



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Innovation

Falling through the cracks: Evaluating the role of nonacute surgical liaison personnel during COVID-19—A narrative review



Stephen Tolmay, MBChB^{a,*}, Jonathan Koea, MBChB, FRACS, MD^b,
Ian Stewart, MBChB, FRACS^b, Jamie-Lee Rahiri, MBChB, PhD^b

^a Faculty of Medical and Health Sciences, University of Auckland, New Zealand

^b Department of Surgery, North Shore Hospital, Waitematā District Health Board, Auckland, New Zealand

ARTICLE INFO

Article history:

Accepted 23 August 2021

Available online 2 September 2021

ABSTRACT

Background: In March 2020, in response to the COVID-19 pandemic, the New Zealand government instituted a 4-level alert system, which resulted in the rapid dissolution of nonurgent surgical services to minimize occupational exposure to both patients and staff, with the primary health sector bearing most of the diverted caseload. Consequently, the study authors sought to collate information around the establishment of a supportive nonacute surgical liaison role in a public hospital surgical department, with an interest in establishing this role in New Zealand.

Methods: The narrative review conducted systematically in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement. Databases searched included Pubmed, MEDLINE, Embase, and Cochrane Controlled Register of Trials. A deductive analysis was applied using a demand management model developed by the Institute for Innovation and Improvement at Waitematā District Health Board. All included studies were rated using the Oxford Centre for Evidence-Based Medicine Levels of Evidence tool.

Results: Collation of 19 studies resulted in 3 key findings: first, that a surgical liaison could be utilized at the primary care to specialist interface to improve communication and workflow between services. Second, a liaison could be utilized directly communicating with patients as a means of increasing engagement and self-management. Finally, this service can be offered through multiple modalities including a noncontact telehealth service.

Conclusion: Evidence of nonacute surgical liaisons both internationally and specifically within New Zealand has been collated to provide evidence for its application.

© 2021 Elsevier Inc. All rights reserved.

Introduction

The World Health Organization declared COVID-19 a pandemic on March 11, 2020. In response, the New Zealand (NZ) government instituted a 4-level COVID-19 alert system, which saw NZ move to alert level 4 (full social lockdown). Strict measures including the closure of all nonessential organizations and businesses, mandatory self-isolation, and reduction of nonacute surgical services ensued. These mandated alert levels led to dramatic structural adjustments within nonacute surgical services, with resultant changes including the implementation of virtual and telehealth clinics.^{1,2}

The rapid unfolding of events surrounding COVID-19 has, and continues to place, considerable strain on healthcare systems and communities.^{1,3,4} To reduce community transmission, the NZ Ministry of Health mandated the cancellation of nonurgent elective and outpatient surgical services.^{1,2} Such measures align with the World Health Organization operational guidelines for healthcare facilities regarding infection control measures, streamlining healthcare services, and reprioritization of healthcare workers, which are all strategies to “flatten the curve.”^{5–7} However, these changes especially challenged the primary healthcare providers (general practitioners; GPs) who had reduced specialist input in the community and the added risk of a later surge in patients with more advanced, non-COVID-related conditions that require immediate treatment and resource allocation.

Consequently, this study aimed to collate and summarize the literature related to the implementation of supportive nonacute surgical liaison services, with a particular interest at the interface

* Reprint requests: Stephen Tolmay, MBChB, Department of Surgery, Waitematā District Health Board & The University of Auckland, North Shore Hospital, 24 Shakespeare Road, Takapuna, Auckland 0620.

E-mail address: stephen.tolmay@waitematadhb.govt.nz (S. Tolmay).

between primary and secondary (hospital based) healthcare, as well as those studies centered within NZ.

Methods

A narrative review was performed systematically in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement.⁸

Eligibility criteria

All studies that assessed the role of a nonacute surgical liaison were included. For this study, surgical liaisons were defined as nonacute surgical practitioners (consultant surgeons, registrar/residents, nurse practitioners, or research fellows) who provided hospital-based advice for nonacute management of surgical patients. Studies reporting experiences of liaisons in nonsurgical specialties and studies for which full texts were unable to be retrieved (eg, conference abstracts) were excluded.

Search strategy

A series of electronic searches were performed from inception, with studies included from January 1, 1990 up until June 2, 2020 in PubMed, MEDLINE, Embase, and Cochrane Controlled Register of Trials. Two authors (ST and JR) collated a list of keywords and search terms to build search strategies for each database (Table 1). Study design or language limitations were not applied. Search results were downloaded and managed with EndNote X9 (Clarivate Analytics, Philadelphia, PA) and RefWorks citation managers. The reference lists of all included articles were also searched for relevant texts.

Study selection

Two reviewers (ST and JR) independently performed the searches and examined titles and abstracts to exclude irrelevant reports and produce a list of studies for full-text review in an iterative process. Any disagreement over inclusion of studies was reached by consensus.

Data abstraction

Data were extracted from the included studies into electronic datasheets independently by 2 reviewers (S.T. and J.R.). This was pilot-tested on the first 3 studies and finalized for subsequent articles. Data extracted from the included studies included (1) study characteristics (journal, setting, time period, the intervention and comparison groups, and study sample size); (2) outcome measures; and (3) study conclusions.

Thematic analysis

Studies were subject to deductive thematic analysis using a demand management model developed by the Institute for Innovation and Improvement at Waitematā District Health Board (WDHB), in conjunction with the National Institute for Health Innovation at the University of Auckland.⁹ This model promotes managing the provision of hospital services by reducing the inflow of patients to hospital so that demand for specialist services reaches a stable relationship with the available supply of specialist care. The intervention targets 3 key levels of healthcare: hospital specialists, primary care, and home/self-care; with the ultimate goal involving the implementation of models of care that shift away from specialist level care and toward home/self-care. Articles were

initially read several times to generate codes that were ultimately organized into themes. These themes were then discussed between 2 authors (ST and JR) to determine where they best aligned on the demand management model.

Risk of bias assessment

All studies were rated using the Oxford Centre for Evidence-Based Medicine—Levels of Evidence tool.⁸ This tool ranks studies based on a hierarchy of the likely best evidence with level 1 evidence constituting randomized controlled trials through to level 5 evidence constituting expert opinion without critical appraisal. Given the heterogeneity of all included studies and their respective quality scores, a quantitative analysis was not possible; therefore, a narrative review was performed.

Retrospective ethical approval for this study was granted by the Waitematā Institutional Ethics Committee in accordance with National Ethics Advisory Committee standards.

Results

A total of 19 studies were included in this review (Fig 1 and Table 1). The majority of studies reported liaison roles in orthopedic surgery, and most liaison personnel were clinical nurse specialists. Table 1 presents a summary of all included study characteristics and their respective Oxford Centre for Evidence-Based Medicine scores. Studies were analyzed using the Institute for Innovation and Improvement Demand Management Model and are described in 3 parts.

Part 1: Innovative models at the specialist–primary care interface

Improving access to specialist advice enhances access to specialist healthcare and can be achieved through the use of a dedicated rostered consultant available to provide direct telephone or email advice to GPs.⁹ Kohlert et al¹⁰ reported that their outpatient head and neck surgical service in Canada observed a 251% increase in wait times from the time of primary clinician referral to initial assessment, averaging 7.8 weeks in 2015 compared to data from 1993.¹⁰ After establishing a specialist-led electronic consultation service, they demonstrated a greater median response time (29 times faster) with a median time of 1.89. Additionally, liaison input changed management in more than 50% of e-consults, leading to a 50% reduction in unnecessary face-to-face referrals. More than 90% of primary care doctors surveyed reported it as a valuable tool for referring physicians.¹⁰ Similar benefits were also described by Den Hollander et al,¹¹ where a specialist-led electronic liaison service for a burn's unit in South Africa improved the management of 66% of patients through liaison with primary care and other secondary care services. Specific improvements included avoiding inappropriate hospital admission and arranging delayed admission until the patient was ready for definitive treatment.¹¹

Additionally, the implementation of “hot” clinics for on-the-day rapid assessment and advice enhances GP access to specialist care. These include dedicated phone advice and face-to-face assessment helping to reduce outpatient clinic waiting times and admissions.⁹ Bowman et al¹² established a doctor-led hot clinic, which reduced wait times for nonurgent referrals in the outpatient setting of a pediatric surgical department in NZ. Prior to establishing the role, only 75% of nonurgent referrals were seen within 19 weeks, and after the use of a liaison, waiting times reduced to 8 weeks, while the volume of patients seen increased by 130%. Considerations around the importance of institutional leadership and departmental “buy-in” when faced with establishing a novel service

Table 1
Study characteristics and Oxford rating of all included studies

Author (Year)	Country	Specialty	Personnel	Study design	Intervention	Outcome measures	Conclusion	Oxford
Tackitt (2016)	USA	Urology	Nurse-led	Quality improvement audit	Telephone advice line	Number of calls (with reasons) and ED readmissions	No change in call numbers but decreased ED visits by 11%	2c
Senay (2020)	Canada	Orthopedics/ Rheumatology	Nurse-led	Retrospective cohort	FLS	Rates of investigation, treatment, and participation were >80% over a 2-year period. Fragility fracture incidence rate was <3 per 100 person-years and this correlated with improvements in biochemical markers and functional capacity and pain scores.	The FLS model of care with an intensive follow-up is able to achieve adequate rates of assessment and intervention.	4
Oberg (2017)	England	Neurosurgery	CNS	Case series/survey	Telephone clinics	Enhanced patient satisfaction (overall 95%) and cost savings at £23 per teleclinic (vs £150 for SMO clinic)	Nurse-led follow-up clinics are a cost-effective service alternative to consultant lead clinics that could be done virtually and were highly rated by patients	4
Miller (2015)	USA	Orthopaedics	Mixed: CNS and physician	Expert opinion/Literature review	Fracture liaison service	Different exemplar models of the FLS	The FLS provides a comprehensive approach to identify patients at risk of secondary fracture but also apply interventions.	5
McLellan (2003)	Scotland	Orthopaedics/ Rheumatology	CNS	Retrospective cohort	Fracture liaison service	Of the study population: 73.5% were assessed by the FLS and of those 56.4% required and received intervention (within 18 months of seminal operation).	The FLS were able to assess and treat patients postsurgery who were identified as being at risk. Only patients who declined the service did not receive FLS.	4
Luc (2020)	Canada	Orthopedics/ rheumatology	Fracture liaison coordinator and GPs	Retrospective cohort and expert opinion	Fracture liaison service	Among the 454 FLS patients recruited to the intervention group, 83% were investigated for FF risk, communication with the primary care provider was established for 98% of the participants, 54% initiated medication, and 35% were referred to organized fall prevention activities.	They highlighted the primary care physicians restricted access to further intervention programs and medication limited the service and that there was an important role for FLS providers to resolve this.	4-5
Hyde (2004)	UK	Cardiothoracics	Nurse led	Retrospective cohort and survey	Telephone follow-up	7 of the 29 patients in this study were identified as requiring further intervention on nurse-led follow-up. Patient satisfaction was high.	Nurse-led follow-up postsurgery provided evidence that they could identify patients requiring intervention and achieved satisfaction on patient surveys	4
Lebanon (2019)	Israel	Orthopedics		Prospective cohort	Virtual orthopedic-rehabilitation-metabolic collaboration.	Among 253 hip fracture patients the postintervention osteoporosis medication issue rate was higher than in the nonintervention group (48.2% vs 22.0%, respectively; $P < .001$). More intervention group patients received drugs 3 months (18.8% vs 2.9%; $P < .001$) and 6 months after	Virtual orthopedic-rehabilitation-metabolic collaboration increased osteoporosis treatment rates posthip fracture. Yet treatment rates remained <50%.	4

(continued on next page)

Table 1 (continued)

Author (Year)	Country	Specialty	Personnel	Study design	Intervention	Outcome measures	Conclusion	Oxford
Kohlert (2018)	Canada	ENT	ENT surgeon via GPs	Prospective observational study	eConsults	surgery (40% vs 5.9%; $P < .001$). One-year mortality was lower among patients who received any osteoporosis medications (either through our intervention or from community physicians) than among untreated patients (5.1% vs 26.3%; $P < .001$). ~40% seen in 24 h with 29× faster response; 88% of PCPs and 92% patients found it to be valuable	Cost-effective. Decreased wait times, improved communication between PCPs and otolaryngologists	4
Kelly (1999)	Canada	Gynecology	CNS	Case series	Telephone follow-up	Eighty-seven percent found that receiving a call postchemotherapy was reassuring and helpful; 83% stated that medications could be adjusted according to the severity of side effects; 80% of patients agreed that most issues had been dealt with at the time of telephone follow-up; 64% said that their concerns had been addressed during the phone calls.	Post-chemotherapy nurse-led telephone calls are a valuable tool in assessing patient needs, side effects, and concerns experienced during treatments.	4
Jose (2018)	USA	Orthopedics/ Rheumatology	CNS	Case series	Fracture Liaison Service	991 fracture encounters excluding other non-osteoporosis-related causes were admitted	Low recruitment rates in an open health system FLS require more outreach and coordination with both in and out-of-network primary care providers (PCP).	4
Hubbard (2014)	UK	General Surgery	House officer run with registrar and consultant input	Quality improvement audit	Hot clinic	Decrease in patients whose principal assessment and management was made by a SHO level doctor through the hot clinic patient journey from 26% to 9% (64% decrease) with a corresponding increase in registrar and consultant clinics. The number of patients attending hot clinic that had effective discharge liaison (in the form of a formal letter) to the GP increased from 18% to 68% (250% increase).	In conclusion, the introduction of updated guidelines effected a safer and more effective ambulatory hot clinic to perform closer to full capacity, providing improved patient care for the local population. Note: this clinic is arranged within 24 h of ED visit where inpatient admission was decided against. It involved review and/or outpatient ultrasound scan.	2c
He (2018)	China	Cross departmental including surgical	Consultant/SMO	Retrospective cohort	Telehealth Liaison	Survey results of patient satisfaction rating, reasons for presenting, and barriers to the service	Saves costs, has high patient satisfaction and price acceptability	4
Den Hollander (2017)	South Africa	Plastics/burns	Consultant SMO	Retrospective case series	Teleclinic liaison	Inappropriate transfer was avoided in 38% of cases, and in 28% a period of treatment in the referral hospital was advised before transfer. 66% of patients after consult either avoided	Telemedicine consultations using a cellular phone significantly improved referrals to a burns unit.	4

Chewitt (1997)	Canada	Surgery- cross departmental	Specialist nurse	Retrospective cohort	Phone advice hotline	admission or delayed admission until more appropriate. Approximately 10% of all calls were deemed as requiring ED or further phone call follow-up. Of the callers surveyed, 85% stated that the hotline met their needs, and 98% claimed they would recommend the hotline to other postsurgical patients. The vast majority of respondents (95%) reported they had no difficulty getting through to the hotline.	A surgical hotline was well received by patients and majority of calls were resolved by nurses as opposed to requiring further follow-up or admission.	4
Caljouw (2010)	Netherlands	Gynecology	Specialist nurse	Randomized controlled trial	Telephone advice line	Reasons: wound pain (56%), mobility problems (54%), and constipation (27%). Participants who completely followed the advice with regard to wound healing ($P = .02$), pain ($P = .01$), vaginal bleeding ($P = .03$), and mobility ($P = .04$) experienced greater improvement.	Assists gynecological surgical patients to solve or reduce their postdischarge health problems	1b
Bowman (2015)	New Zealand	Pediatric orthopedics	Nonsurgical pediatric orthopedic physician	Prospective audit	NSP liaison ($n = 155$)	75% of referrals were seen within 55 days (8 weeks), 90% within 61 days (9 weeks), and 12% of patients were referred to an orthopedic surgeon.	Reduction of clinic wait times for patients with nonurgent pediatric orthopedic conditions	2c
Bonnardot (2014)	Multiple countries (MSF)	Multiple disciplines including surgery	SMO	Retrospective case series	Telemedicine	Survey: The majority of referrers (79%) reported that the advice received via the system improved their management of the patient.	Lack of feedback about patient follow-up but some improvement.	4
Benninger (1992)	USA	ENT	Nurse led	Case series	Cancer care coordinators	Thirteen of 31 surgery patients had unreliable follow-up, with 7 lost to follow-up. Only 8 of 93 radiation patients were unreliable, with 4 lost.	Nonphysician healthcare personnel who help to coordinate patient treatment and follow-up have a positive effect on overall patient care	4

CNS, clinical nurse specialist; ED, emergency department; ENT, ear nose and throat; FLS, fracture-liaison service; MSF, Médecins Sans Frontières; NSP, non-surgical paediatric orthopaedic physician; SMO, senior medical officer.

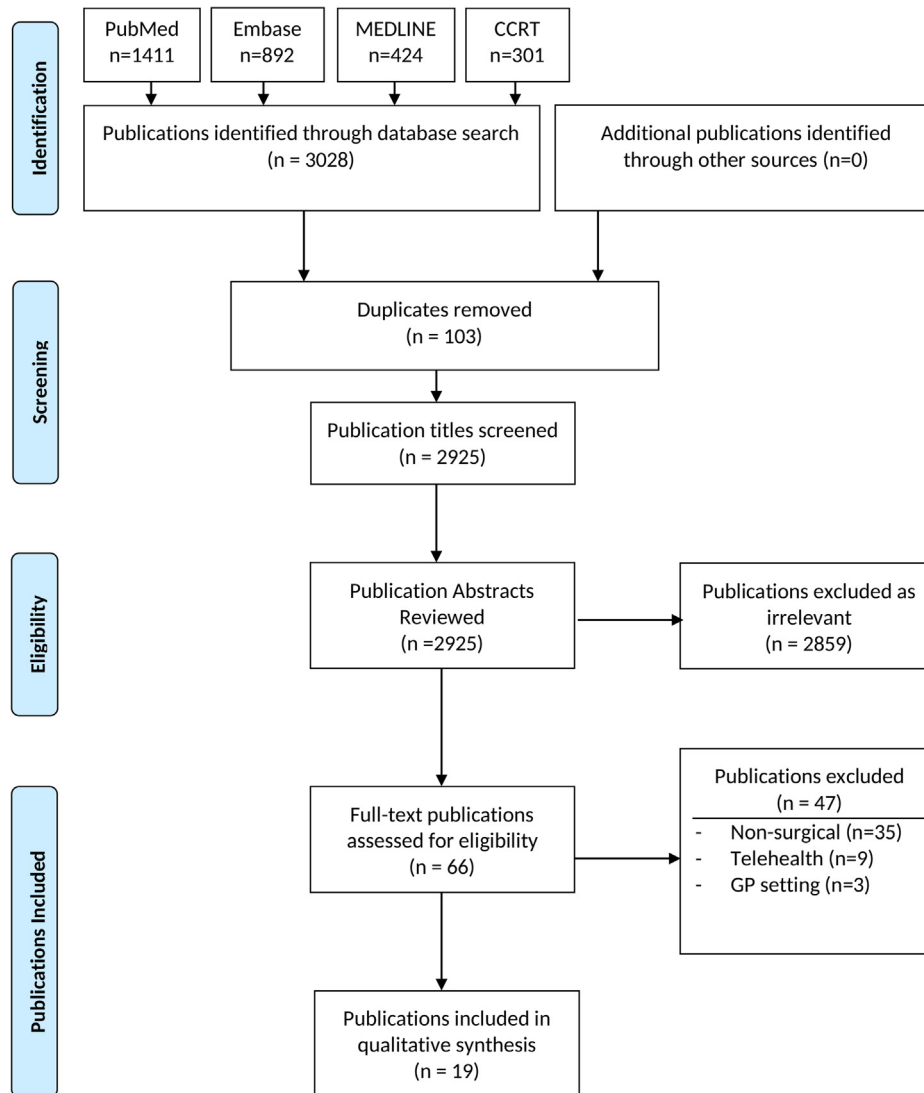


Fig 1. PRISMA flowchart of electronic searches.

within a department was a recurring theme.¹² Hubbard et al¹³ reported that in a large team-dependent general surgical department in the United Kingdom, a significant challenge was driving cultural change. Although a hot clinic service was acceptable, and worked well for patients, the benefit to individual physicians was less clear initially, requiring extra work on their part with senior input. It was determined that strong leadership behind the program was necessary to engage the department early from the start, with clear objective measures defining departmental problems that need addressing, and second, it was necessary to have a clearly defined liaison program that could be incorporated well into the service guidelines. Hubbard et al¹³ further stated that the leadership role is best assigned to a permanent senior physician in the department to ensure adequate supervision of junior colleagues. This is important in departments with high turnover of staff, as is common in large surgical departments.¹³

The Noncontact First Specialist Assessment (NcFSA) model involves a specialist who provides a written care plan and any other necessary advice to GPs in response to outpatient referrals. This model is particularly useful in services where clinical management decisions rest heavily on diagnostic test results.⁹ Miller et al¹⁴

exemplified 1 clinical application of a NcFSA, through their experience in establishing and subsequent conceptualization of a fracture liaison service as part of their department of orthopedic surgery in the United States. They described the importance of an orthopedic consultant in initiating the fracture clinic pathway for patients where indicated, with subsequent nurse specialist staff to ensure appropriate investigations and treatment were arranged before discharge from the service to their primary care physician for ongoing maintenance of therapy. The reported benefits of this NcFSA model included higher rates of investigation and treatment, with lower patient attrition rates.¹⁴ Miller et al raised similar considerations to Hubbard et al,¹³ emphasizing that a clear roadmap for the service was critical in ensuring that all members of the multidisciplinary team shared the same mission and vision for the program. The authors recommend that this was best orchestrated by the senior orthopedic surgeon who was ideally positioned to initiate and oversee the service after the management of a patient's fracture, ensuring continuity of care.^{13,14} However, McLellan et al¹⁵ reported that this was challenging because orthopedic surgeons were reluctant to assume such a central role due to the chronicity of the underlying disease processes.

Another key component of the demand management model at the specialist–primary care interface is the upskilling of GPs in order to refine the appropriateness of referrals to specialists.⁹ Both Kohlert et al¹⁰ and Bowman et al¹² reported that in addition to improved communication between primary care doctors and specialists, liaison services also confer the added benefit of intra-professional education regarding specialist problems, and this translated into subsequent referrals being more appropriate. Bowman et al¹² also demonstrated that more than 80% of their pediatric orthopedic referrals had nonsurgical outcomes, highlighting the importance of interprofessional education so referrals can be more confidently managed in primary care. In addition to interprofessional education, collaborative engagement between specialists and GPs in the development of primary/secondary pathways and management guidelines is critical to their successful acceptance and implementation. However, several studies found that, particularly, where liaison services would offer services direct to the patient, communication with the patient's primary care physician was often not undertaken.^{10,12} Hubbard et al¹³ found that their general surgical ambulatory liaison clinic would only include a formal letter to the patient's primary carer in 18% of cases. However, after explicit guidelines changes and increased senior physician input this was able to be increased to 68%.⁹ Similar issues around lack of communication with the patient's GP were also reported by fracture liaison services in orthopedics.^{14,15} This illustrates the importance of developing protocols and guidelines, in collaboration with primary care physicians, ensuring adequate communication is maintained in addition to liaison specific training.^{13,14,16}

Part 2: Innovations to increase patient engagement and self-management at home

Shifting the provision of care service into people's own homes aligns with the goal of a patient-centered health system that supports people to make informed decisions about and to successfully manage their own healthcare. Multiple studies demonstrated this model of care, offering liaisons as a follow-up service for patients after discharge after surgery.^{17–20} Tackitt et al, through their nurse-led liaison service after ureteroscopic stone surgery, demonstrated a reduction in postoperative presentations to the emergency department (ED) by 11%.²⁰ It is worth noting that these studies collectively demonstrated a reduction in unnecessary ED presentations and subsequent hospital in-patient admissions. With regard to services that directly liaised with patients, 5 studies found that the nurse-led liaison studies had high patient satisfaction rates on surveys^{11,17–19,21} More specifically, the results of Chewitt et al's survey showed that 85% of patients were satisfied with the advice received, and the liaison service met their needs and was a positive factor in their recovery.²² Around 98% of patients stated they would recommend the service to other patients, and 95% reported they had no difficulty accessing the service. Frequent comments made in the survey included that patients found it reassuring that help was only a phone call away, that they felt more cared for postdischarge, and that the service prevented unnecessary visits to ED. However, Chewitt et al emphasizes that establishing a liaison position is not without cost.²² There are the obvious costs of setting up an office space with the resources required (eg, face-to-face clinic, telephone, telemedicine capabilities) in addition to employing and training personnel. Additionally, there is an associated opportunity cost, because these roles require trained personnel and office space that could be utilized elsewhere. However, to counter some of these barriers, both Kohlert et al¹⁰ and Chewitt et al²² report that the actual time spent on each consult is minimal, with more than 75% of consults being completed in 10 minutes.^{10,22}

Part 3: Improving supply—Innovations to increase productivity and deliver care more efficiently

An alternative to manipulating demand for hospital services is to increase the supply of services by working more efficiently to increase productivity. At times, virtual alternatives to office visits (eg, telephone, secure messaging, video chat) can provide patients with an appropriate level of care while improving access through mitigating the inconveniences of traffic, parking, and lost days at work/school and at a reduced cost to in-person visits. They may be particularly useful for reaching patients who struggle to access healthcare services, particularly those with chronic conditions.⁹ Four studies advocated for reducing access barriers by offering alternative modes of healthcare delivery.^{10,22–24} Bonnardot et al²³ and He et al²⁴ used a telemedicine service to benefit rural and/or resource constrained communities. He et al²⁴ cited that a significant problem faced by the Chinese medical system was the maldistribution of healthcare resource between rural and urban areas. Consequently, they implemented a telemedicine system, which included both visual and audio-only telephone options providing a service directly to patients within their own home. They also worked in collaboration with primary care service providers in instances where patients needed further assessment and escalation of care. The program was successfully broadly implemented across specialties, reaching otherwise isolated populations at a lower cost to patients and the service provider.²⁴

Offering a similar service, Bonnardot et al²³ reported their findings of a Doctors Without Borders multilingual telemedicine service that consulted directly with primary care physicians and other field healthcare workers providing multidisciplinary specialist advice. They illustrated high satisfaction from primary care providers, with approximately 79% reporting that the service improved their management of patients.²³ However, both studies acknowledge that, in an attempt to improve access through alternative means, it runs the risk of further isolating vulnerable groups who do not benefit from such types of intervention. For example, He et al²⁴ reported that communities who lived in rural areas with access issues were also more likely to be older in age, identify as certain ethnic groups, have lower socioeconomic status, and have less formal education and, thus, report more frequent issues with affordability of devices, computer literacy, communication, and language barriers. Thus, already disadvantaged populations are at risk of becoming further isolated should the healthcare system adopt new services without critical reflexivity of privilege and socioeconomic class.²⁴

Another pertinent consideration raised in several studies was the issue of a liaison service encountering novel medicolegal issues that might not otherwise be an issue with more traditional face-to-face services.^{11,13,22} All authors comment that the medicolegal aspects relevant to noncontact liaison consults are similar to traditional face-to-face consults. These considerations include the need for consent, secure and confidential software, and clear documentation. The only additional consideration is when the liaison deems there to be a significant benefit from further face-to-face assessment, in which case escalation of the service would need to be advised and documented.^{11,13,16} Three studies emphasized that data recording is an important part of auditing the service and subsequent appraisal of its outcome.^{13,14,22}

Discussion

Through the synthesis of studies included within this review, we have provided qualitative evidence for the different types of non-acute surgical liaison roles. Although nonacute surgical liaisons have not been routinely employed at the primary and secondary

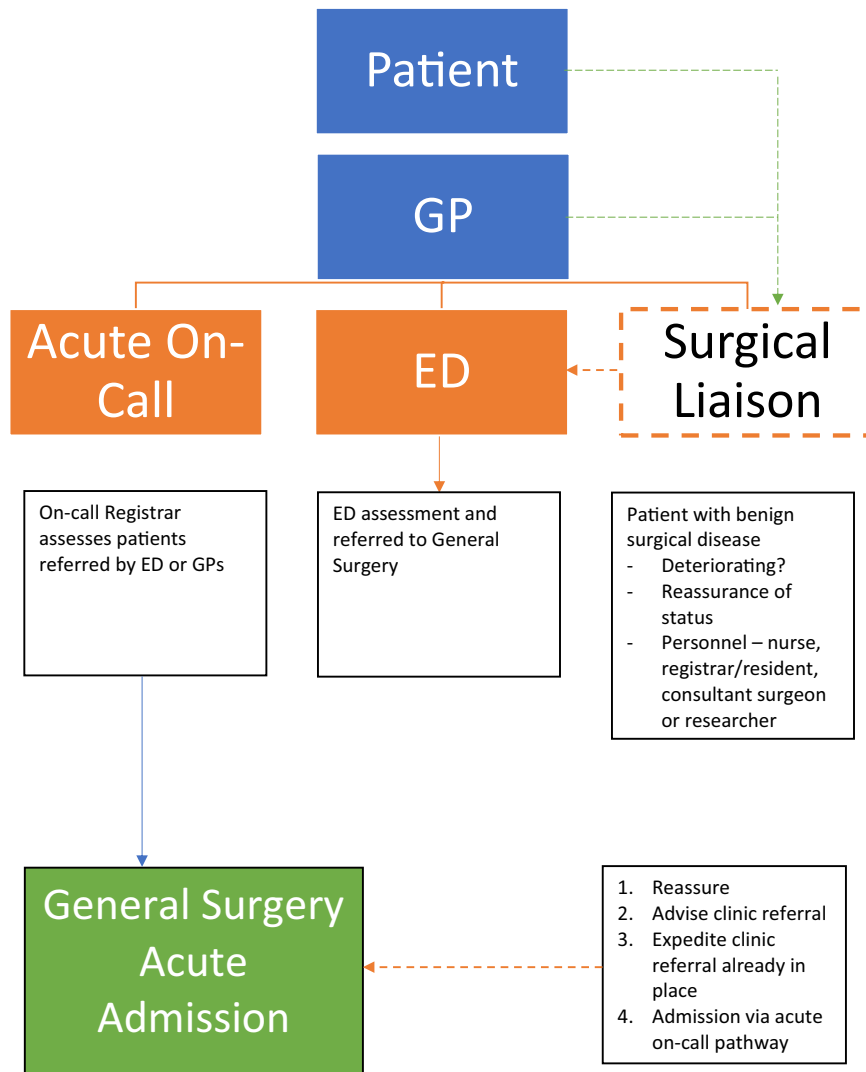


Fig 2. Proposed framework for a nonacute surgical liaison role.

care interface, studies have presented safe and effective findings that should be considered in the context of the COVID-19 pandemic.

The Institute for Innovation and Improvement Demand Management Strategy was seminal to the synthesis of the included articles because it seeks to implement models of care that shift toward home/self-care, ultimately striving toward the asymptotic gold-standard of a patient-centered health system.⁹ Overall, studies described 3 important roles of a surgical liaison role at the primary–secondary care interface. First, an initial consultation service for GPs to liaise with a specialist, typically in a virtual format, allowed for referrals to be appropriated and promoted intraprofessional education.^{10–12,23} A local example of the successful implementation of a role similar to these already exists at WDHB where a specialist mobile phone is carried by endocrinologists to field any urgent questions from GPs. Similarly, an inpatient equivalent exists for specialist advice termed “e-referrals,” an electronic software-based equivalent to email advice from specialist services, in which the specialist can choose a variety of ways in which to respond, ranging from an immediate electronic reply with advice through to patient review in person and further advice.⁹ In addition, a hospital-based neurology service in NZ had a waiting time for outpatient assessment in excess of the Ministry of Health target of 4 months—with some patients waiting 24 months

to be assessed. After implementing a NcFSA initiative, 20% to 30% of GP referrals are now managed with extensive letters and care plans being sent to GPs without face-to-face assessment of the patients. Furthermore, there was no significant clinical risk associated with NcFSA, and wait times now meet all required targets mitigating concerns about patients falling through the cracks.⁹

A second key area where a liaison service can be implemented is as a measure to increase patient engagement and management at home. Studies typically used a postdischarge follow-up service to monitor patient adherence to management plans and any complications or ailments that patients are experiencing. The unanimous benefit reported by studies in this review was a reduction in ED visits as well as high patient satisfaction.^{18–20,22,25–29} An example of this includes care coordination programs that target patients at high risk of hospital readmission due to complex long-term needs or treatment regimens and/or the need for multiple services, providers, and resources. In NZ, the care coordinator role is established in cancer care as part of the government’s Faster Cancer Treatment program. The Ministry of Health funds dedicated cancer nurse coordinators who provide a direct and single point of contact for patients and their families along the cancer care pathway. Studies appraising this program have found a significant health gain was achievable and cost-effective with the benefit being attributable via

4 effects: reducing time from provisional diagnosis to surgery, reducing time from surgery to chemotherapy, improving the coverage of chemotherapy, and reducing patients' anxiety during the pathway.³⁰

The final area of intervention involves striving toward better supply innovations to increase productivity and efficient care delivery. The general consensus among the studies reviewed was that alternatives to face-to-face consults is one of the most efficacious to achieve this. A recent example is the use of telehealth services to reduce demand on outpatients, reduce nonattendance, expand follow-up options, and improve patient experiences.⁹ A trial conducted at WDHB over 4 months in 2019 showed that telehealth had the potential to be successful at achieving these goals by illustrating that when offered a choice between a traditional face-to-face appointment and a noncontact appointment, 45.2% of patients chose a telehealth appointment. By eliminating travel, the telehealth user group saved an estimated combined \$9,500 (NZD; 1\$NZ = \$US0.75 = €0.5). Additionally, more than 80% of patients and more than two thirds of clinicians described their experience as the same or better than a traditional in-person visit to the hospital. These findings mirror those of [Teladoc.com](https://www.teladoc.com), one of the largest telehealth providers in the United States, which offers patients with minor illnesses 24-hour access convenient care to physicians via telephone or Internet video consults.³¹

The limitations encountered within this review are mostly due to the lower quality of evidence used in the appraisal of interventions, with most studies being case series using less objective outcome measures. Most studies had anecdotal or survey-based findings, conveying that the particular outcomes of interest were difficult to measure objectively. Furthermore, there was heterogeneity among the articles with regard to the type of liaison roles appraised. Additionally, there was variance across studies in the specialties that utilized the role but also in the way it was utilized, either as a service for primary care physicians as a diagnostic and management aid, or directly to patients typically as a follow-up service. In addition, there was differing practice in the scope of the liaison role as well as the qualifications of the staff who were in these roles. Thus, the suitability of a liaison in a more specific context will need to be further investigated depending on the requirements of the specific service looking to establish such a role. In this study, the type of liaison professional was not discriminated, primarily because the implementation of a liaison role has economic considerations for the department that hope to implement it. We wanted to appraise evidence that included diverse types of professional liaison roles to prospectively determine which staff were best suited to the role and in what setting they were utilized. This would help the department to choose the more appropriate professional for the role. This has associated economic implications as well as potential outcomes for the users of the service. The second reason was that, given that this topic is still quite novel, there are limited articles reporting and appraising their use within surgical departments. Thus to broaden the studies included within this review, the type of professional was not discriminated on.

Future directions after this study include a role for further quality improvement audits and derivative analysis after implementation of the service to obtain more objective measures of these positions within more specific settings. Other future directions could involve further research into the application of surgical liaison roles specifically in the context of chronic disease with the potential to reduce the burden of hospital visits to sufferers of these diseases. One pertinent example is seen with patients who have a temporary or permanent ostomy. In this scenario, a liaison role could offer advice to primary care physicians inquiring about management options. In addition, a liaison could be offered directly

to patients to help with any issues that occur after this, thus empowering the patient through education to manage some of these issues within their own home environment. Consequently, we conclude this review with an initial framework for the potential of a surgical nonacute liaison that can be adapted as necessary to provide a predominantly advisory service (Fig 2). This role would seek to promote the timely provision of advice, appropriation of referrals to ED and outpatient clinics, and assistance with management of surgical conditions in the community. Furthermore, as part of this framework we have included the potential for patients and other recipients of this service to provide feedback to the liaison provider to dynamically respond to any issues encountered. As the health system continues to evolve in the face of the COVID-19 pandemic, implementing innovative and reflexive solutions to not only uphold, but improve, surgical care and follow-up for patients is urgently needed.

Funding/Support

No funding was provided for the publication of this document.

Conflict of interest/Disclosure

The authors have no related conflicts of interest to declare.

References

1. Jefferies S, French N, Gilkison C, et al. COVID-19 in New Zealand and the impact of the national response: a descriptive epidemiological study. *Lancet Public Health*. 2020;5:e612–e623.
2. Ministry of Health. COVID-19 alert system. <https://covid19.govt.nz/government-actions/covid-19-alert-system/>. Accessed April 3, 2020.
3. Kaye AD, Okeagu CN, Pham AD, et al. Economic impact of COVID-19 pandemic on health care facilities and systems: international perspectives. *Best Pract Res Clin Anaesthesiol*. 2021;35:293–306.
4. Remuzzi A, Remuzzi G. COVID-19 and Italy: what next? *Lancet*. 2020;395:1225–1228.
5. Prem K, Liu Y, Russell TW, et al. The effect of control strategies to reduce social mixing on outcomes of the COVID-19 epidemic in Wuhan, China: a modelling study. *Lancet Public Health*. 2020;5:e261–e270.
6. World Health Organization. *Operational considerations for case management of COVID-19 in health facility and community: interim guidance, 19 March 2020*. World Health Organization; 2020.
7. World Health Organization. *Maintaining essential health services: operational guidance for the COVID-19 context: interim guidance, 1 June 2020*. World Health Organization; 2020.
8. Oxford Centre for Evidence-Based Medicine. Levels of evidence. <https://www.cebm.net/2009/06/oxford-centre-evidence-based-medicine-levels-evidence-march-2009/>. Accessed July 14, 2020.
9. Waitemata District Health Board (WDHB): The Institute for Innovation and Improvement and the University of Auckland (the UoA): The National Institute for Health and Innovation. Demand Management. Auckland, New Zealand: WDHB & the UoA; 2018. Available from: <https://i3.waitematadhb.govt.nz/assets/documents/our-work/research-innovation/innovation-library/Demand-Management.pdf>. Accessed January 12, 2021.
10. Kohlert S, Murphy P, Tse D, Liddy C, Afkham A, Keely E. Improving access to otolaryngology—head and neck surgery expert advice through eConsultations. *Laryngoscope*. 2018;128:350–355.
11. Hollander D, Mars M. Smart phones make smart referrals: the use of mobile phone technology in burn care—a retrospective case series. *Burns*. 2017;43:190–194.
12. Bowman M, Mackey A, Wilson N, Stott NS. The effect of a non-surgical orthopaedic physician on wait times to see a paediatric orthopaedic surgeon. *J Paediatr Child Health*. 2015;51:174–179.
13. Hubbard T, Thomas R. Improving the surgical hot clinic. *BMJ Open Quality*. 2014;3(1).
14. Miller AN, Lake AF, Emory CL. Establishing a fracture liaison service: an orthopaedic approach. *JBJs*. 2015;97:675–681.
15. McLellan AR, Gallacher SJ, Fraser M, McQuillan C. The fracture liaison service: success of a program for the evaluation and management of patients with osteoporotic fracture. *Osteoporos Int*. 2003;14:1028–1034.
16. Luc M, Corriveau H, Boire G, Filiatrault J, Beaulieu MC, Dagenais P, Gaboury I. Implementing a fracture follow-up liaison service: perspective of key stakeholders. *Rheumatol Int*. 2019;1–8.

17. Clarke V, Braun V, Terry G, Hayfield N. Thematic analysis. In: Liamputtong P, ed. *Handbook of Research Methods in Health and Social Sciences*. Singapore: Springer; 2019:843–860.
18. Love J, Moore A, Hyde A, Berwick S, Thomas R. 98 Outcomes from a novel nurse led telephone clinic, post-thoracic surgery. *Lung Cancer*. 2016;1:S35.
19. Kelly DF, Faught WJ, Holmes LA. Ovarian cancer treatment: the benefit of patient telephone follow-up post-chemotherapy. *Can Oncol Nurs J*. 1999;9:175–178.
20. Tackitt HM. Nurse-initiated telephone follow up after ureteroscopic stone surgery. *Urolog Nurs*. 2016;36(6).
21. Jose D. Fracture Liaison Service in an open health system: outcomes and challenges. In 2018 ACR/ARHP Annual Meeting, 2018 Oct 23.
22. Chewitt MD, Fallis WM, Suski MC. The surgical hotline: bridging the gap between hospital and home. *J Nurs Admin*. 1997;27:42–49.
23. Bonnardot L, Liu J, Wootton E, et al. The development of a multilingual tool for facilitating the primary-specialty care interface in low resource settings: the MSF tele-expertise system. *Frontiers Public Health*. 2014;2:126.
24. He C, Zhou Q, Chen W, et al. Using an Internet-based hospital to address maldistribution of health care resources in rural areas of Guangdong Province, China: retrospective and descriptive study. *JMIR Med Informatics*. 2018;6:e51.
25. Benninger MS. Medical liaisons for continuity of head and neck cancer care. *Head Neck*. 1992;14:28–32.
26. Caljouw MA, Hogendorf-Burgers ME. GYNOTEL: telephone advice to gynaecological surgical patients after discharge. *J Clin Nurs*. 2010;19:3301–3306.
27. Oberg MI, Price MS. PP33. Nurse-led telephone clinics improve patient satisfaction and enhance follow-up for benign/low grade tumour patients. *Neuro-Oncology*. 2017;19(Suppl 1):i10.
28. Lebanon OT, Netzer D, Yaacobi E, et al. Virtual orthopedic-rehabilitation-metabolic collaboration for treating osteoporotic hip fractures. *Endocrine Practice*. 2020;26:332–339.
29. Senay A, Perreault S, Delisle J, Morin SN, Fernandes JC. Performance of a fracture liaison service in an orthopaedic setting: a report of key indicators and improvement of longitudinal outcomes. *JBJS*. 2020;102:486–494.
30. Blakely T, Collinson L, Kvizhinadze G, et al. Cancer care coordinators in stage III colon cancer: a cost-utility analysis. *BMC Health Serv Res*. 2015;15:1–2.
31. Waitemata District Health Board (WDHB): the Institute for Innovation and Improvement. Outpatient Telehealth Trial (OTT). Auckland, New Zealand: WDHB; 2019. Available from: <https://www.telehealth.org.nz/news/waitemata-dhb-zoom-trial-a-success/>. Accessed January 12, 2021.