are we there yet? *European Journal of Emergency Medicine*. 2014;21(4):296-300.
36. Seyedin H, Moradimajd P, Bagheri H, Nasiri A. Providing a Chemical Events and Threat's Preparedness Model for Hospitals in the Country: A Qualitative Study. *Journal Mil Med*. 2021;23(3):220-7.
37. Christensen BE, Duncan MA, King SC, Hunter C, Ruckart P, Orr MF. Challenges during a Chlorine Gas Emergency Response. *Disaster Medicine and Public Health Preparedness*. 2016;10(4):553-6.

APPENDIX 1: SEARCH STRATEGY FOR PUBMED

Database	Controlled and natural keywords
PubMed	<p> ((Tool [Title/Abstract])) OR (Questionnaire [Title/Abstract])) OR (Checklist [Title/Abstract])) OR (Instrument [Title/Abstract])) OR (Rating Scale [Title/Abstract])) OR (Inventory [Title/Abstract])) OR (Profiles [Title/Abstract])) OR (Scale [Title/Abstract])) OR (Index [Title/Abstract])) OR (Assessment [Title/Abstract])) OR (Criteria [Title/Abstract])) OR (Standards [Title/Abstract])) OR (survey [Title/Abstract])) AND (medical facilities [Title/Abstract])) OR (Emergency room [Title/Abstract])) OR (Health officials [Title/Abstract])) OR (Health care facilities [Title/Abstract])) OR (Health care facility [Title/Abstract])) OR (medical facility [Title/Abstract])) AND (Preparedness [Title/Abstract])) OR (Readiness [Title/Abstract])) OR (Response [Title/Abstract])) OR (Appraisal [Title/Abstract])) OR (Measurement [Title/Abstract])) OR (Evaluation [Title/Abstract])) OR (Management [Title/Abstract])) AND (chemical Incidents [Title/Abstract])) OR (hazardous material [Title/Abstract])) OR (chemical accident [Title/Abstract])) OR (chemical Event [Title/Abstract])) OR (chemical occurrence [Title/Abstract])) OR (chemical hazard [Title/Abstract])) OR (chemical Threat [Title/Abstract])) OR (chemical Agent [Title/Abstract])) OR (chemical Terrorism [Title/Abstract])) </p>

ENSURING EMOTIONAL FITNESS OF HEALTHCARE WORKERS THROUGH EMPLOYEE CHAMPION ROLE OF HUMAN RESOURCE MANAGEMENT

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ABSTRACT

BACKGROUND

With the outbreak of COVID-19 the emotional health problems of healthcare workers have been further aggravated. If now left unaddressed this can lead to distress as well affect their effectiveness at work. It becomes essential to look at those specific emotional needs of healthcare workers, enabling them experience emotional well-being at different levels.

OBJECTIVE

This study examines the Human Resource (HR) Champion approach in combating the emotional health problems of healthcare workers. The objectives of the study included identifying the different emotional needs of Health care workers, mapping the various Human Resource Champion roles towards each of the identified emotional needs of workers and the different levels of emotional well-being. The study further looks at the feasibility/availability of the various identified employee champion roles in healthcare.

METHODS

Based on a mini review the purpose of the paper is to create a unique synthesis and proposal for utility of healthcare organizations. The exploration included terms of search in combination and in particular related to emotional fitness of healthcare workers, COVID-19, HR role in managing employee stress, workplace stress, employee champion and HR champion. The potential chances of subjectivity in selection of the papers cannot be overlooked though the various databases used for review include Google Scholar, Web of Science, Semantic Scholar which provides the most cited work.

RESULTS

The study reports a negative influence of pandemic on HCW's mental health. The identified needs of healthcare workers during the pandemic include caring, protecting, hearing, preparing and supporting them. The identified needs have been mapped towards the various HR champions i.e., physical, social, financial, emotional, work-life integration and meaning in work champion. The various practices that were available and were considered feasible have also been evaluated. The fulfillment of the specific emotional needs of HCW's can lead to emotional well-being at different levels including essentials, belonging, purpose and flourishing. But the fact remains that many of the champion roles are way far from being implemented in healthcare due to the nature of work and to an extent attitude of the management.

CONCLUSIONS

The findings of the study reveal that different employee champions can nurture the specific emotional needs of healthcare workers thereby leading to fulfillment of their emotional well-being at different levels. Some champion roles

are more visible (physical and financial champions) as compared to work- life integration, social, emotional, meaning in work champions in healthcare organizations.

LIMITATIONS

The potential chances of subjectivity in selection of papers cannot be overlooked though the study made use of Semantic Scholar, Google Scholar, Web of Science which provides the most cited work. Since the core purpose of this paper is to provide a unique synthesis and proposal of value to healthcare workers, this mini review has its use in contribution towards a conceptual model that can be subject to empirical attestations in future research to further establish the role of different HR champions towards the increased emotional well-being of Healthcare workers at the workplace.

KEYWORDS

healthcare workers; emotional well-being; mental health; pandemic; COVID-19; healthcare; employee champion; human resource management; stress

INTRODUCTION

STRESS OF HEALTHCARE WORKERS DURING PANDEMIC

In spite of exhaustion, personal risk of infection, fear of transmission of infection to family members, sickness or demise of colleagues and friends and loss of numerous patients, health-care workers have constantly provided services. However, their ability to cope has also been affected by many additional and at times unavoidable factors of stress including long shifts combined with unprecedented population, anxiety, restrictions including self-isolation. [41]

Healthcare workers are prone to depression, anxiety, burnout, moral distress, insomnia and post-traumatic stress disorder as they are impacted by severe burnout syndrome under unusual working conditions with as many as 33% in the category of critical care nurses and 45% in the group of critical care physicians. [45] Chronic stress affects healthcare workers after the eruption of the acute respiratory syndrome in 2003 was reported to last for months to years.[40] It has been reported in a Chinese study that the healthcare workers treating patients with COVID-19 experienced high rates of distress (72%), anxiety (45%), depression (50%) and insomnia (34%).[33] Studies conducted in France and Italy reported that staff working directly with COVID-19 patients, being female, working as a nurse and younger age are prone to experience high burnout, risk factors for contrary psychological outcomes, post-traumatic stress disorders and depressive symptoms. [13, 7] With 40% of physicians having reported burn-out and almost 74% of physicians surveyed conveying symptoms of burn-out as compared to 25% of the general workforce, it has been demonstrated through multiple studies that the

licensed healthcare providers have rates of depression nearly three times the national average. [28, 57, 31] while the major contributors being unparalleled levels of daily stress, exposure to trauma and extremely long hours of working. [52]

Working in an environment that is highly demanding and strained, healthcare workers are experiencing poor quality of life and psychosocial risk factors. [6] The most important psychosocial risk factors for nurses identified during COVID-19 in city of Ahvaz, Iran included stress, work- family conflict, emotional needs, job dissatisfaction and burnout [46] which are strong risk factors to poor health, work related outcomes, burnout and job dissatisfaction. [23]

The above studies and a review of available literature reveal the main stress related issues of health care professionals as anxiety, stress, insomnia, depression, fatigue and burnout which have further been aggravated in the pandemic due to physical exhaustion and emotional strain, shortages of personal equipment's, providing care to co-workers, concerns about transmitting infection to families, assuming new and unfamiliar clinical roles and shortages of ventilators. [48]

The work-related psychological distress, burnout and anxiety are unavoidable occupational health issues especially during a pandemic. [12] Burnout experienced as an outcome of poor quality of life, poor physical and psychological health among healthcare workers not only affected their job satisfaction but their general well-being as well. Hence hospital management should initiate health facilities that essentially improve the working conditions thereby reducing job stress and in turn, reducing burnout at

work thereby improving the well-being of healthcare workers. [6] Moreover, mental problems have been a major issue for the healthcare workers especially during the pandemic and hence a timely intervention that addresses these mental problems are vital. [24]

This paper aims at addressing the commonality of the psychological distress experienced amongst the healthcare professionals through employee champion role of human resources (HR) thereby ensuring different levels of emotional well-being. The study attempts to determine the needs of healthcare workers (HCW) during the pandemic; align the different roles of employee champion to the needs of HCW; mapping the fulfilled needs to the different levels of emotional well-being of HCW. As HR champions can cater towards systems that facilitate not only the mental health needs of employees but also increase their efficiency at work. [8]

THEORETICAL BACKGROUND

EMPLOYEE CHAMPION ROLE OF HUMAN RESOURCES

The workplace plays a major role on the well-being of employees, but at the same time it can also be used as an ideal setting to promote health [16] - both physical and mental health. In order to build a well-being support system, management or HR can develop the organizational context which cater both to organizational and individual factors [14, 59] which in turn, can be driven by pro-health

ideologies, valued leadership, safe screening and assessment mechanisms. [5]

It has been found that organizations committed to employee well-being and a work unit well-being champion are better providers of employee satisfaction, employee engagement, and personal well-being which in turn contribute towards a promising perception of the organization.[62] An organization that is associated with intensely supportive benefits at multilevel, towards a robust well-being champion program can have an overwhelming impact on the psychological, physical and social well-being of personnel. By embracing and emphasizing employee welfare HR can become true "employee champions" and can work towards enhanced employee well-being. [60, 61].

A Workplace Champion Program that has been well defined is found in philosophies of behavior change and finds its base in social cognitive theory as research has established the significance of social networks and peer support for individual behavior. [62]

The well-being champion model as depicted in Table 1, focuses on six pillars of well-being including social, work-life integration, physical, emotional, financial and meaning in work which has been proved beneficial at the Mayo Clinic (USA) and have been delivered by expert driven, evidence-based programs and employee champions including supervisors [15,62].

TABLE 1: EMPLOYEE CHAMPION ROLES OF HUMAN RESOURCE MANAGEMENT

Roles of Employee Champion	Description
Social	Building on a sense of connection, belongingness, and inclusion everywhere.
Physical	Learning, engaging, and maintaining behaviours towards physical health that facilitates attaining best health and energy
Emotional	Cultivating positive feelings and reactions that help towards fulfilment and meaning in all spheres of one's life
Financial	Availability of resources those are financially comfortable and stable now as well as in the future.
Work-life integration	Creating a sense of harmony and balance in both personal and professional realms
Meaning in work	Finding a deeper awareness on purpose and meaning in work while getting support with on-going self-discovery.

Source:: [63 p.108]

The overall success, understanding and awareness of an employee health and wellness program can be ensured by the management through a well-being champion that is employee-led.[19]

The measures implemented need to be matched to the problems they are intended to address, which would imply a high measure-to--challenge communication at the operational-level workplace interventions aimed towards improved employees' health efforts and working conditions.[2]

Well-being Champions, hospital management departments and psychological experts can collaborate to implement different interventions that addresses problems of depression which has been on a rise after the pandemic. [42] They can provide the critical peer support needed to maintain and improve healthy behaviors among coworkers [25] as they may have a better understanding and knowledge of personal challenges, workplace, health/wellness problems and apprehensions and organizational concerns that are most central to the employees and their families and colleagues.[20]

With a readiness towards educating and supporting their colleagues and investing in their own wellness, the wellness champions are potential agents of change [9, 32, 36, 63]. A wellness champion in the healthcare workforce can communicate health-wellness activities and resources as well as motivate their colleagues to contribute to the wellness opportunities.

Rather than embracing the "best practice" approach (or "one size fits all") [27, 38] HR managers should deliver the tailored "best fit" strategies of HR that are aligned to organizational goals. In the current context HR champion roles can be tailored best fit in accordance with the healthcare through a wellness champion program, while the common thread being the need for "good practice" in human resource management (HRM) is appreciated, while good practice may or may not often be a common practice.

MATERIALS AND METHODS

Based on a mini review designed to address the research goals mentioned in the previous section this paper aims to create a unique synthesis and proposal for utility of healthcare organizations. While reporting the maximum

relevant findings mini reviews condense the most significant concepts related to a topic.[21] The study is based on research papers available in Web of Science, Google Scholar, PubMed, Semantic Scholar on HR champions and the emotional distress of healthcare workers, especially during the current pandemic. The search terms include in particular and in combination were - employee champion; HR champion; workplace stress; emotional fitness of healthcare workers; emotional distress; healthcare workers, COVID-19; pandemic; emotional well-being of healthcare workers.

Articles that have been cited have been included in the study, as scholarly associations in available publications are shaped when one work cites another.[4] Since the number of studies on emotional fitness and well-being of healthcare workers were limited, the studies on HR strategies and psychological studies on combating stress also formed a part of the review. Moreover, reports that specifically dealt with the emotional distress of health care workers were also included in the study.

Enabling meaning in the data and themes becomes evident initially in the review process through routine piloting of large systematic reviews and in turn adds on to the efficiency and validity of the review. Hence a study that looks at a review of 20 or more included studies can use a purposive sampling method to include up to 10 papers from the pool of comprised trials. [37]. The researcher took up a routine pilot of a sample of 10 papers all through to the stage of evidence synthesis from the included trials of 35 papers. This was done to judge the potential of the extracted data to answer the review questions at an early stage. The data extracted from the sample papers were processed up to the synthesis stage before going ahead with the full review.

Understanding from the stage of pilot synthesis helped the researcher to adapt measures in the data extraction form, as only information that was targeted at employee wellness and the current distress of healthcare workers as well as strategies that could be integrated towards HR Championing role were included in the study. Insights from pilot synthesis enable modifications that ensure the most useful information to be extracted from the lot of available papers in a single phase without having to revisit each paper at the later stage. [44]

The researcher initially identified the needs of the HCW's

during the pandemic and later arrived at the different roles of Employee Champion (EC). The different needs of HCW's were then aligned with each of the identified EC roles. The needs and the aligned EC roles were further mapped to the different levels of emotional fitness of HCW's. The feasibility/ opinion on the EC roles within the context of health care was undertaken using a one- to- one interview) with a sample of 20 healthcare workers including nurses, frontline workers and HR and administrative staffs to understand the feasibility and the extent to which these champion roles were evident in the health care.

A total of 32 articles were selected through initial screening, of which 3 were reports, 20 were original research articles,

2 were correspondence articles/commentaries, 5 were review articles and 2 were ideas/viewpoints.

EMOTIONAL FITNESS LEVELS OF HEALTHCARE WORKERS

Emotional fitness is the ability to build in emotional strength, flexibility and endurance while being able to meet one's needs including the basic essentials of cultivating a sense of purpose, securing a sense of belonging as well as finding prospects to flourish (Aon, Empower results, 2020). Table 2 summarizes the different levels of emotional fitness and well-being of employees.

TABLE 2: LEVELS OF EMOTIONAL FITNESS/WELL –BEING

Well- being levels	Meaning
Essentials	When an individual is able to fare with finances in order to meet the expense of food, shelter, clothing and emergencies. Is able to have physical activity, healthy sleep, social interaction, safe working and living environment, positive work relationships, job security and job satisfaction.
Belonging	The emotion of being recognized and valued for one's work as well being accepted. It also reflects one's degree of loyalty towards the company.
Purpose	It indicates how good an individual feels about himself as well the extent to which they are rewarded and recognized for the job they do. It gets reflected in the confidence they have in themselves.
Flourishing	A sense of fulfilment and satisfaction derived from the job and is reflected not only in behaviours including helping others and involving in community activities but as well in the pursuit of personal development and growth.

Source: adapted from Reith and Kuehl et al. [51,39]

Certain key functions that include linkage to medical resources and care; emotional and social provisions to encourage disease management behaviors; backing designed to withstand health behavior change; as well as coping with negative emotions are integral to the role of a wellness champion. [9, 32, 63, 3] This in turn, can ensure a sense of belonging, creating a purpose, meeting their essential needs and exploring opportunities for employees to flourish in health care.

FINDINGS

ADDRESSING THE CONCERNS OF HEALTHCARE WORKERS THROUGH THE CHAMPION ROLES OF HR

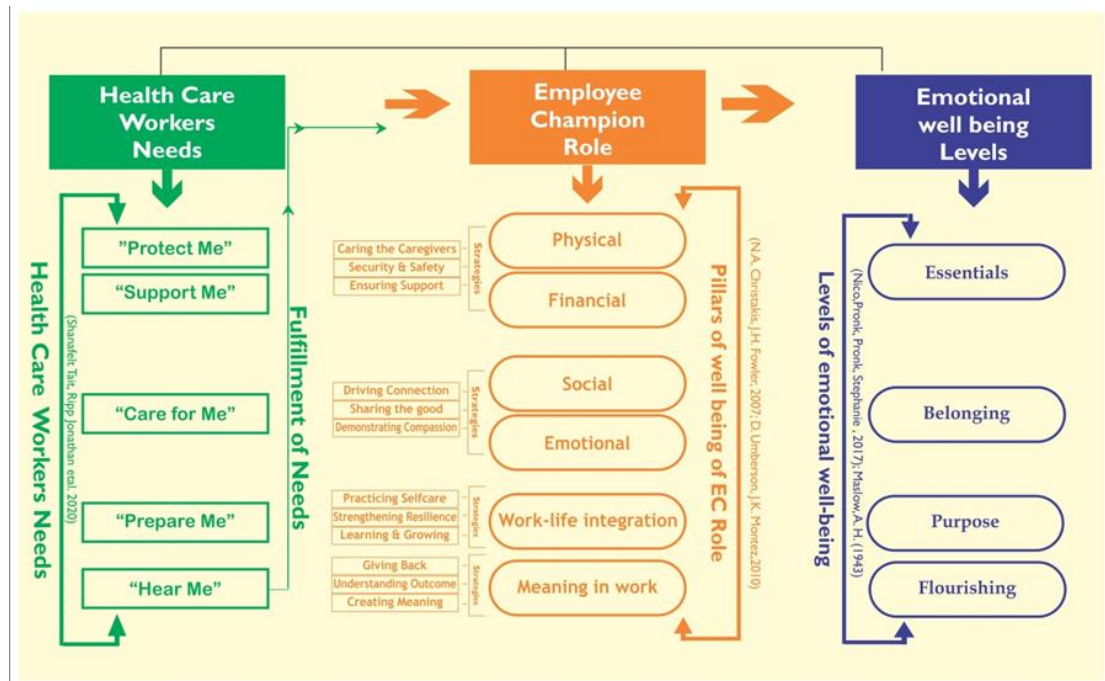
The various EC roles of HR can address the shared aims of the needs of psychologically distressed healthcare professionals which in turn can contribute to their emotional well- being. The needs of the healthcare workers during the pandemic include Hear me; protect me; prepare me; care for me; support me [56] can be aligned to the various HR champion roles. [63] The commonalities of the needs of

HCW can be further mapped towards the state of emotional well-being of healthcare workers as depicted in table 3

Table 3 summarizes the concerns, needs and apprehensions of HCW's through feedback and input channels during the pandemic, which have been mapped

to the required HR support that needs to be ensured through the various champion roles which in turn can contribute to the different levels of emotional well-being. Table 4 also records the opinion/ feasibility of the identified EC strategies by the HCWs.

TABLE 3: MAPPING EMPLOYEE CHAMPION ROLE TOWARDS HEALTHCARE WORKERS NEEDS AND EMOTIONAL WELL-BEING



Source: [56, 15, 62, 50, 39].

Proposing in lines of a strategy which is high reach that enhances employee participation in the broader wellness programs, the well-being programs initiated by Employee champions can be beneficial as they foster a culture of wellness and health at workplace thereby impacting positively the workplace healthy living behaviors.[47] Here measures that ensure security and safety; care; support; driving connections; compassion; self-care; learning and growing; understanding impact of their jobs; and creating meaning in their work has to be made available [1] This can be ensured by making appropriate provisions of resources including quick access to occupational health and expert testing, follow-ups, fostering wellness programs, providing peer support, improving and maintaining healthy and supportive behavior amongst co-workers, and nurturing a culture towards instituting the significance of emotional well-being of the HCWs. Within the context of an organization, the potential benefits of interventions that involve support from peers including well-being champions are boundless [36]

Interventions aimed to improve mental health in the workplace are effective when objective methods are made use of as these approaches are participative. Here the employees are encouraged to be a part of the support mechanisms with co-workers and groups for participation at both employer and employee level. [18,34] Modified roles of EC that foster participatory approaches by strengthening the feedback loops between organization and individuals as well the collective systemic methods that address the specific needs of HCW can lead to different levels of their emotional well-being. Collective 'systemic' methods that look at interventions both at individual and organizational level and involve methods of 'primary prevention', e.g., by sustaining individual wellbeing and nurturing healthy organizations and methods of "secondary prevention", e.g., improved working around managing risks or reducing stressors tend to work better than those single objective methods for sustainability. [35, 55, 22].

TABLE 4: MAPPING HEALTHCARE WORKERS CONCERNS, NEEDS AND APPREHENSIONS TO THE CHAMPION ROLES OF HUMAN RESOURCE MANAGEMENT - A FEASIBILITY ANALYSIS

Concerns	Needs	Apprehensions	HR support	Champion Role	Reasoning	Feasibility/ opinion
"Protect Me"	Ease out the threat of health care professionals being infected or transmitting infections to family members	Bothered about taking infection home to family members; availability and access to the personal protective equipment; unavailability of prompt access to tests through occupational health, if need be.	Provision of resources so as to avoid carrying infection home; access to the required personal protective equipment as well quick access to occupational health with expert testing and follow- up if symptoms exist.	Physical Champion (PC) and Financial Champion(FC) Caring the Caregivers: Ensuring an environment that provides tutoring, maternal health, back-up-care and vendors for eldercare and child care; Ensuring flexibility while sensitizing the team to be flexible thereby allowing employees fix the boundaries they need; promptly reaching out to employees by identifying their emergent needs. Security and Safety: Ensuring listing the assistance/local means or resources available for employees towards their basic needs including safety, shelter and food; Clear communication to ensure psychological and physical protocol based on roles and industry.	Job demands that include high workloads and emotional demands from employees can lead to reduced well –being of employee health.[54] Employee champions are high reach strategy towards ensuring employee participation in broader wellness programs towards specific needs of the organization [25] Job resources or the aspects of the job can facilitate towards employees' work goals as well buffer the negative aspects of well-being that arise out of job demands. [54].	There was mixed opinion of HCW's on the HR support as many felt that the hospital administration took care while an equal number of them felt that they have not been extended enough provisions. Security and safety needs were rated as most feasible and were practiced to quite an extent except for the clear communication which could not be ensured at all times. Less feasible/ available PC and FC strategies: Support services including strategies that prepare employees as to what is ahead; internal resources that cater and support the mental health of employees; psychological first aid on a virtual platform
"Support Me"	Support system that empathizes and understands limitations of individuals during times of uncertainty, long work hours and extreme exposure to critical and ill patients.	Requirement of support at both family and personal level looking into the demands and increased work hours. Ensuring facilities including support services for physical needs, hydration and healthy meals while	A support system that ensures emotional and psychological first aid on a virtual platform through webinars which are delivered directly to each unit especially on topics that deal with practicing self – care, dealing with insomnia and anxiety, dealing with moral distress and	Providing Support: Collecting, recognizing and analyzing all available internal resources towards supporting the mental health of employees and ensuring easy access to contact information; A policy that supports the behavioral wellness partners and the health plan to prepare the employees as to what is going to come, be it the risk of grief, violence, bereavement, anxiety and uncertainty; effective		Feasible/ available PC and FC strategies: communication and clear instructions, environment that fosters maternal health, back-up- care and vendors for eldercare and childcare (to an extent); flexibility at the team level towards fixing the boundaries they need(limited); medical treatment support; transportation and food support.

		at work, Transportation assistance to sleep deprived workers, housing facilities for those who are on rapid shifts and those who stay far from the hospital vicinity and childcare support services	supporting one another and providing individual support for those undergoing greater distress	communication towards the coverage costs related to COVID - 19.		
"Care for Me"	Ensure a holistic support for the person and his/her family in case they need to be quarantined	Uncertain whether the individual will be taken care of by the organization. An uncertainty as to if the health care professional develops an infection will the organization extend support.	Ensure housing support for people who are not staying with their families; support for physical needs including childcare food etc.; paid time off in case of quarantine and ensure emotional support.	Social Champion(SC) and Emotional Champion (EC) Driving Connections; Sharing the good Inspiring individuals at workplace to pick a workplace buddy with whom they can attach and connect on a day-to-day basis; increasing opportunities for camaraderie and social connection through virtual coffee, happy hours and online meetings; Training champions to recognize employees who stay unaccompanied and require extra support and hand holding. Demonstrating Empathy and Compassion: Trying to feature the CEO sharing their consistent updates, experiences and stories of connecting and adjusting to normalize, humanize and reassure emotions and feelings; encouraging leaders to be available as well involve in genuine conversations with individuals and teams probing	Employees are motivated by not only maintaining of existing resources but also new resources, as losing resources would mean leading to experiencing high levels of stress [26]. A HRM system that is strong ensures that employee experience high level of consensus, consistency and distinctiveness in the HRM [10].	The HCW's felt that HR support services for 'Caring 'were available by relying on each other and asking for help when need be within the work group, while child care support and housing support may be further improved upon. Less feasible/ not available SC and EC strategies: Efforts towards ensuring contact information in case of assistance (for mental health); health plan towards preparing employees as to what is going to come, efforts towards driving connections. Not Feasible SC and EC strategies: Practices towards inspiring employees to pick a workplace buddy; social connections through virtual coffee and happy hours; demonstrating empathy and compassion through consistent updates; sharing experiences and stories by the director or top

				how they are doing and what they need.		management; stories of connecting and adjusting to normalize and reassure emotions and feelings by the leaders.
"Prepare Me"	Ensure support and training that facilitate high-quality care to patients	Worried whether one shall be able to offer proficient medicinal care/ nursing/if positioned to new area (As all nurses for e.g., may be required to be intensive care unit nurses). Moreover, the rapid change in the communication/ information challenge is again bothersome	Provide quick support and training for the basic essential knowledge and skill and allow adequate access and backup to specialists. Unambiguous and clear communications at all times and rapid trainings to support the basic critical knowledge base followed by the required access as well backup to experts.	Work –Life Integration Champion Role(WLI champion) Learning & Growing; Strengthening Resilience; Practicing self -care Ensuring learning and growing at both personal and professional level of employees; facilitating mentorships; efforts to connect with others in the workplace, industry certifications; allowing time for reinvention and innovation ;can help bring in business opportunities and initiate professional growth opportunities. Initiating activities to ensure connecting job tasks to the influence it has on the world. (It can be ensured by sharing patient success stories that let the employees know how their jobs are creating an impact). Flourishing at personal level through: Encouraging employees to make use of additional time they might have from shelter in place for connecting and with old friend; bonding with family; daily walks or starting a book club etc.	The HR practices have been interpreted based on resources available at work and the demands of work [29, 49,30] which can exist at different levels, including the kind of social relations like getting support from coworkers; job security at organizational level; clarity in the job role at the job level; autonomy in work at the task level [54]. Employee champions not only invest in themselves but also are a great support to their co-workers as they educate and support them [36].	There was a mixed opinion on this aspect with equal number of HCW's making use of the support for training and communication, and the same number of HCW's grading this strategy as not feasible. Feasible/ available WLI champion strategies : Focus by management to a great extent on ensuring learning and growing at professional level; availability of expertise in areas including critical care and infection control; emergency medicine and emotional health; facilities including support services for physical needs, hydration and healthy meals. Less feasible/ not available WLI champion strategies: provisions for encouraging industry certifications; allowing time for reinvention and innovation; helping bring about business opportunities; initiating professional growth opportunities.

"Hear Me"	Attend to and act on healthcare professionals' proficiency and frontline understanding. Look into their apprehensions to an extent that leaders and management are capable.	Uncertain as to whether leaders are recognizing the most bothering problem of the frontline health care professionals; whether the local physician expertise in areas including critical care, infection control, emergency medicine and emotional health are being made use of in order to progress towards organization-specific responses?	Ensuring opinions of the Healthcare workers are a part of the decision-making practice by creating feedback and input channels through: Suggestion Box; Emails; Leader interactions; listening groups; visits by leaders	Meaning In Work Champion (MIW champion) Giving Back; Creating Meaning; Understanding Impact Creating a vision testimonial of how the organization has been contributing completely and supporting through the pandemic. Encouraging employees to talk one-on-one while reflecting on ways and areas which they made a change during the week can further create meaning; charitable donations can be made through employee participation including community giving or healthy habits or through activities like mask-making, run mileage/weekly walk, food shelf donation etc.	A strong HRM systems ensures that employees experience high consensus, distinctiveness, and consistency in the HRM systems.[10] The various domains of well-being that include team building, volunteerism, physical activity, stress management, social interaction new experiences and financial well-being for the work group are promoted by the HR champions. [63]	Inputs are generally ensured through visits by leaders/ supervisors and leader interactions at work. Suggestion box and mails are generally not used and were rated not very feasible. Not Feasible/ not Available MIW champion strategies: Creating meaning at work and understanding impact was considered less feasible by HCW's. There were no provisions for: sharing patient success stories; community participation; leveraging organization social media sites to share the feelings of gratitude; sharing success stories to let employees know how their job is creating an impact; Testimonials of how the organization has been contributing and supporting during the pandemic; encouraging employees to talking one-on-one ; staying active, eating healthy for energy, getting good sleep, ensuring a schedule that is regular inclusive of breaks as well prioritizing personal hygiene); Support at both family and personal level looking into the demands and increased work hours and closure of day-cares and schools.
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Source: Ref: [1, 56]

The one –to –one interview with a random sample of 20 HCW's which included nurses, frontline workers, HR and administrative staffs from both government and private hospitals revealed that the feasibility of some of the champion roles of HR were less and there remains a need for specific initiatives that typically look at meaning in work; social and emotional support; work- life integration of HCWs. Though within physical and financial needs there were few practices that have been taken up to some extent during the pandemic. Over time there are examples and cases that have been described specific to the organization, although there is no agreed upon standard that has been established in health care with regard to the responsibilities of a wellness champion.[9, 32 , 63, 3] The findings reveal that the champion roles of HR have not really been practiced to a great extent both due to the nature of work and to an extent approach of the hospital management.

In an organizational setting the workplace environment highly influences the emotional fitness of the individual workers and the work force as a whole when considered as a population. [50,51] In this context, a direct supervisor agreement form that ensures the direct supervisor support and support of top leadership including Human resource managers who look at the organizational support becomes critical. A program that is well designed with means that covers all six aspects of well-being of HCWs while giving champions the autonomy to encourage programs of personal interest and the work group can facilitate emotional well-being at workplace.

Within particular workplace settings, the role of HR champion can be encouraged through meetings with the team leaders and in- charge supervisors for the preliminary development and planning which contribute towards the internal leadership and initiatives that lead to positive mental health. The potential of champions to create an impact depends on their current (paid job) roles, the work settings, motivation and skills. [53]

HR can make use of metrics to track and measure the increase in wellness programs/events by measuring program involvement rates, the overall effect and/or tracked by facility or location thereby mapping it towards the impact on emotional fitness levels of HCW's. Satisfaction of employees with precise aspects of the program that might be affected by the wellness champions; shifting some of the traditional rules and a culture assessment thereof can be made use of. [19]

Ascertaining the champion role of HR in healthcare sector can contribute towards nurturing the emotional needs of the Healthcare workers. The set of scales between roles and positions can vary within and between hospitals. Terms used can also be different between hospitals with 'workplace health champions', HR champions and wellness champions, all being used. With individuals articulated as activators and facilitators without recognizing that they are champions.

DISCUSSION

Increased social connections within the team, mostly through one-on-one dialogues, guarding against feelings of demoralization and isolation thereby creating space for people to speak up and share their thoughts [58] can create a sense of belonging, help drive connections, demonstrate empathy and compassion. Well-being champions tend to play the role of positive influencers within the work setting. A well-being champion coupled with a comprehensive employee well-being strategy at workplace leads to better and favorable perception of the organization. [63] In order to facilitate employee engagement in the workplace champion wellness program, there must be proper support of wellness champions by managers [43] and hospital administrators within the healthcare settings. Payback, asset out by employees towards an employee champion, include better sense of provision and support for attaining a healthy lifestyle, rise in consciousness of wellness prospects and better perceived wellness and health. [63]

The different employee champions: physical, financial, social, emotional, meaning in work and work-life integration champions [15,62] need to be further evolved and worked upon in the healthcare so as to fulfill the various needs of the HCW which include: "Protecting, supporting, caring, preparing and hearing them. [56 This in turn can lead to HCW's experiencing different levels of emotional fitness or mental well-being which basically exists at four levels i.e., essential, belonging, purpose and flourishing. [1]

While ensuring and defining the different employee champions and their roles, the healthcare environment can nurture the emotional needs of their workers, thereby contributing to the fulfillment of emotional well-being at different levels and therefore allowing them to flourish and revitalize in the workplace setting.

CONCLUSION AND FUTURE RESEARCH

The purpose of the paper is to suggest avenues for actions for HR managers from a perspective of an employee champion role towards enhancing the emotional well-being of HCWs. The apprehensions and concerns of HCWs - 'Hear me', 'Care for me', support me' 'protect me' and 'prepare me' [56] can be best addressed through the employee champion roles of HR. The six pillars of well-being champions i.e., social, work-life integration emotional, physical, financial and meaning in work has proved to be beneficial [15,62], which in turn, can contribute to different levels of emotional well-being: belonging, essentials, flourishing and purpose of HCW.[1]

The study also reveals that there are certain champion roles that are more visible (physical and financial champions) as compared to Work-life Integration, Social, Emotional, Meaning in Work champions in healthcare organizations. HCWs opined that the nature of work, and to an extent the management approach, make strategies that revolve around social interactions at workplace, emotional wellness and integrating work-life balance less feasible. But yes, given options, the higher end strategies shall make the employees more happy and satisfied as activities that foster employee comfort can be valuable for employees both in terms of relationship and happiness forms of well - being as well as the performance of the organization. [30]

Not many articles have examined the emotional well-being of healthcare workers from a HR perspective. The paper supports to expand the possibility of research on emotional well-being of health care workers from the champion perspective of HR as well it provides insights for HR practitioners and top management towards meeting the well-being needs of the HCWs.

The contribution however should be reflected in light of certain limitations. Though the work has been based on a review of various databases which provides the most cited work (including Semantic Scholar, Web of Science, Google Scholar) one cannot overlook the potential chances of subjectivity in selection of papers. Since the main purpose of this paper is to provide meaningful information to both management and HR managers from the perspective of improving emotional well-being of healthcare workers through HR Champions, this review can find its contribution to a conceptual model that builds on to HR Champions Roles in the healthcare. This can be subject to empirical

attestations in future research to further establish the role of different HR champion towards increased emotional well-being of healthcare workers. Moreover, the survey which had one-to-one interview with HCW's on the different employee champion roles was confined to a small group of healthcare employees and hence a rigorous study that looks at the dynamism and importance of the various champions in the healthcare sector should be undertaken. An empirical attestation that looks at the different employee champion roles in order of their feasibility in both government and private hospitals can be explored.

This article contributes towards well-structured and well condensed information obtained from a mini review. Future research can look at a quantitative analysis as well as the level of impact of different HR champions on HCWs emotional well-being. Even more future research can look at studies that confirm the causal relationship of EC role on the mental health of HCW's keeping in account the moderating factors including the marital status, years of experience, physical health of the individual, organization size etc which have not been explored in the paper.

ABBREVIATIONS

HCW- Healthcare workers

HR- Human Resources

EC- Employee champion

PC- Physical Champion

FC- Financial Champion

SC –Social Champion

WLI champion- Work Life Integration Champion

MIW champion- Meaning in Work Champion

References:

1. Afshari D, Nourollahi-Darabad M, Chinisaz N. Psychosocial factors associated with resilience among Iranian nurses during COVID-19 outbreak. *Frontiers in public health*. 2021;10:92.
2. Akerstrom M, Corin L, Severin J, Jonsdottir IH, Björk L. Can Working Conditions and Employees' Mental Health Be Improved via Job Stress Interventions Designed and Implemented by Line Managers and Human Resources on an Operational Level?. *International Journal of Environmental Research and Public Health*. 2021 Feb;18(4):1916.
3. Amaya M, Melnyk BM, Buffington B, Battista L. Workplace wellness champions: lessons learned and implications for future programming. *Building Healthy*

- Academic Communities Journal. 2017 May 31;1(1):59-67.
4. Strengthening Emotional Fitness for Healthcare Workers [Internet]. 2020. Available from: <https://www.aon.com/getmedia/fe13fd62-0b2d-42b2-9ae5-94bb67d39496/COVID-19-Employee-Emotional-Fitness-2020-05-20.aspx>
 5. Appio FP, Cesaroni F, Di Minin A. Visualizing the structure and bridges of the intellectual property management and strategy literature: a document co-citation analysis. *Scientometrics*. 2014 Oct;101(1):623-61.
 6. Archer S. Health is wealth: The rise of workplace wellness. *IDEA Fitness Journal*. 2012;9(5):37.
 7. Asante JO, Li MJ, Liao J, Huang YX, Hao YT. The relationship between psychosocial risk factors, burnout and quality of life among primary healthcare workers in rural Guangdong province: a cross-sectional study. *BMC health services research*. 2019 Dec;19(1):1-0.
 8. Azoulay E, Cariou A, Bruneel F, Demoule A, Kouatchet A, Reuter D, Souppart V, Combes A, Klouche K, Argaud L, Barbier F. Symptoms of anxiety, depression, and peritraumatic dissociation in critical care clinicians managing patients with COVID-19. A cross-sectional study. *American journal of respiratory and critical care medicine*. 2020 Nov 15;202(10):1388-98.
 9. Berry LL, Mirabito AM, Baun WB. What's the hard return on employee wellness programs. *Harvard business review*. 2010 Dec 1;88(12):104-12.
 10. Bloom S. Employee wellness programs. *Professional Safety*. 2008 Aug 1;53(8):41-2.
 11. Bowen DE, Ostroff C. Understanding HRM-firm performance linkages: The role of the "strength" of the HRM system. *Academy of management review*. 2004 Apr 1;29(2):203-21.
 12. Brownson RC, Eyler AA, Harris JK, Moore JB, Tabak RG. Getting the word out: new approaches for disseminating public health science. *Journal of public health management and practice*. 2018 Mar 1;24(2):102-11.
 13. Cai H, Tu B, Ma J, Chen L, Fu L, Jiang Y, Zhuang Q. Psychological impact and coping strategies of frontline medical staff in Hunan between January and March 2020 during the outbreak of coronavirus disease 2019 (COVID-19) in Hubei, China. *Medical science monitor: international medical journal of experimental and clinical research*. 2020;26:e924171-1.
 14. Carmassi C, Foghi C, Dell'Oste V, Cordone A, Bertelloni CA, Bui E, Dell'Osso L. PTSD symptoms in healthcare workers facing the three coronavirus outbreaks: What can we expect after the COVID-19 pandemic. *Psychiatry research*. 2020 Oct 1;292:113312.
 15. Chin WS, Rasdi RM. Protean career development: Exploring the individuals, organizational and job-related factors. *Asian Social Science*. 2014 Nov 1;10(21):203.
 16. Christakis NA, Fowler JH. The spread of obesity in a large social network over 32 years. *New England journal of medicine*. 2007 Jul 26;357(4):370-9.
 17. Chu C, Breucker G, Harris N, Stitzel A, Gan X, Gu X, Dwyer S. Health-promoting workplaces—international settings development. *Health promotion international*. 2000 Jun 1;15(2):155-67.
 18. Clark MM, Warren BA, Hagen PT, Johnson BD, Jenkins SM, Werneburg BL, Olsen KD. Stress level, health behaviors, and quality of life in employees joining a wellness center. *American Journal of Health Promotion*. 2011 Sep;26(1):21-5.
 19. Corbière M, Shen J, Rouleau M, Dewa CS. A systematic review of preventive interventions regarding mental health issues in organizations. *Work*. 2009 Jan 1;33(1):81-116.
 20. Seaverson ELD, Seaverson ELD. Building a Wellness Champion Network [Internet]. SHRM. SHRM INDIA CORPORATE INFORMATION; 2015 [cited 2022 Nov 5]. Available from: <https://www.shrm.org/resourcesandtools/hr-topics/benefits/pages/wellness-champion-networks.aspx>
 21. Elfar JC. Introduction to Mini-Review. *Geriatric Orthopaedic Surgery & Rehabilitation*. 2014 Jun;5(2):36-.
 22. Fertman CI. Workplace health promotion programs: planning, implementation, and evaluation. John Wiley & Sons; 2015 Sep 10.
 23. Giga SI, Noblet AJ, Faragher B, Cooper CL. The UK perspective: A review of research on organisational stress management interventions. *Australian Psychologist*. 2003 Jul;38(2):158-64.
 24. Goetz K, Berger S, Gavartina A, Zaroti S, Szecsenyi J. How psychosocial factors affect well-being of practice assistants at work in general medical care? –a questionnaire survey. *BMC family practice*. 2015 Dec;16(1):1-7.
 25. Guo WP, Min Q, Gu WW, Yu L, Xiao X, Yi WB, Li HL, Huang B, Li JL, Dai YJ, Xia J. Prevalence of mental health problems in frontline healthcare workers after the first outbreak of COVID-19 in China: a cross-sectional study. *Health and quality of life outcomes*. 2021 Dec;19(1):1-0.

26. Halbesleben JR, Neveu JP, Paustian-Underdahl SC, Westman M. Getting to the "COR" understanding the role of resources in conservation of resources theory. *Journal of management*. 2014 Jul;40(5):1334-64.
27. Renwick D. HR managers: Guardians of employee wellbeing? *Personnel Review*. 2003 Jun;32(3):341–59.
28. IsHak WW, Lederer S, Mandili C, Nikraves R, Seligman L, Vasa M, Ogunyemi D, Bernstein CA. Burnout during residency training: a literature review. *Journal of graduate medical education*. 2009 Dec;1(2):236-42.
29. Jackson SE, Schuler RS, Jiang K. An aspirational framework for strategic human resource management. *Academy of Management Annals*. 2014 Jan 1;8(1):1-56.
30. Leslie K. Medscape National Physician Burnout, Depression & Suicide Report 2019 [Internet]. Medscape.com. 2022 [cited 2022 Dec 28]. Available from: https://www.medscape.com/slideshow/2019-lifestyle-burnout-depression-6011056?icd=login_success_email_match_norm
31. Kuehl H, Mabry L, Elliot DL, Kuehl KS, Favorite KC. Factors in adoption of a fire department wellness program: champ and chief model. *Journal of occupational and environmental medicine/American College of Occupational and Environmental Medicine*. 2013 Apr;55(4):424.
32. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, Wu J, Du H, Chen T, Li R, Tan H. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA network open*. 2020 Mar 2;3(3):e203976-.
33. LaMontagne AD, Keegel T, Louie AM, Ostry A, Landsbergis PA. A systematic review of the job-stress intervention evaluation literature, 1990–2005. *International journal of occupational and environmental health*. 2007 Jul 1;13(3):268-80.
34. Lelliott P, Tulloch S, Boardman J, Knapp M. Mental Health and Work [Internet]. 2008. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/212266/hwwb-mental-health-and-work.pdf
35. Linnan L, Fisher EB, Hood S. The power and potential of peer support in workplace interventions. *American journal of health promotion: AJHP*. 2013 Sep 1;28(1):TAHP2-10.
36. Long L. Routine piloting in systematic reviews—a modified approach? *Systematic reviews*. 2014 Dec;3(1):1-5.
37. Marchington, M, Wilkinson A. *People Management and Development*. 2nd edition. Chartered Institute of Personnel and Development, London.; 2000.
38. Abraham M. *Motivation and personality*. Nueva York: Harper & Row, Publishers. 1954.
39. Maunder RG, Lancee WJ, Balderson KE, Bennett JP, Borgundvaag B, Evans S, Fernandes CM, Goldbloom DS, Gupta M, Hunter JJ, Hall LM. Long-term psychological and occupational effects of providing hospital healthcare during SARS outbreak. *Emerging infectious diseases*. 2006 Dec;12(12):1924.
40. Mehta S, Machado F, Kwizera A, Papazian L, Moss M, Azoulay É, Herridge M. COVID-19: a heavy toll on health-care workers. *The Lancet Respiratory Medicine*. 2021 Mar 1;9(3):226-8.
41. Mendy A, Stewart ML, VanAkin K. A leader's guide: Communicating with teams, stakeholders, and communities during COVID-19. McKinsey & Company. 2020 Apr:1-9.
42. Miao X, Wang W, Chen Y, Huang X, Wang R. Psychological stress and influencing factors of hospital workers in different periods under the public health background of infectious disease outbreak: A cross-sectional study. *Health Science Reports*. 2022 Sep;5(5):e834.
43. Mitchell L, Amaya M, Battista L, Melnyk B, Andridge R, Kaye G. Manager support for wellness champions: A case study for consideration and practice implications. *Workplace Health & Safety*. 2021 Mar;69(3):100-8.
44. Moher D, Tsertsvadze A, Tricco A, Eccles M, Grimshaw J, Sampson M, Barrowman N. When and how to update systematic reviews. *Cochrane database of systematic reviews*. 2008(1).
45. Moss M, Good VS, Gozal D, Kleinpell R, Sessler CN. An official critical care societies collaborative statement: burnout syndrome in critical care health care professionals: a call for action. *American Journal of Critical Care*. 2016 Jul;25(4):368-76.
46. Terry PE. Do wellness champions have a job big enough for their talents? *American journal of health promotion: AJHP*. 2013;28(1):TAHP10-2.
47. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsis E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain, behavior, and immunity*. 2020 Aug 1;88:901-7.
48. Peccei RE, Voorde FC van de, Veldhoven MJPM van. HRM, well-being and performance: A theoretical and empirical review. *HRM & Performance: Achievements*

- & Challenges [Internet]. 2013;15–46. Available from: <https://research.tilburguniversity.edu/en/publications/hrm-well-being-and-performance-a-theoretical-and-empirical-review>
49. Pronk N, Kleinman DV, Goekler SF, Ochiai E, Blakey C, Brewer KH. Practice Full Report: Promoting Health and Well-being in Healthy People 2030. *Journal of Public Health Management and Practice*. 2021 Nov;27(6):S242.
 50. Pronk NP, Pronk SJ. Emotional Fitness at the Workplace. *ACSM's Health & Fitness Journal*. 2017 Sep 1;21(5):51-4.
 51. Reith TP. Burnout in United States healthcare professionals: a narrative review. *Cureus*. 2018 Dec 4;10(12).
 52. Robinson M, Tilford S, Branney P, Kinsella K. Championing mental health at work: emerging practice from innovative projects in the UK. *Health promotion international*. 2014 Sep 1;29(3):583-95.
 53. Schaufeli WB, Bakker AB. Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*. 2004 May;25(3):293-315.
 54. Seymour L, Grove B. Workplace interventions for people with common mental health problems (2005). London, British Occupational Health Research Foundation, Ref Type: Report.
 55. . Shanafelt T, Ripp J, Trockel M. Understanding and Addressing Sources of Anxiety Among Health Care Professionals During the COVID-19 Pandemic. *JAMA* [Internet]. 2020 Apr 7;323(21).
 56. Temple KM. Healthcare Professionals' Mental Health Needs: Where Can They Go? [Internet]. *The Rural Monitor*. 2020. Available from: <https://www.ruralhealthinfo.org/rural-monitor/healthcare-professionals-mental-health/>
 57. Thompson AE, Anisimowicz Y, Miedema B, Hogg W, Wodchis WP, Aubrey-Bassler K. The influence of gender and other patient characteristics on health care-seeking behaviour: a QUALICOPC study. *BMC family practice*. 2016 Dec;17(1):1-7.
 58. Tu HT, Mayrell RC. Employer wellness initiatives grow, but effectiveness varies widely. *National Institute for Health Care Reform*. 2010 Jul;1:1-3.
 59. . Alge B. Human resource champions, by David Ulrich. (1996). Boston: Harvard Business School Press. 281 pp., \$29.95. *Human Resource Development Quarterly*. 1997;8(2):186–90.
 60. Ulrich D. A new mandate for human resources. *Harvard business review*. 1998 Jan 1;76:124-35.
 61. Umberson D, Karas Montez J. Social relationships and health: A flashpoint for health policy. *Journal of Health and Social Behavior* [Internet]. 2010 Mar;51(suppl):S54–66. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3150158/>
 62. Van De Voorde K, Paauwe J, Van Veldhoven M. Employee well-being and the HRM–organizational performance relationship: a review of quantitative studies. *International Journal of Management Reviews*. 2012 Dec;14(4):391-407.
 63. Wieneke KC, Schaepe KS, Egginton JS, Jenkins SM, Block NC, Riley BA, Sifuentes LE, Clark MM. The supervisor's perceived role in employee well-being: Results from Mayo Clinic. *American Journal of Health Promotion*. 2019 Feb;33(2):300-11.