

Telehealth during the coronavirus disease 2019 pandemic: Rapid expansion of telehealth outpatient use during a pandemic is possible if the programme is previously established

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Abstract

Introduction: The coronavirus disease 2019 (COVID-19) pandemic has significantly impacted the health-care system both in Australia and internationally, and has rapidly transformed the delivery of health care in hospitals and the community. Implementation of social isolation and distancing measures to stop the spread of the disease and to reduce potential harm to patients has necessitated the use of alternate models of health-care delivery. Changes that would normally take months or years have occurred within days to weeks.

Methods: We conducted analysis of outpatient clinic data during the period of the pandemic and compared this to previous telehealth use. We also present the results of clinician and patient telehealth experience surveys.

Results: We describe a 2255% increase in the use of telehealth at a tertiary hospital within a period of six weeks, and a significant simultaneous reduction in the outpatient clinic failure-to-attend rate. The vast majority of patients and clinicians agreed that the standard of care provided by telehealth was the same as that provided by on-site appointments.

Discussion: Telehealth that previously had only limited utilisation has now become a main method for the delivery of outpatient care. Clinicians and patients agreed that consultations provided by telehealth were of the same standard as those provided on site. Health care in the post-pandemic period should embed the use of telehealth for outpatient care and consider the range of other clinical contexts where this can be utilised.

Keywords

Telehealth, COVID-19, telemedicine, pandemic, social distancing

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Introduction

Telehealth using videoconferencing has been an established mode of health-care delivery for clinical consultations for many years but has enjoyed only a limited uptake, both in Australia and internationally.¹

The coronavirus disease 2019 (COVID-19) pandemic of 2020 has necessitated social distancing to reduce the spread of infection. Health-care facilities have addressed this through providing clinical services at a distance where possible. This keeps vulnerable multi-morbid patients at high risk of severe COVID-19 away from hospitals, primary-care clinics² and other patients who may have COVID-19.³ This potentially reduces

the introduction and transmission of COVID-19 to and from hospital patients.

One of the solutions to the need for social distancing is the use of telehealth.⁴ This has been recommended

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and is rapidly being implemented in many parts of the world.^{3,5,6} Telehealth can also allow staff who have to be quarantined to continue working.⁷

Until recently, Australian Medicare funding for telehealth had only been available for regional patients, indigenous patients and those in residential aged care facilities. On 29 March 2020, the Australian government introduced funding for telehealth consultations for all patients and did not impose geographic restrictions. The funding also extended to consultations provided by telephone if the use of telehealth was not possible.⁸ This has contributed to a large increase in the use of telehealth for outpatient clinical consultations.

Telehealth for outpatient care (and Medicare funding) is where a patient and a clinician conduct a consultation and the patient may be at home or, if the visit is with a specialist, supported by their general practitioner (GP). The connection link includes both voice and video occurring concurrently (videoconferencing).

Early telehealth programmes required high-cost stand-alone systems that needed significant investment and had significant costs for ongoing maintenance and usage.⁹ As the cost of devices and connectivity decreased, the use of telehealth increased.^{10,11}

From the onset of the COVID-19 pandemic, the tools for rapid expansion were in place. Most computers and hand-held devices have an inbuilt microphone, speaker and camera, and can be used for telehealth. Internet data speeds have improved to the point that the quality of images viewable over the Internet is routinely of a level suitable for a medical consultation.¹² This was facilitated by costs for both purchasing devices and use of the Internet falling as the speed of data processing increased.¹³ Australian recommendations support expansion of telehealth to improve access to care.¹⁴ The stage was set for rapid expansion, but the impetus was yet to arrive. The COVID-19 pandemic has now provided that impetus for the rapid uptake of this previously underutilised means of health-care provision.

Methods

This study and the patient survey were approved as quality-assurance activities through the Melbourne Health ethics committee (QA2017126 and QA2020070). The demographic and clinic data were collected as part of routine hospital practice. Data were extracted from the hospital's data warehouse using structured query language (SQL). Data were then analysed using R via RStudio (RStudio, Inc., Boston, MA).

Outpatient appointments were considered attended by telehealth if a consultation was commenced. We

included appointments where a synchronous audio and visual connection occurred between clinician and patients. Consultations that were performed by telephone were collated separately to telehealth consultations. Consultations that were not clearly designated as either telehealth or telephone were considered to have occurred on site. Appointments that were cancelled before the day by either the patient or the clinician were not included. The limited number of appointments occurring on weekends and public holidays were excluded.

The survey of patient and clinician experience of telehealth was conducted between November 2018 and March 2020. This was provided as an optional electronic survey with fewer than five questions that were presented to patients and clinicians at the end of the consultation. The satisfaction and experience survey was offered to patients electronically after all telehealth consultations. The clinician survey was offered intermittently to avoid potentially overburdening clinicians who may have been higher users of telehealth.

Results

The hospital implemented a telehealth programme for all outpatients in 2017 and has been using telehealth within some outpatient clinics since 2011. The hospital telehealth programme had only a slow increase in uptake over the two-year period to the start of March 2020.

The utilisation of telehealth rose rapidly throughout the COVID-19 period, with the mean daily number of telehealth appointments rising from 8.30 in February to 195.5 in April, representing an increase of 2255%. This is despite the median total number of daily appointments decreasing from 850.5 in February to 692.5 in April – a decrease of 158 (95% confidence interval (CI) 97.0–174, $p=0.0001$) over the same time period. On-site delivery of appointments decreased from 95% to 29%, with telehealth rising from 1% of all appointments to 28% of all appointments ($p<0.0001$). The remaining 43% of appointments were delivered via telephone. During February 2020, 23 departments within the hospital had at least one telehealth consultation, and this increased to 47 departments during April (Figures 1 and 2). The rapid uptake of telehealth closely matched the increase of new cases in Victoria and the implementation of social-distancing restrictions (Figure 3). The increase in telehealth attendance was accompanied by an increase in clinic attendance rate, with failure-to-attend rates of <10% (Figure 4).

The ages of patients who used telehealth were compared to the ages of those attending outpatient

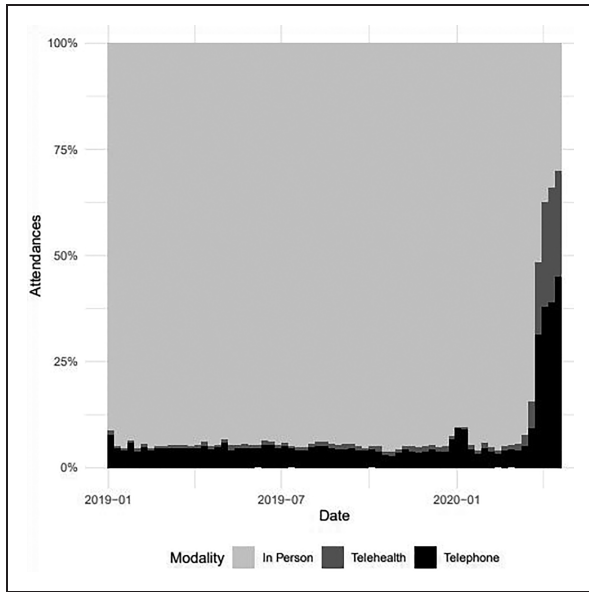


Figure 1. Percentage of weekly outpatient attendances and pattern of telehealth and telephone usage | January 2019–1 May 2020.

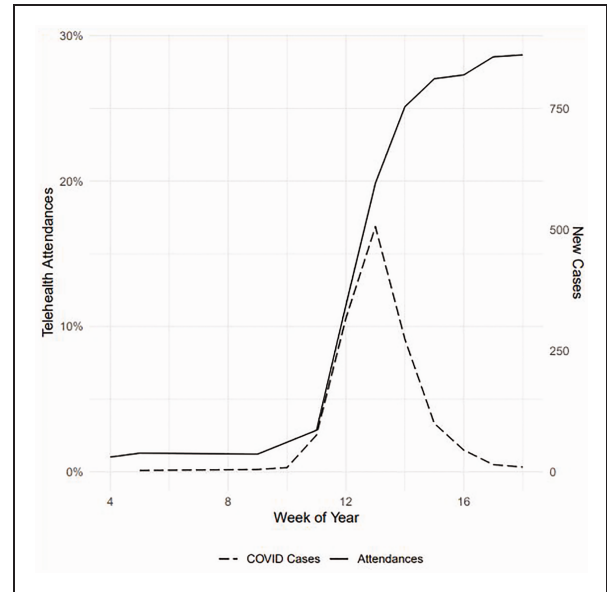


Figure 3. Number of weekly telehealth attendances and coronavirus disease 2019 cases in Victoria.¹⁵

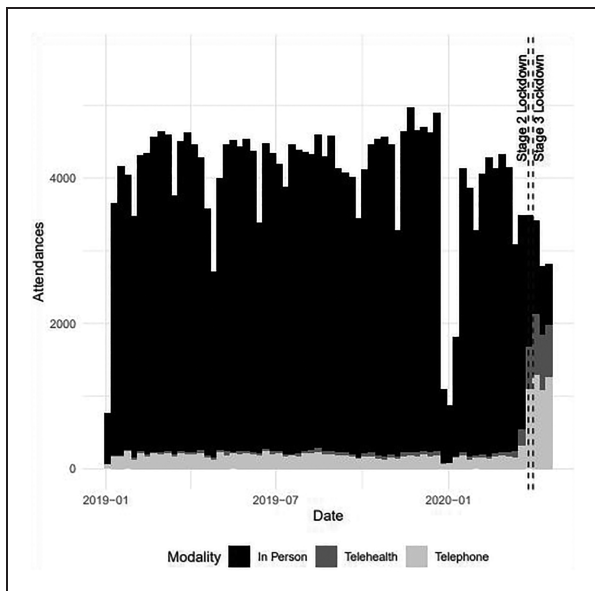


Figure 2. Weekly outpatient attendance, including telehealth and telephone usage with levels of government lockdown included.¹⁵

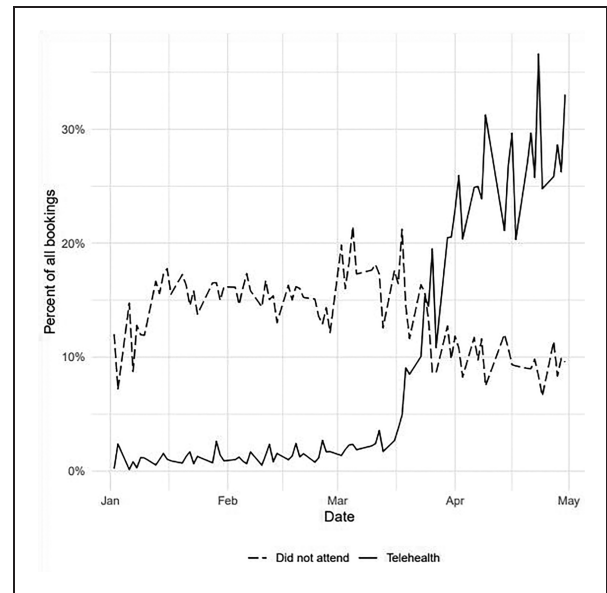


Figure 4. Outpatient failure-to-attend rate compared to percentage of telehealth attendances.

appointments on site during the COVID-19 period. This demonstrated that the mean age of those attending via telehealth was 2.62 years less than those who attended on site (95% CI 1.94–3.31, $p < 0.001$; Figures 5 and 6). The mean age of telehealth patients was 47.6 years, and the mean age of on-site patients was 50.3 years. The oldest patient to use telehealth was 94 years

of age, and 20% of patients were older than 64 years of age.

The patient experience survey was conducted prior to the COVID-19 pandemic, and was collected after 777 separate outpatient telehealth consultations. Patients were at home for 78% of the consultations, with their GP for 8% of consultations, at another health service for 5% of consultations and at work for 5% of consultations. In 52% of consultations, the

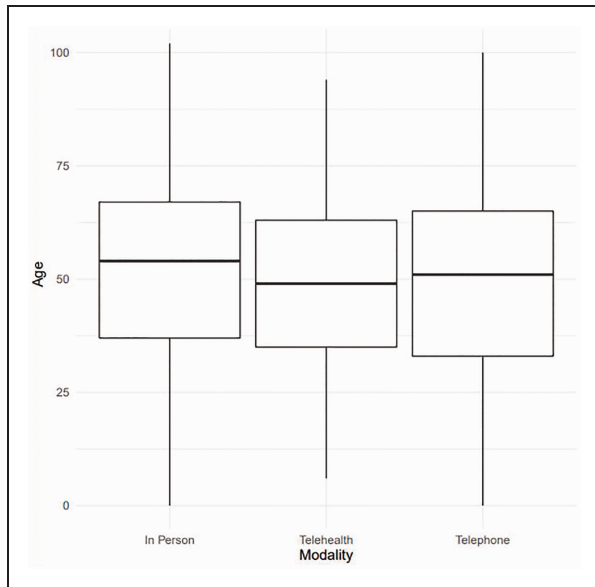


Figure 5. Mean age (with interquartile range) of patients attending, and comparison between modality of attendance.

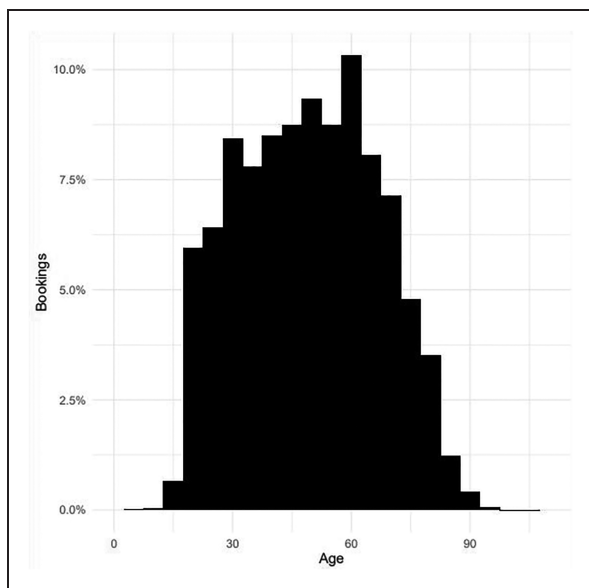


Figure 6. Age of those attending a telehealth appointment.

patient said they would have had to take a day's leave from work if they had attended the consultation on site, and 42% would have required a family member to take time off work for on-site attendance. The vast majority (93%) agreed or strongly agreed that initiating the telehealth consultation was easy, and 93% also thought the standard of care they received was the same as an on-site appointment.

The clinician experience survey was also conducted before COVID-19 and was collected after 838 separate

consultations. The vast majority of clinicians (84%) agreed or strongly agreed that they could provide the same quality of care as an on-site visit. Nearly all (97%) agreed they would use telehealth again, and 95% agreed the software was easy to use.

Discussion

The COVID-19 pandemic has demonstrated how rapidly health-care practice can change when necessary, as long as a baseline programme and infrastructure is present. The move to telehealth has been extraordinary, and the ongoing evaluation of telehealth services in the pandemic era will help shape and design post-pandemic health service delivery. A key to this successful change has been the previously established programme. The pandemic did not require the implementation of new processes, the introduction of new technology systems, the purchase of new equipment or the employment of new human resources, but rather a very significant acceleration in the uptake of use.

In countries such as Italy with a limited telehealth infrastructure and minimal history of telehealth use, a rapid increase in telehealth has not been possible, potentially contributing to ongoing pandemic spread.¹⁶ In Australia, in general practice, the switch away from on-site visits has been largely towards telephone consultations due to the lack of established systems for telehealth within this context.² The rapid move to telehealth that has been described at this hospital is particularly impressive, as it has occurred within a health service that does not have an integrated computer system or electronic health record – factors that are considered enablers for establishing telehealth use.¹⁷

The high attendance rates have been an unexpected benefit of the move to telehealth. Previously, the telehealth literature around attendance rates has been variable, although the hospital experience has been that telehealth attendance rates are slightly higher than on-site appointments. Clinics such as renal transplant, where patients have a long therapeutic relationship with their clinicians and a multidisciplinary team approach, have had very high telehealth attendance rates for many years. This may be in part due to a greater amount of points of contact prior to the appointment acting as a reminder to support attendance.¹⁸

The contribution of 'stay at home' orders is uncertain, as patients may have had fewer competing time demands and a greater level of anxiety about health overall, leading to improved attendance rates across all visit types. Across society, there has been large-scale increased familiarity with videoconferencing during the COVID-19 pandemic. Workplaces are using virtual meetings, families are now connecting

with relatives virtually and virtual connection is occurring in all areas of life. Overall, Internet usage has surged, and technology companies have experienced huge increases in value.¹⁹ This has almost certainly increased confidence with videoconferencing technology amongst the population as a whole.

The mean age of patients using telehealth was significantly lower than that of those attending on site, although only by 2.62 years. The ages of patients who have been using telehealth does show a slightly lower mean age, but also shows a large number of older patients are successfully using this modality. This mean age difference of only 2.62 years and the fact that patients as old as 94 years are using telehealth suggests that older age is not a significant barrier to adoption in this setting. This technology also has the potential to offer the greatest advantage to elderly patients who experience more logistical difficulties when attending on-site appointments.

A previous Australian systematic review of telehealth implementation suggested that the key elements include 'vision, ownership, adaptability, economics, efficiency and equipment',¹⁰ and others have included wider system factors, level of complexity and value proposition as important to successful implementation.²⁰ It can now be added to this that necessity has driven uptake in a way that was only dreamt of prior to this point.²¹

With the implementation of rapid changes, concerns can be raised about the quality of care delivered. For telehealth a significant body of research can reassure us that safe, effective care can be provided, in addition to the recognised benefits in terms of cost effectiveness and patient satisfaction.^{22,23} It is reassuring in the patient experience survey that has been conducted that patients are satisfied with the care they receive, and that they, along with the clinicians, believe this care is comparable to that which is delivered on site.

Recently, studies have demonstrated the clinical effectiveness of telehealth programmes. These have included heart failure management,²⁴ supporting hepatitis C care,^{25,26} diabetes management,²⁷ asthma control²⁸ and stroke care.²⁹ A study of renal patients managed using telehealth identified similar outcomes to on-site management, and patients also had higher rates of clinical attendance.¹⁸ Studies of diabetic foot management have, however, been variable, with studies showing better outcomes with telehealth, but one study showing higher mortality in the telehealth group, without a clear reason being identified.^{30,31}

With new technology, unintended consequences can occur, and the long-term impact of telehealth on doctor-patient relationships remains uncertain.³² An international expert panel has raised a list of possible unintended consequences with telehealth. This includes

the constantly changing technology requiring ongoing training and education, possible provision of clinical care with less than ideal levels of clinical information and the fact that telehealth systems may not link well with other health-care records. These barriers are not insurmountable, but those who are actively using telehealth should be aware of these considerations.³³

Overall, reviews of the clinical effectiveness of telehealth demonstrate there is adequate evidence of benefit, and that efforts should now focus on implementation.³⁴ The next challenge for the hospital telehealth programme is to switch the consultations that are being provided via phone to telehealth. Prior to this pandemic, the use of the phone for clinical consultation would have been considered as less than optimal, and although the evidence in this area is limited, studies of interpreter use have demonstrated more translation errors when using the phone rather than videoconferencing.³⁵ Previously, the most optimistic projections have considered that up to 50% of consultations for rural patients could be delivered by telehealth by 2025.^{21,36} Now it has been demonstrated that more than 70% of outpatient visits can be delivered remotely, including nearly 30% using telehealth, and this can be achieved within a period of only six weeks. For this to be sustained, it will be important that funding structures remain in place and that telehealth remains part of mainstream health provision and not a separate stream of care.^{4,37}

The COVID-19 pandemic has caused significant morbidity and mortality worldwide. However, in Australia, the implementation of social distancing before widespread community transmission has thus far prevented this outcome. The rapid changes in health care that were necessary to achieve this have demonstrated that new models of care can be feasible, effective and scalable. We must evaluate and plan how best to use these innovative care models and telehealth to ensure they have a significant role after the pandemic has passed. The response to COVID-19 has demonstrated telehealth appointments are often preferable for many patients. There are marked efficiencies for both health-care workers and patients, minimising travel and waiting times at hospital clinics, as well as the ability to remain at work or at home. Evaluating the uptake of telehealth and other ambulatory services will be important in the design of the post-pandemic health service.

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