


ORIGINAL RESEARCH

Acceptability and feasibility of telehealth outpatient video-link consultations: A national cross-sectional survey of surgeons prior to the COVID-19 pandemic

Lisa Mackenzie PhD^{1,2,3}  | Natasha Noble PhD^{1,2,3} | Anthony Proietto PhD^{1,4} | Julia Jones MBBS⁵ | Grace Norton BPubHlth(Hons) GradCertEpidemiology^{1,2,3} | Kerrin Palazzi MPH^{3,6}

¹Health Behaviour Research Collaborative, University of Newcastle, Callaghan, New South Wales, Australia

²Priority Research Centre for Health Behaviour, School of Medicine and Public Health, Faculty of Health and Medicine, University of Newcastle, Callaghan, New South Wales, Australia

³Hunter Medical Research Institute, New Lambton Heights, New South Wales, Australia

⁴Hunter New England Local Health District, New Lambton Heights, New South Wales, Australia

⁵Prince of Wales Hospital, Randwick, New South Wales, Australia

⁶Clinical Research Design & Statistics, Hunter Medical Research Institute, New Lambton Heights, New South Wales, Australia

Correspondence

Lisa Mackenzie, University of Newcastle, Level 4 West, HMRI Building, Kookaburra Close, New Lambton Heights NSW 2305, Email: lisa.mackenzie@newcastle.edu.au

Funding information

Australian National Breast Cancer Foundation; Hunter Medical Research Institute

Abstract

Objective: This study explored use and perceived barriers to the use of post-operative video-link telehealth among a sample of Australian surgeons shortly before the COVID-19 pandemic.

Methods: During 2019–2020, a survey was mailed to RACS or RANZCOG Fellows.

Design: Cross-sectional survey.

Setting and Participants: A total of 907 surgeons practising in Australia completed the survey.

Main Outcome Measures: The study-specific survey assessed telehealth use in the last 3 months and the perceived barriers and enablers to the use of post-operative teleconsultations, across the domains: quality of care; convenience and efficiency; legal/regulatory issues; financial issues and technological issues.

Results: Twenty-five percent of eligible surgeons returned the survey, with $n = 763$ pre-pandemic responses included in analyses. Approximately one-quarter (26%) of surgeons had used telehealth post-operatively with patients in the last 3 months. The most frequently endorsed barriers to use related to quality of care: 'I cannot undertake a patient examination' and 'I cannot provide the same level of care as during an in-person consultation'; and convenience and efficiency: 'Teleconsultations are more difficult to arrange'. Surgeons who had recently used telehealth were less likely to endorse most barriers. Younger age, awareness of Medicare telehealth reimbursement and working in neurosurgery, urology, paediatric surgery and plastic and reconstructive surgery (compared to general surgery) were associated with recent telehealth use by surgeons.

Conclusions: Some surgeons' perceived barriers to telehealth pre-COVID may be overcome by COVID-19-related telehealth uptake and familiarisation. However,

The corresponding author Dr Lisa Mackenzie is supported by a Postdoctoral Fellowship grant (PF-16-011) from the Australian National Breast Cancer Foundation.

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2022 The Authors. *Australian Journal of Rural Health* published by John Wiley & Sons Australia, Ltd on behalf of National Rural Health Alliance Ltd.

many barriers will need to be addressed to ensure that telehealth adoption is sustained beyond the pandemic.

KEYWORDS

barriers, surgeons, telehealth, video link

1 | INTRODUCTION

Post-operative follow-up is an area of clinical care where telehealth may provide efficiencies for patients while minimising risk to patient safety and quality of care.¹ Post-operative video-link teleconsultations have been demonstrated to be feasible and acceptable to patients and clinicians in international settings.^{1,2} In Australia, many surgeons began offering telehealth for the first time during the COVID-19 pandemic.^{3,4} Temporary telehealth Medicare Benefits Schedule (MBS) item numbers were introduced in March 2020 to support the provision of outpatient care via video link. This was extended to include telephone consultations if video link was not possible. In response, there was a rapid uptake of telehealth consultations to allow surgeons to continue to deliver care to their patients.⁵

In a recent review during the COVID-19 pandemic, both patients and health care providers reported a high level of satisfaction with the use of telehealth, and expressed willingness to continue using telehealth after the pandemic.⁶ In order to establish sustainable and clinically appropriate post-operative telehealth follow-up models of care and inform implementation initiatives post-pandemic,⁵ there is a need to identify surgeons' views of the barriers associated with telehealth. We conducted a national cross-sectional survey to explore and understand surgeons' utilisation of telehealth video-link consultations, and the main barriers and enablers to their use for different surgical specialties across Australia in the pre-pandemic environment. Our aims were to explore recent (i.e. in the last 3 months) use of video-link telehealth consultations; to identify demographic and surgery-related characteristics associated with telehealth use and to describe barriers to the use of post-operative video-link telehealth (and whether these varied according to recent telehealth usage).

2 | METHODS

2.1 | Design

National cross-sectional survey conducted in 2019 and 2020. An initial pilot phase invited surgeons to provide feedback on the survey.

What is already known on this subject:

- Telehealth offers a range of benefits for patients, such as reduced time and costs associated with attending appointments, particularly for those in rural locations
- In Australia, many surgeons began offering telehealth for the first time during the COVID-19 pandemic
- However, a range of barriers affect telehealth use, and uncertainty remains about the sustainable adoption of post-operative telehealth into the future

What this paper adds:

- Our study explored the use and perceived barriers to use of post-operative video-link telehealth among a sample of Australian surgeons shortly before the COVID-19 pandemic, finding low overall utilisation of telehealth by surgeons prior to the pandemic
- The top barriers to the use of post-operative telehealth follow-up were related to concerns over quality of care; convenience and efficiency and technological issues
- Surgeons who had recently used telehealth with patients were significantly less likely to endorse perceived barriers, suggesting that engaging with telehealth delivery can reassure surgeons that they can deliver the same level of care and a satisfactory service for patients via telehealth

2.2 | Sample and setting

A national contact list of surgeons practising in Australia was compiled from two publicly available databases: The Royal Australasian College of Surgeons (RACS); and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) directories.

2.3 | Procedure

A study information package including invitation letter, information statement, survey, participation form and reply-paid envelope was mailed to all surgeons on the contact list. Surgeons also had the option of completing the survey online or as a telephone interview if preferred. Consent was implied by survey completion. Surgeons who did not wish to participate, were retired or not currently practicing, were asked to return the participation form. A reminder was sent after approximately 4 weeks, and reminder calls were made to surgeons if a $\geq 20\%$ consent rate per state/territory was not achieved. Due to the COVID-19 pandemic impact on telehealth use, surveys returned after March 2020 were excluded from analysis.

2.4 | Measures

The research team developed a survey to assess use and acceptability of post-operative teleconsultations. The following definition of telehealth was provided at the survey start: “teleconsultations use secure, encrypted computer software to connect with the patient via a video-link allowing a consultation without needing to travel”. The survey assessed recent telehealth use (i.e. within the last 3 months) with post-operative patients and other health care providers, knowledge of Medicare telehealth rebates and perceived barriers and enablers to the use of post-operative teleconsultations across the domains: quality of care; convenience and efficiency; legal/regulatory issues; financial issues and technological issues. Surgeons indicated their agreement with a series of statements for each domain on a Likert response scale from 1 (strongly disagree) to 4 (strongly agree). For example, quality of care domain: *‘I have concerns about video-link teleconsultations because I cannot provide the same level of care as during in-person consultations’*. Surgeons were invited to list any barriers or benefits to telehealth use not covered by the survey as open-ended text. Surgeons were also asked to report their age, gender, surgical speciality, whether they held multidisciplinary team membership (breast, bowel, lung or other), primary place of practice (regional/rural; urban) and mainly public or private practice. Pilot testing with surgeons from one jurisdiction found the survey was well understood.

2.5 | Ethics approval

Ethics approval was granted by the University of Newcastle HREC (Ref: H-2018-0460).

2.6 | Analysis

Proportions, means and standard deviations were calculated to describe sociodemographic variables. Crude and adjusted logistic regression analyses assessed the association between recent telehealth use (i.e. within the last 3 months) with patients (yes/no) and: (a) age; (b) gender; (c) primary surgical speciality; (d) primary place of practice (regional/rural vs urban); (e) type of practice (mainly public, mainly private or public and private) and (f) awareness of Medicare telehealth reimbursement (yes, no, not sure). Proportions with 95% confidence intervals (CIs) were calculated for agreement with each of the barriers or enablers to teleconsultations. Chi-square analysis, adjusted for multiple comparisons, was used to assess whether endorsement of barriers to telehealth use varied according to surgeons' recent telehealth use with post-operative patients.

Analyses were programmed using Stata v16 (StataCorp) and SAS v9.4 (SAS Institute). A priori, statistical significance was set at p -value < 0.05 . The Benjamini–Hochberg procedure was used to account for multiple comparisons by controlling the false discovery rate (FDR) at a 10% level for Chi-square tests and for the adjusted logistic regression model.⁷

Open-ended survey comments were coded in NVivo (www.qsrinternational.com). Qualitative content analysis using modifiable coding systems was used for analysis of surgeon comments, and comments were considered separately for surgeons who did and did not report recent telehealth use with patients. Comments were coded by one author (Author 2) in discussion with another (Author 1).

3 | RESULTS

Of 3596 eligible surgeons, 907 surveys were returned (25% response rate) with 763 received by March 2020 (prior to the COVID-19 pandemic) and included in the analysis. Characteristics of the sample are presented in Table 1. The majority of surgeons were male, aged between 40 and 60 years, practising in an urban location and in a combination of public and private practice. General surgeons made up just over a quarter (27%) of the sample.

3.1 | Recent use of video-link telehealth consultations

The majority (64%) of surgeons had not used telehealth video link to connect with post-operative patients or other health care providers recently. Just over a quarter (26%)

TABLE 1 Sample characteristics by recent use of telehealth with patients ($n = 763$)

Characteristics	Total N (%) ^a
Gender	
Male	603 (79%)
Female	157 (21%)
Age	
Under 40 years	53 (7%)
40-60 years	550 (72%)
Over 60 years	147 (19%)
Surgical specialty	
General	203 (27%)
Orthopaedic	177 (23%)
O&G	91 (12%)
Otolaryngology/head and neck	61 (8%)
Plastic and reconstructive	60 (8%)
Urology	57 (7%)
Neurosurgery	34 (5%)
Vascular	32 (4%)
Cardiothoracic	22 (3%)
Paediatric	21 (3%)
Other	4 (<1%)
Multidisciplinary team membership ^b	
Breast	77 (10%)
Bowel	72 (10%)
Lung	15 (2%)
Other	229 (30%)
None	423 (56%)
Location	
Rural/regional	168 (22%)
Urban	587 (77%)
Practice type	
Public	86 (11%)
Private	243 (32%)
Both public and private	427 (56%)
Years of practice (mean, SD)	19 (10.8) years

^a% do not add to 100 due to missing values.

^bMDT membership numbers and % do not add to total due to membership of multiple teams.

reported recent video-link consultations with patients, while 22% reported recent video-link use to connect with other health care providers. The characteristics of surgeons who had, and had not, recently used post-operative video-link teleconsultations with their patients are shown in [Table 2](#).

3.2 | Factors associated with surgeons' use of video-link telehealth consultations

Results of the logistic regression are shown in [Table 3](#), accounting for multiple comparisons. Surgeon age, surgical specialty and awareness of the Medicare reimbursement for telehealth were significant predictors of recent telehealth use with patients. A 1-year increase in surgeon age was associated with a 3% decrease in the odds of using teleconsultations with patients recently (OR = 0.97, 95% CI: 0.95–0.99, $p = 0.0108$). The odds of using teleconsultations were approximately three times higher among surgeons who were aware of the Medicare reimbursement for telehealth (OR = 2.76, 95% CI: 1.85, 4.10, $p < 0.001$) compared to those who were not. Compared to general surgeons, the surgical specialties of urology, neurosurgery, paediatrics and plastic and reconstructive surgery were more than two to three times more likely to have used telehealth with patients recently (ORs between 2.36 and 3.79; see S3).

3.3 | Perceived barriers and enablers to telehealth post-operative follow-up

The top three most frequently endorsed barriers were as follows: 'I cannot undertake a patient examination' (94% agreed/strongly agreed), 'I cannot provide the same level of care as during an in-person consultation' (72% agreed/strongly agreed) and 'Compared to in-person appointments, teleconsultations are more difficult to arrange' (71% agreed/strongly agreed).

[Table 4](#) shows the proportion of surgeons who agreed or strongly agreed with each of the barriers presented in the survey, presented according to whether or not surgeons had recently used video-link telehealth to connect with patients post-operatively. Chi-square comparisons according to recent telehealth use are also shown, accounting for multiple testing. Except for one barrier (inadequate Medicare reimbursement for offering teleconsultations), agreement with all other barriers differed significantly according to recent patient telehealth use. Surgeons who had not used telehealth to connect with patients recently were significantly more likely to agree/strongly agree with each of the potential barriers. For example, 77% of surgeons who had not used telehealth recently agreed that they 'cannot provide the same level of care' using telehealth compared to an in-person consultation, compared to 57% of surgeons who had recently used telehealth with their patients. All significant differences shown in [Table 4](#) remained significant after controlling for a 10% FDR.

TABLE 2 Surgeon characteristics by use of video-link telehealth consultations in the last 3 months

Surgeon characteristics	Use of telehealth consultations with patients in the last 3 months	
	Yes N (%)	No N (%)
Age		
Under 40 years (N = 53)	12 (23%)	41 (77%)
40-60 years (N = 549)	154 (28%)	395 (72%)
Over 60 years (N = 145)	28 (19%)	117 (81%)
Gender		
Male (N = 600)	158 (26%)	442 (74%)
Female (N = 157)	38 (24%)	119 (76%)
Surgical specialty		
General (N = 202)	43 (21%)	159 (79%)
Orthopaedic (N = 177)	48 (27%)	129 (73%)
O&G (N = 91)	13 (14%)	78 (86%)
Head and neck (N = 60)	8 (13%)	52 (87%)
Plastic and reconstructive (N = 60)	21 (35%)	39 (65%)
Urology (N = 56)	24 (43%)	32 (57%)
Neurosurgery (N = 34)	14 (41%)	20 (59%)
Vascular (N = 32)	9 (28%)	23 (72%)
Cardiothoracic (N = 22)	6 (27%)	16 (73%)
Paediatric (N = 21)	10 (48%)	11 (52%)
Other (N = 4)	1 (25%)	3 (75%)
Ophthalmology (N = 1)	0	1 (100%)
Multidisciplinary team membership		
Yes (N = 338)	94 (28%)	244 (72%)
No (N = 422)	103 (24%)	319 (76%)
Primary place of practice		
Urban (N = 584)	157 (27%)	427 (73%)
Regional/rural (N = 168)	36 (21%)	132 (79%)
Type of practice		
Mainly public (N = 86)	25 (29%)	61 (71%)
Mainly private (N = 242)	56 (23%)	186 (77%)
Public and private (N = 426)	114 (27%)	312 (73%)
Aware of Medicare reimbursement for telehealth		
Yes (N = 192)	71 (37%)	121 (63%)
No (N = 492)	90 (18%)	402 (82%)
Not sure (N = 59)	27 (46%)	32 (54%)

Table 5 presents the themes emerging from the thematic analysis of the open-ended comments ($n = 395$). Comments and themes were grouped under the domains

and barriers included in the survey, with additional themes identified by surgeons also included in the table. Quotes illustrating the main themes are included (with surgeon ID and whether they had recently used telehealth to connect with their patients or not labelled as 'telehealth user' or 'non-user').

4 | DISCUSSION

This large national Australian study provides an insight into surgeons' use of telehealth, and perceptions of barriers to telehealth use with patients, prior to the onset of the COVID-19 pandemic. We found low utilisation of telehealth by surgeons (just over one quarter of surgeons [26%] reporting having recently used telehealth for post-operative follow-up with patients). Younger surgeons, those who were aware of the Medicare reimbursement and some surgical specialities (neurosurgery, urology, paediatrics and plastic and reconstructive surgery, compared to general surgeons) were more likely to have used telehealth for post-operative follow-up. The differences in telehealth use by surgical specialty likely reflect the clinical appropriateness of telehealth for some types of surgical care compared to others.^{3,8} Specialties, such as neurosurgery, paediatrics and more complex plastic surgery, are also generally smaller specialties concentrated in major centres and often providing a supraregional service, which may explain greater use of teleconsultations among these specialties.

Faced with the new demands of the COVID-19 pandemic, many surgeons have rapidly adopted telehealth approaches with their patients.^{3,5} The COVID-19 pandemic saw a substantial increase in Australian surgeons' use of telehealth: 95% of surgeons reported using telehealth during the pandemic, compared to 56% using telehealth either occasionally (45%) or regularly (11%) prior to the pandemic.³ A majority of Australian surgeons indicated a willingness to continue to use telehealth after COVID-19,³ yet uncertainty remains over the sustainable adoption of post-operative telehealth into the post-pandemic period. A RACS review⁸ of trends in surgeon telehealth activity following introduction of the telehealth MBS items in March 2020 showed that telehealth accounted for 14% of specialist consultations from March to September 2020. However, this was characterised by an initial increase to 30% in April 2020 which fell to 12% by June 2020. Telephone was the preferred telehealth modality, accounting for 80% of claims.⁸

To our knowledge, this study is the first to explore whether perceived barriers to telehealth use differ according to recent use of telehealth technology with patients. Surgeons who had not recently used telehealth

Variable	OR (95% CI)	p-value
Age (linear: 1-year increase)	0.97 (0.95, 0.99)	0.0108**
Gender		0.9725
Male	Reference	
Female	0.99 (0.61, 1.62)	
Surgeon specialty		0.0003**
General	Reference	
Cardiothoracic	0.98 (0.32, 2.99)	0.9766
Head and neck	0.58 (0.25, 1.38)	0.2188
Neurosurgery	2.72 (1.20, 6.15)	0.0166**
Obstetrics and gynaecology	0.58 (0.27, 1.25)	0.1640
Orthopaedic	1.39 (0.82, 2.36)	0.2188
Other	1.66 (0.15, 18.08)	0.6758
Paediatric	3.79 (1.35, 10.62)	0.0113**
Plastic and reconstructive	2.36 (1.19, 4.65)	0.0136**
Urology	3.21 (1.60, 6.43)	0.0010**
Vascular	1.27 (0.51, 3.19)	0.6052
Practice location		0.7252
Regional/rural	Reference	
Urban	1.09 (0.69, 1.71)	
Practice type		
Private	Reference	
Public and private	1.04 (0.68, 1.58)	0.8719
Public	1.23 (0.65, 2.32)	0.5331
Aware of Medicare reimbursement		<0.001
No	Reference	
Not sure	1.77 (2.07, 6.86)	<0.0001**
Yes	2.76 (1.85, 4.10)	<0.0001**

**Indicates significant p-value after adjusting for a false discovery rate at the 10% level.

TABLE 3 Adjusted logistic regression results for the association between surgeon characteristics and surgeons recent use of teleconsultations with patients ($n = 716$ in model)

were significantly more likely to agree with the barriers presented in the survey, except regarding inadequate reimbursement – where approximately 40% of surgeons agreed the Medicare reimbursement for telehealth was inadequate. Whilst fewer surgeons endorsed barriers related to legal/regulatory and financial issues than in past research,⁹ being unaware of Medicare rebates for telehealth was significantly associated with telehealth non-usage.

The most frequently endorsed barriers to telehealth use related to quality of care; convenience and efficiency and technological issues. Quality of care barriers included not being able to undertake a patient examination and not being able to provide the same level of care as during an in-person consultation. Qualitative comments especially noted difficulties in checking wounds and conducting internal examinations. Convenience and efficiency barriers included teleconsultations being more difficult to arrange and more time consuming than in-person consultations. A number of surgeons (mainly those who had not recently

used telehealth) commented that their patients want or prefer face-to-face consultations. This is challenged by recent data indicating a high level of satisfaction with telehealth among patients and health care providers.⁶ Technological issues included a lack of reliable internet access for patients, and lack of a user-friendly interface for patients. These findings echo previously identified barriers to telehealth use.^{5,8,10}

The qualitative comments highlighted additional practical barriers including limited access to telehealth facilities and equipment and problems with software compatibility/interfacing between private versus public settings. In line with the RACS review,⁸ many surgeons noted that they use telephone or email with their patients, and prefer this to video link.

Surgeon's relatively low pre-pandemic use of telehealth with patients appears to be related to a wide range of perceived barriers. While some patients may continue to prefer face-to-face post-operative care,¹¹

TABLE 4 Agreement with barriers to use of post-operative video-link teleconsultations for surgical patient follow-up according to current telehealth use

Perceived barrier (N responded)	Surgeons who did not use telehealth with patients in the last 3 months (N = 563) ^a	Surgeons who did use telehealth with patients in the last 3 month (N = 197) ^a	Chi-square p-value
	Strongly agree/agree N (%) [95% CI]	Strongly agree/agree N (%) [95% CI]	
<i>Quality of care issues I have concerns about video-link teleconsultations because I:</i>			
Cannot provide the same level of care as during in-person consultations (total N = 756)	434 (77%) [74–81%]	112 (57%) [50–64%]	28.6 p < 0.0001
Cannot undertake a patient examination (total N = 755)	539 (96%) [95–98%]	173 (89%) [84–93%]	15.3 p < 0.0001
Cannot effectively monitor patient well-being (total N = 754)	240 (43%) [39–47%]	36 (18%) [13–24%]	38.0 p < 0.0001
Cannot deliver a satisfactory service for patients (total N = 752)	278 (50%) [46–54%]	26 (13%) [9–18%]	79.3 p < 0.0001
<i>Convenience and efficiency issues Compared to in-person appointments, video-link teleconsultations are:</i>			
More difficult to arrange (total N = 747)	428 (78%) [74–81%]	104 (53%) [46–60%]	42.7 p < 0.0001
More time consuming for the surgeon and their staff (total N = 744)	408 (74%) [71–78%]	91 (47%) [40–54%]	49.8 p < 0.0001
<i>Legal and regulatory issues I have concerns about the use of video-link teleconsultations regarding:</i>			
Medical liability issues (total N = 753)	314 (56%) [52–60%]	59 (30%) [24–37%]	39.1 p < 0.0001
Data security issues (total N = 755)	228 (41%) [37–45%]	45 (23%) [17–29%]	20.0 p < 0.0001
<i>Financial Issues I have concerns about the use of video-link teleconsultations including NOT having:</i>			
Adequate Medicare reimbursement for offering teleconsultations (total N = 730)	229 (43%) [39–47%]	75 (39%) [32–46%]	0.8 p = 0.36
Access to free or low-cost teleconsultation software (total N = 733)	332 (62%) [58–66%]	61 (31%) [25–38%]	53.3 p < 0.0001
<i>Technological issues I have concerns about the use of video-link teleconsultations including NOT having:</i>			
Appropriate software installed on my computer (total N = 749)	383 (69%) [65–73%]	62 (32%) [25–38%]	83.4 p < 0.0001
Confidence using teleconsultation technology and software (total N = 752)	276 (50%) [45–54%]	40 (21%) [15–26%]	50.0 p < 0.0001
Adequate technical support for using the technology and software (total N = 749)	368 (66%) [62–70%]	75 (39%) [32–46%]	45.5 p < 0.0001
Reliable teleconsultation technology (total N = 744)	354 (65%) [61–69%]	82 (42%) [35–49%]	29.8 p < 0.0001
Reliable internet access available to me (total N = 750)	185 (33%) [29–37%]	47 (24%) [18–30%]	5.8 p = 0.016
Reliable internet access available to my patients (total N = 746)	371 (67%) [63–71%]	113 (58%) [51–65%]	5.1 p = 0.024
A user-friendly interface for patients (total N = 738)	401 (73%) [70–77%]	104 (54%) [47–61%]	24.4 p < 0.0001

^aThe total number of surgeons in each column (who did not, and who did, use telehealth) varied slightly for each barrier due to missing responses (missing responses ranged from n = 4 to n = 30).

TABLE 5 Open-ended comments regarding the use of video-link teleconsultations (n = 395)

Quality of care issues	Cannot provide the same level of care as during in-person consultations
	Barriers related to providing the same level of care as an in-person consultation was one of the most frequently mentioned issues by surgeons. Such barriers related mainly to communication and the inability to provide other services and procedures for patients.
	Communication: Surgeons mentioned issues around telehealth being impersonal, consultations need to be face to face, ideas of bonding with the patient, building patient rapport and respect, picking up on non-verbal cues and body language and the potential to miss symptoms which the patient does not report or are not visible during a teleconsultation. These issues were mentioned by both telehealth users and non-users. One surgeon (a telehealth user) also specifically mentioned cultural barriers, especially for Indigenous populations.
	Non-verbal cues and nuanced patient doctor interactions are not possible on video link. I will not use it for this reason. (556, non-user)
	Loss of subtle communication feedback - it is like having an interpreter present. (2643, telehealth user)
	Procedures and services: Surgeons mentioned not being able to provide procedures and services for patients via telehealth, especially physical procedures like pap smears, removal of catheters, as well as provision of scripts and referrals. The inability to do this via telehealth might lead to needing another consultation.
	Inability to provide ongoing potential needs for care e.g. scripts, referrals. (777, non-user)
	On the surface most consults start off with not needing an examination necessarily but [patients] often bring up other problems not in initial referral. You are going to have to do 2 x consults. (784, non-user)
	Cannot undertake a patient examination
	The inability to examine patients was the barrier to telehealth most frequently mentioned by surgeons. In addition to a general inability to examine patients, surgeons made specific comments about difficulties or inability to: check wounds, assess whether wounds were infected, assess vaginal surgery, undertake digital rectal examination for prostate cancer, undertake microscopic examinations, perform otoscopy and other ENT examinations, assess range of movement and effectively look at the skin, via telehealth. These types of barriers were mentioned by both telehealth users and non-users.
	The lack of ability to examine the patient is the most serious limitation for first consultations and remains an issue in follow up. (3067, telehealth user)
	Cannot effectively monitor patient well-being
	Monitoring patient well-being was not frequently mentioned as a barrier to the use of telehealth.
	Patients' emotions [are] easier to read in person. (2883- non-user)
	Cannot deliver a satisfactory service for patients
	Some surgeons mentioned that their patients want, prefer or are quite happy to see the surgeon in person, and that their patients have not asked to use telehealth. These comments were mainly made by surgeons who had not used telehealth in the last 3 months.
	Many [patients] prefer to come in and see someone/me. (373, non-user)
	Convenience and efficiency issues
	Teleconsultations are more difficult to arrange
	Surgeons made a range of comments related to difficulties in arranging teleconsultations including difficulties when they were running late and problems in trying to coordinate appointments with other parties (such as GPs or other specialists). Surgeons also mentioned that telehealth interferes with their normal patient throughput, and a lack of booking and scheduling systems in place. Surgeons who had used telehealth in the past 3 months with patients frequently mentioned difficulties in arranging teleconsultations as barriers to their use.
	Have tried with Skype but have to connect to the patient before consult and then ensure patient [is] available when I am. If I am running late this becomes an issue. (75, non-user)
	Teleconsultations are more time consuming for the surgeon and their staff
	Surgeons made comments about teleconsultations being more generally more time consuming, time inefficient, less efficient in terms of patient throughput and requiring more staff time to set up. Surgeons also commented that patient reassurance and discussion would take longer via telehealth than in-person, and that telehealth would be slower because of the inhibition of the usual flow of interaction that occurs face to face.
	Patient reassurance and discussion would take longer by teleconference (results of pathology etc.). (589, non-user)
	Legal and Regulatory issues
	Medical liability issues
	Surgeons expressed concern about possible liability and litigation when using teleconsultations, especially due to not being able to physically examine their patients.
	My [patients] are a more likely medico legal risk. I had to see/feel the whole patient so I don't miss anything... (1356, non-user)

TABLE 5 (Continued)

Data security issues	A small number of surgeons made very general comments regarding data security issues or concerns including both telehealth users and non-users.
Financial issues	
Adequate Medicare reimbursement for offering teleconsultations	Both telehealth users and non-users commented that the Medicare reimbursement for teleconsultations is inadequate and does not cover their costs. Surgeons also mentioned other issues related to Medicare reimbursement including that the MBS item numbers were not clear, uncertainty about rebates and eligibility for rebates and that the information provided by Medicare was difficult to find and little support was offered.
In addition, surgeons noted that they often do not bill patients or are not reimbursed for consultations which are done over the phone or by email, and that patients do not expect to be charged for a teleconsultation.	
Access to free or low-cost teleconsultation software	Only three surgeons (all non-users) specifically mentioned software costs associated with telehealth. However, surgeons also mentioned 'cost', 'costs of training staff and 'set up and ongoing costs', as being barriers to using telehealth.
Technological issues	
Appropriate software installed on my computer	Surgeons mentioned not having access to the appropriate technology or software, not knowing what is the best software to use, as well general problems with setting up telehealth including the effort required and not being sure if they had access to the technology or software needed.
I would not know how to organise it in my room. (3512, non-user)	
Confidence using teleconsultation technology and software	Surgeons mentioned a general lack of confidence and exposure to telehealth as barriers to its use, as well as the need for education or training in how to provide this service to patients.
Happy to use telehealth but no idea where to start! (3702, non-user)	
Adequate technical support for using the technology and software	Surgeons, both users and non-users of telehealth, noted a lack of technical support available for installing and using telehealth, in particular for those working in the public hospital sector.
I work predominantly in the public sector - IT support is extremely poor. (699, non-user)	
Reliable teleconsultation technology	Barriers related to reliable technology was one of the most frequently mentioned issues. There were three main themes related to telehealth technology. In addition to the technology itself not being reliable, surgeons also raised issues related to the quality of images available with telehealth, and other technical/support issues. Technology is not reliable: Surgeons mentioned frequent failures of the technology, such as poor connections or connections dropping out, computer issues or software, poor audio or visual quality, and time being wasted on trying to trouble shoot technical problems. Several surgeons also mentioned time delays and difficulties hearing what was being said. Also problems either no video, just audio, or unable to log in to software. (687, user)
Images: Surgeons mentioned issues related to the inability to access or display images, and poor quality images or cameras available to the patient or the surgeon. This was of concern in relation to activities such as for undertaking ear nose and throat examinations, examining wounds or skin lesions, for breast imaging and displaying X-rays, CT scans etc. The potential for this to lead to misdiagnosis was a concern to surgeons.	
My main field is skin cancers and the lighting and camera zooms at patient are a total lottery. (1134, user)	
Other technical/support issues: Other technical issues included limited access to telehealth facilities and equipment or hardware (particularly in public hospitals), as well as problems with compatibility/interfaces between software programs used in private versus public settings. Another theme which surgeons mentioned was that there tended to be a lack of support for telehealth across settings including public hospitals and from GP practices. This included telehealth clinics being poorly organised.	
Very limited access to equipment in our hospital, which is a tertiary, teaching hospital with over 600 beds (286, non-user)	
235 Remote patients often go to their local public hospital and we in the private sector cannot interfere with the software public hospitals use. (235, user)	

(Continues)

TABLE 5 (Continued)

Reliable internet access available to me	
A small number of surgeons, both telehealth users and non-users, commented that internet reliability and low speeds were a major barrier to the use of telehealth with patients.	
Reliable internet access available to my patients	
A small number of surgeons (mainly telehealth users) mentioned patient internet reliability as a barrier to the telehealth use with patients, in particular for country patients.	
I have good internet but country patients largely do not. (3582, non-user)	
A user-friendly interface for patients	
This was not frequently mentioned as a barrier to telehealth use, although a number of surgeons (both users and non-users) mentioned that some patients do not feel comfortable or are anxious with the technology. Surgeons also noted additional barriers to accessing or being familiar with the technology for patients from CALD backgrounds, and cultural concerns around the use of video link including equity in accessing health care for First Nations people.	
Additional issues identified in open-ended comments	
Need for support staff	
One issue that was not included in the survey but was raised by a substantial number of surgeons was the need for adequately trained support staff to be with the patient during a teleconsultation. This was mentioned by both telehealth users and those who had not recently used telehealth with patients. Support staff could include GPs, nurses, health care workers, allied health or other surgeons or specialists, and were needed to support the surgeon by undertaking a physical examination and/or assessment, using equipment to show the view of the patient the surgeon needed, or to check test results.	
Who will support the patient on the other end? GP, surgeon, nurse. Can they do simple examination? (1571, non-user)	
Not suitable for all patients or all types of consultations	
Surgeons (both users and non-users of telehealth) mentioned 'patient selection' and made comments around telehealth not being suitable for all types of patients or all types of consultations. Many surgeons mentioned that their patients are typically older and would potentially be unfamiliar or struggle with the technology (mainly reported by non-users of telehealth). There was also general consensus that telehealth was more suitable for routine and/or non-complicated follow-up and post-operative review, but not for initial consultations or for pre-operative assessment, or post-operatively where examination was required.	
A lot of my pts are 70+ and unlikely to be able to log on. (2847, non-user)	
I do not think telehealth is appropriate for an initial consultation but I would be prepared to consider it for selected cases for follow up (2340, non-user)	
Other barriers to telehealth use	
A number of other barriers to telehealth use were mentioned by a few surgeons: Patients do not attend telehealth appointments: Surgeons suggested that patients fail to attend telehealth appointments. Patient privacy: Several surgeons noted concerns for patients exposing private body parts on camera or undressing in front of a computer camera.	
<i>Breast patients rarely want to be undressed in front of a computer camera (1280, telehealth user)</i>	
Patients are more distracted during telehealth: Surgeons expressed concern that their patients were more likely to be distracted or lose concentration during a teleconsultation than in-person.	
Sometimes the patient is distracted by other events. (1532, non-user)	
Benefits of telehealth identified by surgeons	
A large number of surgeons made comments on the survey which represented 'enablers' or benefits of the use of telehealth, rather than barriers. Comments were mainly around the benefits for rural patients, as well as those who are disabled, elderly, frail or unwell. Surgeons mentioned the convenience, time and money saving for patients, environmental benefits of reducing travel and telehealth preventing patients being lost to follow-up. Enablers were reported by both surgeons who had not, and who had, recently used telehealth to connect with patients. Several surgeons noted that they use telephone or email with patients when suitable.	

addressing surgeons' perceived barriers and improving infrastructure and regulation to support telehealth will help to promote adoption, which carries benefits for patients including reduced travel time and costs, reduced clinic wait times and the ability for patients who are unwell to attend. Many of the barriers identified can potentially be overcome. The key barrier endorsed and mentioned by surgeons was the inability to undertake a physical examination. This can be addressed through having a different health care provider with the patient during a consultation, to allow examination or procedures to take place under the direction of the surgeon. Surgeons' comments highlighted the need for trained staff to assist during teleconsultations. Alternatively, telehealth may be more effective for pre-operative assessment and routine follow-up, and/or in situations where physical examination is not required. Telehealth can also be used to determine which patients require a face-to-face appointment.¹²

While perceptions of barriers are likely to influence whether surgeons use telehealth, our results suggest that many surgeon concerns can be allayed through engaging with telehealth. Issues related to telehealth being difficult to arrange or more time consuming are likely to be lessened or overcome with telehealth set-up and regular use. Engaging in telehealth with patients may also serve to reassure surgeons that they can deliver the same level of care and a satisfactory service for patients. Our findings suggest that this may be the case with concerns about quality of care and convenience and efficiency of telehealth being much less prominent among surgeons who had recently used telehealth with their patients than those who had not. In contrast, technical issues, such as internet problems, are likely to be encountered when telehealth is used, and thus remain a persistent concern. Qualitative comments supported this idea, with surgeons mentioning frequent failures of the technology including poor connections, poor audio or visual quality and time being wasted on trying to trouble shoot technical problems. Re-examining perceived barriers to telehealth use among surgeons following the pandemic offers an opportunity to explore this hypothesis.

Barriers related to technical and reimbursement issues will require broad action from Government and health care systems. For example, reliable internet access for patients and clinicians, and appropriate technology in public hospital systems can only be ensured by Government investment in required infrastructure.¹³ Despite recent advances, issues with technology and internet access still need to be addressed in order to support sustained telehealth use into the future.^{3,8} Issues related to the level of Medicare reimbursement for telehealth, as well as concerns about data security, privacy and medical liability,

also require a response at the Government or regulatory level.

Our findings should be interpreted in the context of the 25% response rate. While the response rate is comparable to previous studies involving surgeons and practitioners^{3,14} results may not be generalisable to all Australian surgeons. Another limitation relates to the definition of telehealth used in the survey. Consistent with most common definitions of telehealth,¹⁵ we limited telehealth to a video-link connection with the patient, excluding telephone consultations (which the new MBS items allow where videoconferencing is unavailable). We also asked about post-operative consultations, whereas telehealth can be used pre-operatively.⁸ Thus, some reported barriers may not apply to pre-operative and telephone-based telehealth.

5 | CONCLUSIONS

Hesitation to use telehealth video link for post-operative consultations prior to the COVID-19 pandemic was linked to surgeons' perceptions about quality of care, convenience and efficiency and technical issues. The current coronavirus has changed the health care landscape significantly, with increased telehealth utilisation and intent for continued utilisation among surgeons. The systemic barriers to telehealth identified both prior to and during the pandemic will need to be addressed to ensure sustainable adoption of telehealth in clinically appropriate outpatient surgical settings.

AUTHOR CONTRIBUTIONS

LM: conceptualisation; methodology; investigation; supervision; funding acquisition; project administration; writing – original draft; writing – review and editing. NN: methodology; software; data curation; investigation; formal analysis project administration; writing – original draft; writing – review and editing. AP: conceptualisation; methodology; resources; writing – review and editing. JJ: methodology; writing – review and editing. GN: investigation; formal analysis; project administration; writing – review and editing. KP: formal analysis; writing – review and editing.

ACKNOWLEDGEMENTS

The authors thank Sam Lawson and Sarah Tew for their tireless assistance with the survey mail out and contacting surgeons and Sandra Dowley for entering the data. We would like to thank the surgeons who generously gave their time to complete this survey. Infrastructure support was provided by the Hunter Medical Research Institute. Dr Lisa Mackenzie is supported by a Postdoctoral Fellowship grant [PF-16-011] from the Australian National Breast

Cancer Foundation. Open access publishing facilitated by The University of Newcastle, as part of the Wiley - The University of Newcastle agreement via the Council of Australian University Librarians.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICAL APPROVAL

Ethics approval was granted by the University of Newcastle HREC (Ref: H-2018-0460).

ORCID

Lisa Mackenzie  <https://orcid.org/0000-0002-1286-5242>

REFERENCES

- Gunter RL, Chouinard S, Fernandes-Taylor S, Wiseman JT, Clarkson S, Bennett K, et al. Current use of telemedicine for post-discharge surgical care: a systematic review. *J Am Coll Surg*. 2016;222:915–27.
- Hwa K, Wren SM. Telehealth follow-up in lieu of postoperative clinic visit for ambulatory surgery: results of a pilot program. *JAMA Surg*. 2013;148:823–7.
- Wiadji E, Mackenzie L, Reeder P, Gani JS, Carroll R, Smith S, et al. Utilization of telehealth by surgeons during the COVID 19 pandemic in Australia: lessons learnt. *ANZ J Surg*. 2021;91:507–14.
- Wade V, Soar J, Gray L. Uptake of telehealth services funded by Medicare in Australia. *Aust Health Rev*. 2014;38:528–32.
- 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.
- Andrews E, Berghofer K, Long J, Prescott A, Caboral-Stevens M. Satisfaction with the use of telehealth during COVID-19: An integrative review. *Int J Nurs Stud Adv*. 2020;2:100008.
- Benjamini Y, Hochberg Y. Controlling the false discovery rate: a practical and powerful approach to multiple testing. *J R Stat Soc B*. 1995;57:289–300.
- Smith S, Jacobsen JH, Tivey D, Babidge W. RACS Advocacy – Review of Telehealth Services in Australia. A rapid review commissioned by RACS. Melbourne, AU: RACS; 2021.
- 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.
- Moffatt J, Eley DS. Barriers to the up-take of telemedicine in Australia—a view from providers. *Rural Remote Health*. 2011;11:1581.
- 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;168:851–8.
- Eichberg DG, Basil GW, Di L, Shah AH, Luther EM, Lu VM, et al. Telemedicine in neurosurgery: lessons learned from a systematic review of the literature for the COVID-19 era and beyond. *Neurosurgery*. 2021;88:E1–E12.
- Jang-Jaccard J, Nepal S, Alem L, Li J. Barriers for delivering telehealth in rural Australia: a review based on Australian trials and studies. *Telemed e-Health*. 2014;20:496–504.
- VanGeest JB, Johnson TP, Welch VL. Methodologies for improving response rates in surveys of physicians: a systematic review. *Eval Health Prof*. 2007;30:303–21.
- Fischer SH, Ray KN, Mehrotra A, Bloom EL, Uscher-Pines L. Prevalence and characteristics of Telehealth utilization in the United States. *JAMA Netw Open*. 2020;3:e2022302.

How to cite this article: Mackenzie L, Noble N, Proietto A, Jones J, Norton G, Palazzi K. Acceptability and feasibility of telehealth outpatient video-link consultations: A national cross-sectional survey of surgeons prior to the COVID-19 pandemic. *Aust J Rural Health*. 2022;00:1–12. <https://doi.org/10.1111/ajr.12940>