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REVIEW ARTICLE

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 it's 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, it's 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 CINHAIL, 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 CINHAIL: 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.

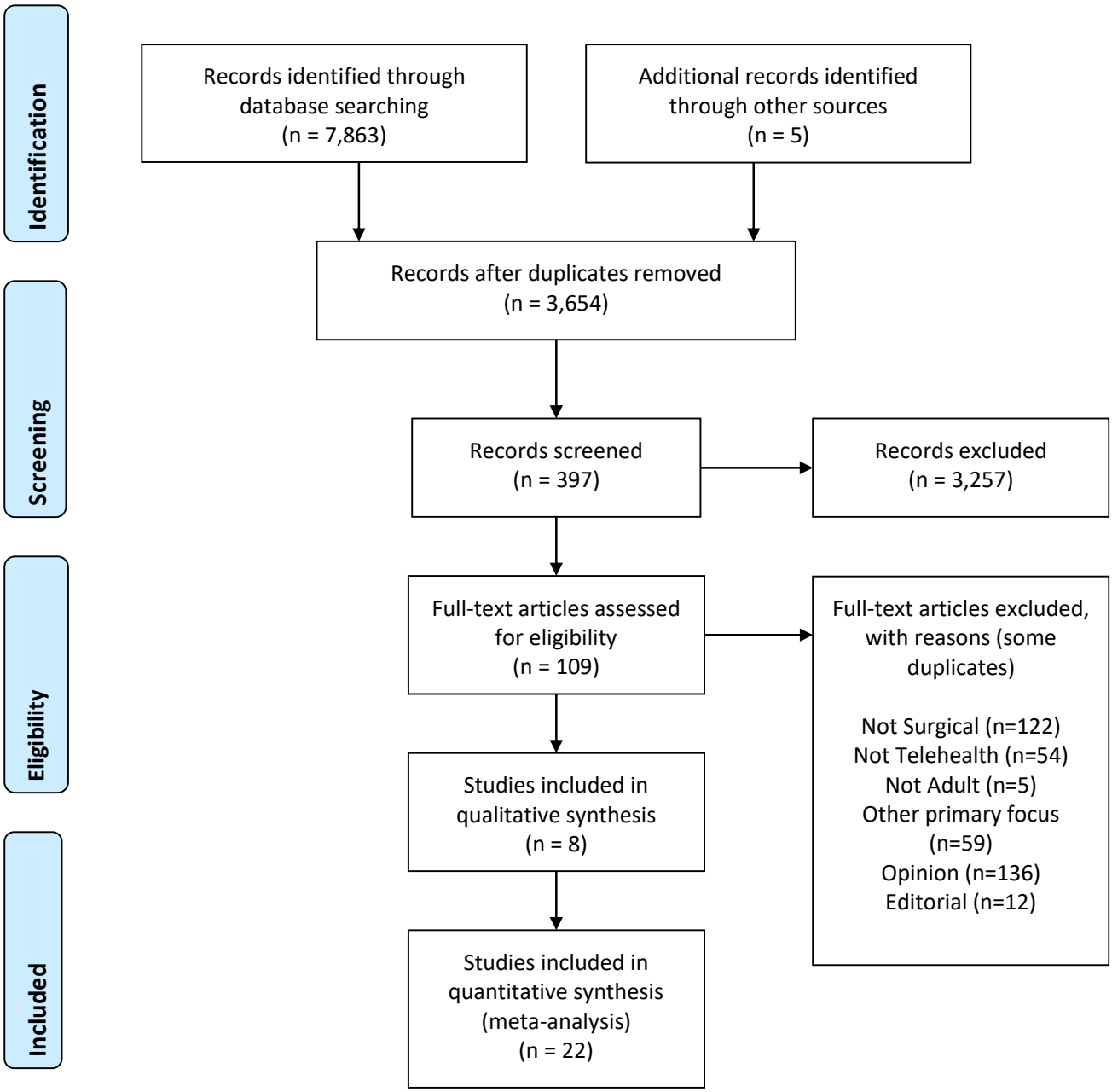
Measures included in the spreadsheet were:

- 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 s ummarised 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 Protocol Compliance	Clinician Satisfaction 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%	17/18 studies reported that adverse outcomes were indicative of safety of this model	Adverse outcomes (complication, operation, re-referral, deviation from protocol), cost reductions, efficiency (#patients, waiting times, #radiographs)
	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.	
Wallis, CJD [10]	Easier access, but breaking bad news is compromised	Need more study into patient comprehension and engagement
80-95%		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
	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.	
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 cf 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.	
Lonergan, 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] 80-82%	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)
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 N. [25] 95-100%	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.
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, M. [28]	Same satisfaction as f2f, all TH patients would recommend to others.	
86-96%	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]	Follow-up of both groups 71% at 24 months.	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.
86-95%	Essentially, this study demonstrated that the TH application improved compliance, which improved results.	
Kane, L. [30]	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	Satisfied, less time in TH visits 9.5 minutes vs 11.3 for f2f. 89.6% of surgeons found it easy
71-96%	Dropout rate 12% in both groups The postoperative protocols used by surgeons vary considerably. Selection bias.	Pain, immobilisation, range of motion were uniform in each group. No complications in either group
Vance, S., [32]	Likert satisfaction scale and Patient and Observer Scar Assessment Scale did not differ between telephoned and naïve patients	
73-93%	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

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