


# Patient perceptions of surgical telehealth consultations during the COVID 19 pandemic in Australia: Lessons for future implementation

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## Key words

telemedicine, surgery.

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Accepted for publication 7 June 2021.

doi: 10.1111/ans.17020

## Abstract

**Introduction:** Prior studies of telehealth report high levels of patient satisfaction, but within carefully selected clinical scenarios. The COVID-19 pandemic led to telehealth replacing face-to-face care for many surgical consultations across a variety of situations. More evidence is needed regarding patient perceptions of telehealth in surgery, in particular, exploring barriers and facilitators associated with its sustained implementation beyond the pandemic.

**Methods:** Survey invitations were emailed to a convenience sample of surgical patients by their surgeon following a telehealth consultation during the COVID-19 pandemic. Surgeons were recruited from a sample ( $n = 683$ ) who completed a survey on telehealth (distributed via email to all Australian Fellows of the Royal Australasian College of Surgeons). Mixed methods analysis was performed of the patient survey data.

**Results:** A total of 1166 consultations were captured: 50% routine reviews, 17% initial appointments and 20% post-operative reviews. Video-link was used in 49% of consultations. The majority of patients (94%), were satisfied with the quality of their surgical telehealth consultation and 75% felt it delivered the same level of care as face-to-face encounters. Telehealth was convenient to use (96%) and led to cost savings for 60% of patients. When asked about future appointment preferences after the pandemic, 41% indicated they would prefer telehealth (24% video-link and 17% telephone) over face-to-face appointments. There was a perception by patients that telehealth consultation fees should be less than face-to-face consultation fees.

**Conclusion:** Patient satisfaction with surgical telehealth consultations is high. Barriers to more widespread implementation include financial, clinical appropriateness, technical and confidentiality concerns.

## Introduction

Telehealth has the potential to improve access to care for patients, particularly those in rural or remote locations or those in residential care.<sup>1–4</sup> Prior studies of telehealth have identified high levels of patient satisfaction with the level of care provided and significant advantages for patients in terms of convenience and maintained productivity. These advantages include decreased transport costs, decreased time off work and reduced need for childcare.<sup>5,6</sup>

Prior to the COVID-19 pandemic, studies of patient satisfaction with telehealth have largely addressed specific populations or carefully defined-care scenarios (such as rehabilitation following joint replacement, epilepsy management, respiratory assessment or cardiac risk factor monitoring). Furthermore, in the majority of these studies, the number of patients surveyed has often been small (less than 100).<sup>7</sup> A recent cross-sectional survey of use of telehealth in the post-operative setting by Australian surgeons and obstetricians/gynaecologists was completed in late 2019 and 2020 (prior to the pandemic). Preliminary results indicated that the majority of

specialist respondents had not used telehealth (73%) and that these appointments were perceived to be more labour intensive.<sup>8</sup> This and other studies have also highlighted concerns about the quality of care delivered via telehealth.<sup>9</sup> There is a need for data describing the uptake, barriers and facilitators to telehealth utilisation. This information will inform the permanent integration of telehealth services within Australian healthcare in the post-pandemic era.

Despite our vast geography and recent improved access to communication services, telehealth has been under-utilised in Australia across all branches of medicine but particularly so in surgery.<sup>8,9</sup> The COVID-19 pandemic led to the rapid uptake of telehealth by medical practitioners in Australia.<sup>10</sup> For specialist consultations, Medicare Benefits Schedule (MBS) remuneration was made available for telehealth via either audiovisual link or audio only (telephone) on 13 March 2020. Although initially restricted to those self-isolating due to COVID-19 risk, on 30 March 2020 these telehealth item numbers were expanded to all Australians.<sup>11</sup> At the time of this study, there was ongoing uncertainty surrounding the extension of MBS rebates for telehealth consultations.

This study aimed to evaluate the patient's experience of their surgical telehealth consultation. In addition, we explored factors that may facilitate or hinder the extension of telehealth services beyond the pandemic.

## Methods

### Design

Cross sectional survey.

### Sample

Convenience sample of surgical patients who had experienced a surgical telehealth consultation during the COVID-19 pandemic.

### Procedure

In August 2020, a survey was distributed via a weblink to all members of the Royal Australasian College of Surgeons. This survey assessed surgeons' uptake of telehealth (telephone and video-link), and perceived barriers to sustained telehealth use across a variety of domains including quality of care and clinical appropriateness, technical issues, legal and liability issues. Participating surgeons were invited to distribute a patient-reported outcomes survey to their patients who had participated in a telehealth consultation during the pandemic. Surgeons who opted into this aspect of the study were sent a survey weblink to distribute via email to their patients. This consumer survey aimed to replicate the themes of the surgeons' survey but from the perspective of the patient.

Survey responses were captured utilising the Research Electronic Data Capture (REDCap) database.<sup>12</sup> Although a paper-based survey option was provided no patients participated via this route. The initial weblink was sent to surgeons on 10 August 2020 with a reminder email 2 weeks later. The surgeons survey closed on 30 August 2020 and results have been reported separately.<sup>13</sup> The consumer survey remained open for another month, closing on 30 September 2020.

## Measures

Survey items (see Table S1, Supporting Information) assessed sociodemographic characteristics (age, gender, home postcode); mode of telehealth use (telephone or video-link); speciality of the surgeon they consulted with; and appointment type (initial appointment, review prior to surgery, routine follow-up, review after surgery, so on). Perceptions of telehealth quality care, financial impacts, technical, privacy and convenience issues, and preferences for future telehealth use in the provision of surgical care were assessed using closed and open-ended questions. These survey items were designed with the collaboration of behavioural scientists and in consultation with a number of surgeons across varying surgical specialities and geographic locations. The themes of the survey aligned with the themes of the surgeons' survey and were informed by the available literature.<sup>4-8</sup>

## Statistical analysis

Statistical analyses were performed using SAS v9.4 (SAS Institute, Cary, North Carolina, USA). Descriptive statistics were reported for all relevant variables. Exploratory data analysis included crude chi-squared tests of independence to examine associations between patient age groups, appointment-related costs, distance to the surgeon, quality of care items and acceptability of future telehealth used. Thematic content analysis was undertaken of qualitative data with the assistance of NVivo v12 (QSR International, Victoria, Australia).

## Ethics approval

This study was approved by the Hunter New England Human Research Ethics Committee (2020/ETH01270) and the University of Newcastle Human Research Ethics Committee (H-2020-0327).

## Results

There were 1166 respondents to the survey; 19 of whom did not nominate the subspeciality of the surgeon that they consulted with. The majority of respondents had a consultation with a urologist (79%), were male (79%) and aged 60 or older (74%). Of those patients who had a consultation with a surgeon other than a urologist, 55% were female and only 45% were aged 60 or older. Survey respondents resided in Victoria (79%), South Australia (10%), New South Wales (5%) and Western Australia (4%), with the remaining 2% from other states in Australia. The majority of respondents (69%) lived in one of the 17 major cities of Australia,<sup>14</sup> with 31% dwelling in regional or rural areas.

There were only four (0.3%) respondents who identified as Aboriginal or Torres Strait Islander and the majority of consultations (85%) involved patients with private health insurance seen in private consulting rooms. Only 64 (5.5%) patients identified English as their second language and of these 57 (89%) reported that they did not require an interpreter. A trained health-care interpreter was not used in any of the consultations captured by this survey. More detailed demographics of the participants are outlined in Table 1.

**Table 1** Patient and appointment characteristics

| Variable                  |   | Total<br>(n = 1166)* |
|---------------------------|---|----------------------|
| Gender                    | Male  | 919 (79%)            |
| Age                       | 20 or less  | 6 (0.5%)             |
|                           | 21–29   | 6 (0.5%)             |
|                           | 30–39   | 38 (3.53%)           |
|                           | 40–49   | 64 (5.5%)            |
|                           | 50–59   | 184 (16%)            |
|                           | 60 or older   | 863 (74%)            |
| English as first language |   | 1096 (94%)           |
| Public/private            | Public patient in public hospital outpatient clinic       | 35 (3.2%)            |
|                           | Private patient in public hospital outpatient clinic      | 32 (3.0%)            |
|                           | Public patient seen in private surgical consulting rooms  | 93 (8.6%)            |
|                           | Private patient seen in private surgical consulting rooms | 917 (85%)            |
|                           | Surgical speciality                                       |                      |
|                           | Cardiothoracic surgery                                    | 3 (0.3%)             |
|                           | General surgery   | 111 (10%)            |
|                           | Orthopaedic surgery                                       | 27 (2%)              |
|                           | Neurosurgery  | 28 (2%)              |
|                           | Plastic surgery   | 3 (0.3%)             |
|                           | Paediatric surgery  | 7 (6%)               |
|                           | Urology   | 925 (81%)            |
|                           | Vascular surgery  | 9 (0.8%)             |
|                           | Otolaryngology, head and neck surgery                     | 0                    |
|                           | Other   | 34 (3%)              |
| Distance to the surgeon   | Less than 15 km   | 581 (51%)            |
|                           | 15–49 km  | 260 (23%)            |
|                           | 50–99 km  | 78 (6.8%)            |
|                           | 100–150 km  | 79 (6.9%)            |
|                           | More than 150 km  | 150 (13%)            |

\*In each category there are a small number of missing values.

Out of the 1166 respondents, 570 (49%) consulted with their surgeon via video-link. There was no significant difference in the use of video-link (compared with telephone) consultations between subspecialties. The majority of surgical telehealth consultations in this study were for routine follow-up (585, 50%). Initial appointments and post-operative telehealth consultations accounted for 202 (17%) and 239 (20%), respectively.

### Perceptions of telehealth quality of care

The majority of patients reported that telehealth was convenient (96%) and led to less interruption to their routine (92%). Most patients were satisfied with the quality of their telehealth consultation (94%). There was no significant difference in perceived quality of care between appointment types with 73% of patients undergoing an initial consultation and 77% of patients undergoing either a routine follow-up or post-operative review consultation agreeing that their telehealth consultation provided the same level of care as a face-to-face consultation. Only 23% of patients felt that their telehealth consultation was less thorough due to the lack of a physical examination. There was little difference in these responses between surgical subspecialties, Table 2.

**Table 2** Number and proportion (95% confidence interval [CI]) of patients who agreed or strongly agreed with perceptions of the quality of care during their most recent telehealth surgical consultation (n = 1166)

| Aspect of quality of care  | n (%; 95% CI)      |
|--|--------------------|
| It was convenient to connect with my surgeon via telehealth.   | 1064 (91%; 89–93%) |
| Using telehealth allowed me to attend my appointments with less interruption to my routine.              | 1022 (88%; 86–89%) |
| My surgeon was able to answer my questions clearly and satisfactorily during my telehealth consultation. | 1080 (93%; 91–94%) |
| My telehealth consultation was less thorough because I needed a physical examination.                    | 247 (21%; 19–24%)  |
| I was satisfied with the quality of my telehealth consultation.  | 1041 (89%; 87–91%) |
| My telehealth appointment provided me with the same level of care as a face-to-face consultation.        | 836 (72%; 69–74%)  |

**Table 3** Number and proportion of patients reporting out-of-pocket cost-savings associated with telehealth, by distance to surgeon (N = 1140)\*

| Distance to surgeons | Incurred out-of-pocket cost savings†<br>(n = 685) | Incurred no out-of-pocket cost savings†<br>(n = 455) |
|----------------------|---|--|
| Less than 15 km      | 230 (40%)   | 348 (60%)  |
| 15–49 km             | 174 (68%)   | 83 (32%)   |
| 50–99 km             | 71 (92%)  | 6 (7.8%)   |
| 100–150 km           | 66 (85%)  | 12 (15%)   |
| More than 150 km     | 144 (97%)   | 4 (2.7%)   |

\*26 missing values.

†Incurred costs include, at least one of: Overnight stay in hospital, time off work, time off work for carer, transport and accommodation costs.

### Financial impacts, technical, privacy and convenience issues with telehealth

Potential barriers to telehealth utilisation were also explored. Only 63 (5.5%) patients reported a technical issue when connecting to telehealth. An additional 38 (3%) patients reported requiring assistance to connect to telehealth. Of the technical issues reported, 25% related to an issue with internet connection, 30% to an issue with their device, 3% a software issue and 43% reported an alternative source of technical problems. The majority of respondents (92%) were not concerned about a breach of privacy or confidentiality as a result of telehealth; and 77% of respondents felt their telehealth appointment was value for money.

While the majority of respondents (51%) reported a travel distance of less than 15 km to their surgeon; 13% would have travelled more than 150 km for a face-to-face consultation. Telehealth consultations were associated with out-of-pocket cost savings for 60% of respondents and included savings due to less time off work for themselves (19%) or their carer (1%), transport (49%), accommodation (7%), childcare (1%) and other (2%) costs. Increased distance from the surgeon was highly associated with cost savings,  $p < 0.0001$ , Table 3. Over 90% of patients residing more than 50 km from their surgeon reported cost savings with telehealth

**Table 4** Preference for future use of telehealth, by distance to surgeon and incurred costs ( $n = 1115^a$ )

| Variable                           |   | Preference for telephone/video-link ( $n = 848$ ) | Preference for neither telephone/video-link ( $n = 267$ ) |
|------------------------------------|---|---|---|
| Distance to surgeon<br>$p < 0.001$ | Less than 15 km                         | 405 (72%)   | 154 (28%)   |
|                                    | 15–49 km                                | 185 (73%)   | 68 (27%)  |
|                                    | 50–99 km                                | 63 (84%)  | 12 (16%)  |
|                                    | 100–150 km                              | 60 (77%)  | 18 (23%)  |
|                                    | More than 150 km                        | 126 (89%)   | 15 (11%)  |
| Overall costs<br>$p < 0.0001$      | No cost                                 | 297 (67%)   | 145 (33%)   |
|                                    | At least one incurred cost <sup>b</sup> | 541 (82%)   | 120 (18%)   |

<sup>a</sup>51 missing values.

<sup>b</sup>Incurred costs include, at least one of: Overnight stay in hospital, time off work, time off work for carer, transport and accommodation costs.

compared with 40% of those residing less than 15 km from their surgeon.

### Preferences for future telehealth use in the provision of surgical care

Patients were also asked about preferences for their appointment had COVID-19 restrictions not been in place; 59% expressed a preference for face-to-face consultations, while 24% and 17%, respectively, would prefer a telehealth appointment via video-link or telephone. When asked ‘Would you consider a telehealth appointment with your surgeon in the future?’; only 23% of respondents declined this offer in preference for face-to-face consultations. Telephone consultations would be considered by 34% and video-link consultations by 49%. There was no significant association between these future appointment preferences and the age of the patient. However, a significant association was found between patient’s having a preference for future telehealth use and living an increased distance from the surgeon,  $p = 0.0003$ , and having incurred at least one cost saving through the use of telehealth,  $p < 0.0001$ , Table 4. There was also a significant association between having a preference for future use of telehealth and those who rated their telehealth consultation favourably across all the items assessing convenience and quality of care, all  $p$ ’s  $< 0.0001$ .

Qualitative analysis of free text responses was performed via qualitative thematic analysis. A summary these issues is illustrated in Table 5. Themes were centred around clinical appropriateness, technical issues and financial concerns.

## Discussion

This large, national survey sought to examine the experience of patients who had participated in a surgical consultation via telehealth under COVID-19 provisions. At the time of this survey, there was significant community transmission of COVID-19 in Melbourne and regional Victoria and low levels in NSW. In the rest of Australia, there were very few COVID-19 cases. Social distancing restrictions varied greatly across the country with the most significant lockdown restrictions in Victoria. It is in this context that these survey results should be interpreted.

The surgeons survey was sent as a weblink to the email address of all fellows of the Royal Australasian College of Surgeons. There were 683 (12.3%) complete responses. The majority (85%) of surgeon respondents expressed a desire for continued access to telehealth. Although 77% felt that satisfactory care could be delivered via telehealth in half or more consultations, only 38% of respondents felt that the quality of care was equivalent with a face-to-face consultation.<sup>13</sup> It is interesting to note that respondents of this patient survey rated their telehealth consultations more highly than their treating surgeons with 93% being happy with the quality of their telehealth consultation and 75% rating it as equivalent to a face-to-face consultation. In addition, 85% of respondents would recommend telehealth to their family and friends and 41% expressed a desire for telehealth appointments (instead of face-to-face) after COVID-19 restrictions were lifted. It is possible that these high rates of satisfaction are situational and influenced by the pandemic. It is also likely that the consultations surveyed were subject to selection bias as most surgeons have continued to see a number of patients face-to-face (based on perceived clinical appropriateness) throughout the pandemic. Nevertheless, 76% of respondents indicated in that they would consider future telehealth appointments after the pandemic, including 34% who would consider audio-only (telephone) consultations. The strong association between distance travelled and costs incurred for the patient and their preference for future telehealth is confirmed by this study. It is this group who are most likely to benefit from the convenience of continued access to telehealth as part of their care.

There are many barriers to the widespread, sustained implementation of telehealth beyond the current pandemic. Those highlighted by the survey of surgeons included medicolegal, technical and financial concerns.<sup>13</sup> In contrast to the surgeons’ survey where 42% of surgeon respondents cited concerns regarding patient privacy or confidentiality, only 8% of patient respondents shared these concerns. Issues with technology were relatively uncommon in this study (only 6%). This is a low rate particularly in the context of a predominantly elderly population and relatively high rates of video-link consultations. Nevertheless, there is room for improvement with future telehealth services both in terms of technological reliability and privacy.

**Table 5** Thematic qualitative analysis of free text responses

| Themes                        | Illustrative quotes  |
|-------------------------------|--|
| Positive experience           | <p>Telehealth is a brilliant addition to in person consultations. It should not replace in person consultations but remain an additional service. I do not know how we managed without it!</p> <p>Great way forward – saves patients a lot of time and the quality of care, in my experience, is no different compared to a physical visit. Would prefer this method of consult if appropriate given the health issue involved (I understand there may be situations where a physical consult may be required and this is not an option).</p> <p>We live rurally. Being able to access top level specialist health care without having to travel 4 hours each way is a godsend. Less interruption to our lives and a much speedier turnaround to secure appointment (as visiting consultants might be once a month at best and booked well in advance). When dealing with a cancer diagnosis you want to act as quickly as possible to relieve associated stress. Initial, in-person consult was needed for my husband as a physical examination was required, but after that, the ease of use of video link and access to my husband's surgeon was fantastic.</p> |
| Concerns regarding telehealth | <p>Although everything needed was covered in the telehealth appointment, I felt the need to actually meet the surgeon to establish a relationship conducive to development of the questions on which I later needed reassurance.</p> <p>Personal interaction is obviously not as good as in person. This means that in order to get same level of information/feedback you really need to draw up a list of questions and issues to work through. Do not feel that I extracted everything I should have from the appointment as things move at a faster rate than normal.</p>  |
| Financial                     | <p>The cost of the telehealth consultation should be less than the cost as face-to-face consultation.</p> <p>There is no way that my consultation was as thorough as I would expect given no examination took place. It is convenient for rural people to have such appointments but, I do not see why we have to pay the same amount as a face to face appointment. Certainly good to continue with Telehealth but some revision of pricing is required.</p>  |
| Technical concerns            | <p>Telehealth on computer far too hard to cope with. Telephone call very satisfactorily.</p> <p>Face to face consultation allows for greater spontaneity and conversation than inhibitions caused by the technological intermediary.</p> <p>Previous relationship with surgeon increases utility of telehealth. General familiarity with digital technology increases "comfort" level with telehealth.</p>   |
| Clinical appropriateness      | <p>In my particular circumstances a face to face appointment was not necessary although I would like the ability to attend my physician if an examination is required.</p> <p>Telehealth is fine if the consultation does not require examination or an initial visit.</p>   |

The majority of patient respondents felt that their telehealth consultation was value for money. It is beyond the data available to correlate these levels of satisfaction with out of pocket medical expenses. Data from our prior work suggested that many surgeons bulk-billed the majority of patients for telehealth consultations during the pandemic but that this would not be financially sustainable in the future due to the increased administrative burden associated with this type of consultation.<sup>13</sup> Qualitative responses from this survey suggested that many patients felt that the fee for a telehealth consultation should be less than a face-to-face consultation. This is an interesting finding, as it implies that there is a subconscious perception that telehealth is of lower value than a face-to-face consultation, particularly in light of the out-of-pocket savings incurred by patients with telehealth appointments. The discrepancy between patients' perception of value of care and surgeons' reports of the increased financial burden of telehealth will need to be assessed and addressed if telehealth becomes a fixture in the future provision of care.

Our findings should be interpreted with caution given the use of a convenience sample who are unlikely to be representative of all patients who utilised surgical telehealth consultations during 2020, when COVID-19 restrictions were in place. In addition, patient perceptions of telehealth were measured during the pandemic and care should be taken in extrapolating these results to the post-pandemic era. This survey was distributed to a large sample of patients via their treating surgeon. Surgeons indicated their willingness to distribute the survey by supplying their contact details at the completion of the surgeons' survey. There was no public link available for either survey and no additional methods of recruitment were undertaken. Thus, this distribution method relied upon surgeons or their practice administration staff forwarding the survey links to patients, leading to sampling bias within this study.

The participants are strongly skewed towards elderly, male patients who participated in a urology consultation. There is also a bias towards patients seen in private consulting rooms and this is likely due to the survey being distributed by individual surgeons rather than larger organisations (such as hospital outpatient clinics). Aboriginal and/or Torres Strait Islander and those from culturally and linguistic diverse populations are under-represented in this survey. Nevertheless, with over 1000 respondents, this remains one of the largest surveys of patient satisfaction with telehealth and raises some important issues regarding the future of telehealth services, particularly for specialist outpatient care.

## Conclusion

The COVID-19 pandemic has led to the rapid establishment of telehealth in Australia. This survey suggests high rates of patient satisfaction and a desire for continued access to telehealth beyond the pandemic. However, there was a perception that telehealth consultation fees should be less than a face-to-face consultation. The future success of telehealth services requires attention to quality of care, technical and financial issues.



## Conflict of interest

None declared.

## Author contributions

**Elvina Wiadji:** Data curation; investigation; software; writing-original draft. **Lisa Mackenzie:** Conceptualization; formal analysis; methodology; resources; supervision; writing-review & editing. **Rosemary Carroll:** Methodology; project administration; resources; supervision; writing-review & editing. **Patrick Reeder:** Funding acquisition; methodology; project administration; resources; writing-review & editing. **Sima Ahmadi:** Data curation; formal analysis; validation. **Stephen Smith:** Conceptualization; formal analysis; methodology; resources; supervision; writing-review & editing. **Conceptualization; formal analysis; investigation; methodology; supervision; writing-review & editing. Mark Frydenberg:** Formal analysis; funding acquisition; project administration; resources; writing-review & editing. **Christine O'Neill:** Conceptualization; data curation; formal analysis; funding acquisition; investigation; methodology; project administration; resources; supervision; validation; writing-original draft; writing-review & editing.

## References

1. Davy C, Harfield S, McArthur A. Access to primary health care services for indigenous peoples: a framework synthesis. *Int J Equity Health*. 2016;**15**:163.
2. Bradford NK, Caffery LJ, Smith AC. Telehealth services in rural and remote Australia: a systematic review of models of care and factors influencing success and sustainability. *Rural Remote Health*. 2016;**16**:3808.
3. Jong M, Mendez I, Jong R. Enhancing access to care in northern rural communities via telehealth. *Int J Circumpolar Health*. 2019;**78**:1554174.
4. Bradford NK, Caffery LJ, Smith AC. Awareness, experiences and perceptions of telehealth in a rural Queensland community. *BMC Health Serv Res*. 2015;**15**:427.
5. Orlando JF, Beard M, Kumar S. Systematic review of patient and caregivers' satisfaction with telehealth videoconferencing as a mode of service delivery in managing patients' health. *PLoS One*. 2019;**14**:e0221848.
6. Moffatt JJ, Eley DS. The reported benefits of telehealth for rural Australians. *Aust Health Rev*. 2010;**34**:276–81.
7. Kruse CS, Krowski N, Rodriguez B, et al. Telehealth and patient satisfaction: a systematic review and narrative analysis. *BMJ Open*. 2017 June;**7**:e016242.
8. Mackenzie L, Noble N, Proietto A, Jones J, Sanson-Fisher R. Surgeons' perception on acceptability and feasibility of telehealth outpatient consultations: A national cross-sectional survey. 2019; Unpublished data, Hunter Medical Research Institute, New Lambton Heights, NSW, Australia.
9. Jolly, R. The e-health revolution – easier said than done. Australia: Department of Parliamentary Service; 2011. 57p. Research Paper No. 3.
10. Australian Government -Services Australia [internet]. *Medicare Statistics*. Canberra ACT: Australian Government; 2020 [cited 2020 Nov 19]; [2 screens]. Available from:[http://medicarestatistics.humanservices.gov.au/statistics/mbs\\_item.jsp](http://medicarestatistics.humanservices.gov.au/statistics/mbs_item.jsp).
11. Australian Government- Department of Health [internet]. Canberra ACT: Australian Government; 2020. COVID-19 Temporary MBS Telehealth Services. 2020 March 13 [cited 2020 Nov 19]; [3 screens]. Available from: <http://www.mbsonline.gov.au/internet/mbsonline/publishing.nsf/Content/Factsheet-TempBB>.
12. Harris PA et al. Research electronic data capture (REDCap<sup>®</sup>)-a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform*. 2009 Apr;**42**:377–81.
13. Wiadji E, Mackenzie L, Reeder P, Gani J, Carroll R, Smith S, et al. Telehealth in surgery during COVID-19 pandemic in Australia: lessons learnt. 2020. *ANZ J Surg*. 2021;**91**:507–14.
14. Australian Statistical Geography Standard (ASGS): Volume 5 – Remoteness Structure [internet]. Canberra ACT: Australian Bureau of Statistics; 2016 [updated 2018 Mar 13; cited 2020 Dec 14]. Available from: <https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/1270.0.55.005July%202016?OpenDocument>.

## Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

**Table S1** Patient survey