ELDAC

End of Life Directions for Aged Care

Contemporary digital technology-based interventions in Australian primary care - aged care services

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1. Introduction

Historically, the role for digital technology in the aged care sector has tended to focus on improving access to healthcare. For instance, the National Health and Hospitals Reform Commission (2009) recommended "provide improved access to e-health, online and telephonic health advice by older people and their carers". Digital technology has been increasingly promoted as central to the healthcare of older people. The Australian Medical Association (AMA) (2018, p. 2) argued that "aged care sector needs be supported to adopt modern eHealth systems which enable more effective and efficient patient management."

However, despite these arguments the roles in supporting aged care and the extent and impact of digital technology-based interventions remain unclear. This report seeks to establish the extent to which a specific class of remote interaction healthcare interventions supported by digital technology are currently being used, or have recently been newly developed for use, in the care of older people in Australia within the context of the COVID-19 pandemic and the existing Australian aged care system. We place emphasis on those interventions associated with primary care provision, and associated healthcare services such as allied health, rather than outreach from jurisdictional and acute services.

The primary purpose of this investigation was to gain an indication of the extent and range of such interventions and provide a pragmatic commentary on their scope and usage. It was anticipated that this exercise would enable the understanding of some characteristics for success, and drivers for rapid adoption of further digital technology interventions, in the aged care sector. It was also intended that opportunities for development of new interventions could be identified, through the revealing of gaps or shortcomings by the material included in this investigation.

To contextualise this report, in this introductory section we first provide an overview of aspects of the aged care environment which influence and are impacted by health services interventions, including digital technology solutions and the associated changes in service delivery and care models. We then identify the niche domain in which digital technology intersects with aged care, particularly with respect to this technology adoption in response to the COVID-19 pandemic, which has apparently been strongest in

the arena of remote interaction interventions. In the following section of the report we provide a description of issues in using technology in aged care, which act as moderators and in some case blockers for the uptake of new technology solutions. Next, we provide a detailed articulation of the method and results for the main part of the investigation, with findings categorised into 4 types, and a detailed tabulation of intervention examples found for these. Finally, we discuss measures reported at government and corporate levels which have been undertaken or could be undertaken, to enable rapid and widespread adoption of these types of digital technology interventions. The report ends with a brief conclusion.

1.1 The Australian aged care system

The Commonwealth Government Aged Care Act (2013) sets out a number of objectives for aged care including promotion of the wellbeing and independence of older people (and their carers), equitable access to age care, provision of high-quality care to meet individuals' needs, protection of the health and wellbeing of care recipients, and improvement in the integration of aged care services with healthcare services.

The aged care system is large, complex and highly decentralised. According to the Australian Institute of Health and Welfare (AIHW) (2019a) there were 1.2 million people in 2017–18 participating in the aged care system at a total cost to governments of $18.4 billion. The complexity and decentralised nature of the system arises from the number of service providers and the number of different programs administered. According to the AIHW (2019b):

- There were 873 organisations that operated 2,717 services in residential aged care, with an average occupancy rate of 89% across 2018–19.
- 928 organisations that provided home care services at 30 June 2019.
- In 2018–19, 1,458 organisations were funded to provide home support services (https://gen-agedcaredata.gov.au/Topics/Services-and-places-in-aged-care)

At least nine programs fund different aspects of need in aged care including Residential aged care, Home care (Home Care Packages Program), Home support (Commonwealth Home Support Programme), Flexible care (including Transition care and Short-term

restorative care), Multi- purpose services, an Innovative Care Programme, and a National Aboriginal and Torres Strait Islander Flexible Aged Care Program.

The Royal Commission into Aged Care Quality and Safety (Royal Commission) asked in its initial consultation paper how the aged care and health systems could work together to deliver care which "better meets the complex health needs of older people, including dementia care as well as palliative and end of life care" (Royal Commission into Aged Care Quality and Safety, 2019b, p.

25). Many submissions to the commission have commented on this issue. The Older Persons Advocacy Network (2019) pointed out that the lack of integration between acute health, primary health, disability and community services for people with complex health problems and/or disability. The National Advisory Group for Aboriginal and Torres Strait Islander Aged Care (2019) has championed the potential for multipurpose centres to provide greater access to health care.

In a submission to an Inquiry into the Quality of Care in Residential Aged Care Facilities in Australia (2017) the AMA argued that "Medical practitioners need to be recognised and supported as a crucial part of the aged care workforce to improve medical access, care and outcomes for residents of aged care facilities" (Australian Medical Association, 2018, p. 2). Other enquiries into aged care have seen many submissions arguing for better integration of the aged care environment with the primary health and acute care sectors, an increased role for Primary Health Networks (PHNs) (The Senate Community Affairs References Committee, 2019), better coordination between residential aged care, community-based palliative care, hospitals and primary care (Royal Commission into Aged Care Quality and Safety, 2019a). Leading Age Services Australia told the a Senate committee that the "siloed approach to primary health, acute care, aged care and social services needs to be broken down into a person-centred 'ageing well' system" (The Senate Community Affairs References Committee, 2019, p. 81).

1.2 The role for digital technology in aged care

The Royal Commission was established to investigate a broad range of matters in aged care with terms of reference that included the increased use of digital technology by aged care services for "people with disabilities residing in aged care facilities, including younger people; and the increasing number of Australians living with dementia, having regard to the importance of dementia care for the future of aged care services" (Royal Commission into Aged Care Quality and Safety, 2019e). In broad terms the digital technologies used by aged care services fall into two major groups, *communications* technologies such as the telephone, video conferencing, and many forms of messaging, and technologies used to gather and transmit *health information* relevant to the maintenance of the health of older people such as remote monitoring. The Royal Commission (2020) observes these two approaches "have been shown to be viable internationally but have not seen successful adoption at scale for the Australian ageing population" (Royal Commission into Aged Care Quality and Safety, 2020, p. vii). A third group comprising technology supported care using more standalone elements such as robotics, assistive technologies and artificial intelligence services has attracted considerable interest but is currently beyond the scope of this investigation.

Of the multiple programs providing support for older people, only one - the Home Care Packages Program - has explicitly included the use of technology in its services. This program has recently advised service providers that unspent 2019–20 funding can be used to buy up to $1000 worth of personal monitoring technology for vulnerable clients during COVID-19, and that older Australians receiving Home Care Packages can also use their packages to access monitoring services (Australian Government Department of Health, 2020). The other Australian Government program that funds the use of technology in caring for older people is the Medicare Benefits Schedule (MBS) which has listed payments to support remote consultations by a GP or specialists to people in Residential Aged Care Facilities (RACFs). Recently in response to the COVID-19 pandemic, additional MBS payments were added for care planning with RACF residents using telephone or video services. This paucity of support at national level for digital technology use "reflects the wider issue of technology being regarded as an afterthought

to service provision, rather than being embedded as a critical enabler of services and their underpinning systems" (Barnett, 2017, p. 21).

Predictions for the anticipated benefits of using digital technologies in health and aged care are plentiful. For instance, Venture Insights (a research and consulting organisation) states that:

> telemedicine will assist in identification and management of many of health problems experienced by patients. Currently, 42% of the reasons behind GP visits are related to symptoms and communication of complaints. … those issues can be resolved with the help of digital health tools, primarily telemedicine and AI consultations … along with wearables, mobile tracking and online health information, telemedicine provides customers with access to a GP without leaving their home. This is particularly important for people living in remote, rural and regional areas (Venture Insights, 2018).

This report goes beyond simple predictions by examining the underlying issues that influence the use of technology in aged care, particularly telehealth services. Through a review of the grey literature examples are provided of telehealth service supported interventions in Australian aged care. In this investigation telehealth services are defined as a "healthcare activity supported at a distance by information and communication technology service(s)". Based on this examination this report suggests a number of measures that could be taken to support telehealth service use in aged care. Many such measures will require construction of new policies, innovative models of care, investment in the aged care workforce and capital infrastructure as predicated in the Royal Commission terms of reference.

2. Issues in using digital technology in aged care

A recent literature review on behalf of the Aged Care Industry Information Technology Council (ACIITC) found that there are:

> multiple potential barriers that affect the adoption of technology and its integration into core aged care service design and delivery. These occur at different levels – from individual consumers and their supporters, to aged care and health providers, to organisations and system (Barnett, Reynolds, Gordon, Hobbs, & Maeder, 2017, p. 38).

In this investigation, two issues influencing the use of digital technology in the form of remote interaction services in the aged care sector were identified. Firstly, the need to build workforce and client confidence in the use of new practices such as telehealth, and secondly the availability of and access to physical facilities, information technology and communications resources. A common theme within these two issues was a need to develop strategies, policies, standards and regulations that mutually support more effective access to healthcare for older people.

2.1 Confidence

One consequence of the COVID-19 epidemic is that following the legitimisation of telehealth services through the creation of additional MBS items, there has been a huge increase in the use of telephone and video conferencing to undertake remote healthcare consultations. Younger people seem to be using video conferencing technologies for these consultations more than those over 60 years old (Outcome Health, 2020b).. The available data does not indicate if younger people are more confident with video technology or that healthcare personnel are assuming that older people will not wish to use video technology This unknown illustrates the importance of developing the confidence in and use of technologies supporting health services on the part of the workforce and older people, whether they be patients, clients or residents.

2.2 Workforce skills

Rural practices have responded faster in the use of the new MBS telehealth items, perhaps because they have previously been users of telehealth services (Outcome Health, 2020b) which may indicate the importance of confidence and experience in the

use of telehealth services.

On the other hand, the perceived lack of proficiency in the use of digital technology, often termed 'digital literacy' on the part of aged and healthcare workers is seen as inhibiting technology use. The Primary Health Care Research Information Service (PHCRIS) in a 2013 report refers to "problem of poor or absent technology literacy in the aged care community, and suggested that health and digital literacy programs should be introduced concurrently with telehealth service delivery" (Bywood, Raven, & Butler, 2013, p. 15). More recently since there have been calls for

doctors to receive "urgent technology literacy training both in using telehealth technology and in how to develop a rapport with patients when not in the same room with them" (Williamson, 2020).

The Royal Australian College of General Practitioners (RACGP) stated that it was specifically concerned about the workforce issues in residential care where there are:

- An insufficient number, and consistent lack of, nursing and other Residential Aged Care Facilities (RACF) staff available
- Variable training and use of standard clinical communication tools
- Heavy reliance on agency nursing staff
- High staff turnover
- Heavy reliance on staff where English is their second language, which can lead to substandard communication skills (Royal Australian College of General Practitioners, 2019, p. 9).

Concern about the availability of training to develop workforce competencies has been expressed in previous years. The AIHW reported that in 2016 "The aged care workforce remains predominantly female, older, and in good health. It is a well-qualified and trained workforce, with good access to further work-related training. However access to this training was lower than in 2012" (Australian Institute of Health and Welfare, 2016, p. xvii).

The Aged Care Industry Information Technology Council (ACIITC) (2017) provided a series of recommendations pertinent to the acquisition of appropriate skills by the aged and healthcare workforces to support greater use of digital technology, including telehealth services. Some of these workforce recommendations included:

- Design and implement a sector-wide, national Workforce Technology Development Strategy to build capacity to use technologies effectively and integrate these into service processes and systems.
- Re-design of the core aged care workforce structure to operate in a technology-driven world, undertake a series of pilots where technology experts are employed as core (as opposed to outsourced) workforce members, identifying how they are used to greatest effect in building workforce technological readiness and in redesigning care for the benefit of consumers.
- Providing the workforce with increased opportunities for online learning and videoconferencing (with infrastructure to support that, possibly via a dedicatedfund).
- Paid workforce training and learning opportunities designed to enhance digital literacy and the application of technologies to care provision should also be made available to informal carers (summarised from Barnett, 2017, p. 49)

2.3 Older people's skills

In common with many other sectors a large amount of information about aged care services is now available electronically on websites. However the appropriateness of this communication channel has been questioned in submissions to the Royal Commission on the grounds that access to information by older people via a website:

> is unsuitable for the current population of older people who have not grown up with technology and digital services … challenges are compounded for those with cognitive impairment, blindness, literacy or other language issues, those who do not have family or friends to help them, or those outside the range of quality internet, data or mobile connections (Royal Commission into Aged Care Quality

and Safety, 2019c, p. 135)

These sentiments were echoed by other submissions (Multicultural Communities Council of SA, 2019) and the Australian Nursing and Midwifery Federation (2019) which also expressed the view that some older people prefer face-to-face interactions.

On the other hand, the Royal Commission noted that it was "also not beyond the capacity of older people to learn to use technology" (Royal Commission into Aged Care Quality and Safety, 2019c,
p. 135). Relationships Australia also highlighted the importance of social contact and the "potential for use of technology in meeting these needs (e.g. enabling Skype conversations between residents and friends or family who are physically remote)" (Relationships Australia, 2019, p. 12).

Contemporary experiences seem to be supporting this second view. It was reported that "one in five older Australians used a new technology for the first time during the pandemic and almost one in three increased their social media use" (Skatssoon, 2019). Price Waterhouse Coopers (2019) have further reported that:

> there is growing recognition of the importance for them to be active participants in the modern, digital world. In YourLink's work with seniors we have found that once they get a taste, they are curious and energised to learn more. This has been consistent whether through our learning sessions or 1:1 as they learn to use through hand-me-down devices from children and grandchildren (Price Waterhouse Coopers, 2019, p. 5).

The evidence is increasing that older people are using telehealth services. A survey conducted during the COVID-19 pandemic for the National Broadband network found "The number of over 65s accessing telehealth services doubled from 1 in 8 (13%) to 1 in 4 (27%)" (National Broadband Network, 2020). An online survey by the Global Centre for Modern Ageing of 1,242 adults in May 2020 found that for older Australian, 85% said that the "quality of care/treatment was the same or better than normal"(Global Centre

for Modern Ageing, 2020, p. 5), although 38% experienced some concerns or difficulties using telehealth such as lack of body language, awkwardness or hearing. Previously, in 2018 when the Office of the eSafety Commissioner surveyed the digital behaviours of older Australians it was concluded that:

> many older Australians are interested in developing and acquiring new digital skills. However, understanding and learning the 'in and outs' of digital devices and the internet can be intimidating, and asking for assistance or guidance can be daunting. Many older Australians have real concerns about the safety of the internet and want to understand how digital participation can improve their lives. These factors, in combination, pose a real barrier to building digital confidence. Older Australians, particularly those aged 70 years and over, with limited or no experience in using digital devices, have identified that face-to face learning is the preferred option for building digital skills and confidence (Australian Government, Office of the eSafety Commissioner, 2018, p. 3)

This survey found that among Australians over 50 years old:

- 26% performed online activities no more than once a month.
- 8% were non-internet users who never perform online activities.
- 75% of the digitally disengaged group were aged 70 years and over.
- 72% preferred offline training methods in the use of digital devices and the internet (Australian Government, Office of the eSafety Commissioner, 2018).

Regardless of current digital literacy levels, "50% of all respondents mentioned they wanted to use the internet more and said they would be more likely to use the internet if certain barriers around access, knowledge about devices and learning how to do things online were addressed" (Australian Government, Office of the eSafety Commissioner, 2018). The view that older people can apply technology in healthcare activities was reinforced in a report prepared for the Royal Commission by Flinders University:

> Using technology to enable individuals to have greater control over their health can be achieved by cooperation in remote monitoring of health conditions or in the use of mobile apps for managing day-to-day health care needs. This approach can also help in addressing issues of loneliness and social isolation. The use of web or mobile delivery mechanisms for chronic disease management and associated behaviour change programs is seen as a particularly promising avenue, but again may be limited by computer literacy and socioeconomic factors (Royal Commission into Aged Care Quality and Safety, 2020, p. 40)

Feros Care have found that online training can be provided successfully to older people to help them manage chronic conditions. Feros Care developed GoShare videos and animations keep clients engaged during the 1:1 hour-long sessions with their Telehealth Nurse to share current information on chronic aged care conditions and improve health literacy (Healthily, 2020).

2.4 Resources for aged care

While it could be anticipated that telehealth services could increase access to health care, especially for people in residential care, in practice there are structural issues that are limiting the use of these services for primary care. The availability of physical infrastructure and access to information and communication technologies are manifestations of these issues.

2.4.1 Physical infrastructure

In 2019 the RACGP was expressing concern over access for GPs to facilities suitable to conduct face-to face consultations in residential facilities. According to the RACGP:

The significant lack of appropriate infrastructure in RACFs is another barrier for GPs attending and appropriately consulting elderly people. Key barriers around infrastructure include:

- lack of dedicated consultation rooms
- variable access to appropriate equipment (e.g. adequate lighting to undertake

examinations)

- medical records that are held or shared in different locations (e.g. practice-based and RACF-based records) (Royal Australian College of General Practitioners, 2019, p.6).

Access to suitable facilities to conduct consultations is also a problem for remote consultations using telehealth services because the facility resident usually needs to be taken to a private room where a telephone or video consultation can take place.

2.4.2 Information systems

In 2009 the National Health and Hospitals Reform Commission identified the need to provide "improved access to e-health, online and telephonic health advice by older people and their carers" (National Health and Hospitals Reform Commission, 2009) . This aspiration requires that greater levels of interoperability and conformity should exist than at present, and a more universal approach to data governance should be adopted.

For example, when discussing e-health, the RACGP currently advises GP practices that they should "maintain control of patient medical notes, and one of the key challenges to working in an RACF is the sharing of information. One solution to this problem is to copy and paste medical notes from the GP's electronic health record into the RACF's software" (Royal Australian College of General Practitioners, 2018, p. 3). In contrast, the AMA has stated that ehealth systems should "enable the transfer of information across health care systems (e.g. electronic referrals, letters or discharge summaries, and advanced care plans), investigation management (e.g. the ordering, tracking, receipt and action of pathology and imaging tests and results), and medication management" (Australian Medical Association, 2017, p. 9).

Exchange of health information between aged residential facilities and primary care services remains a problem in 2020. The Royal Commission heard evidence that many transfers from residential aged care facilities to emergency departments occurred because of "lack of access to patient aged care records, difficulties accessing specialist

services, limited eHealth technology and a lack of appropriate clinical treatment rooms" (Royal Commission into Aged Care Quality and Safety, 2019d, p. 20).

2.4.3 Communications infrastructure

Communications infrastructure also remains a problem, even after the roll out of the National Broadband network. In the absence of national data sets, anecdotal information indicates that health professionals continue to experience problems with internet connectivity including within aged care facilities and nursing homes. The difficulties in connecting to the internet within many residential facilities appear to include:

- overly strict network connection policies, rules, procedures;
- insufficient bandwidth when the facility has purchased a low-speed link that's shared among many residents; and
- weak Wi-Fi where the facility's access points are too far from where the user is.

2.4.4 Access to devices

Access to information and communications technology infrastructure remains a problem in residential facilities. According to Jiang, Yu, Hailey, Ma, and Yang (2016) "of the 2,754 RAC homes audited, 1,031 (37.4%) used an electronic health record system for client health and personal care information management and 1,723 (62.6%) used only paper records. Access to other digital devices by older people varies by age. The Office of the eSafety Commissioner (2018) reported that:

- 71% of people over 50 years old have access to a smart phone, but this dropped to 57% for those aged 70–79 and 34% for those aged 80 years and older.
- Approximately 9% of the population aged 50 years and over did not have access to any digital device.
- For residents of care facilities access to the internet may be a particular problem because among the general population 11% of the population aged 50 years and over did not have any form of internet access and they were likely to

be aged 70 years and above (of which a significant proportion would be in residential aged care).

3. Examples of digital technology supported interventions

This investigation concentrated on digital technology interventions concerned with remote delivery of health services which involved interaction between a health professional and an aged care consumer, by using some form of telecommunications mechanism and associated control and data management tools. A number of interventions in aged care have been identified as being supported by such telehealth (and in some cases also by other related broader digital health) services and products. Many of these interventions have existed at a small scale for some time; others are at an early stage of development. These interventions all address (to a greater or lesser extent) perceived problems in the care and support of elderly people that have been discussed previously above.

The method used was a rapid review based on public media and literature, primarily grey literature (magazine articles, websites), and a few recently published academic articles. This method was chosen mainly due to the absence of comprehensive academic literature on this topic, as the pandemic has been a very recent event compared with the timescale of research studies and peer review publication appearance. As a source of description and pragmatic commentary on interventions, the chosen target sources were seen as the best option for locating current information on telehealth applications of digital technology in aged care. The search cut-off date for the study was nominally 15 June 2020: the short study period available for the investigation also necessitated the use of rapid methodology.

The search strategy consisted of three arms. First a Google search for items that referred to (Aged care AND (Telehealth OR Telecare OR Telemedicine)) was performed, and the Google search returns were scanned for relevant Australian examples. Second, scanning searches were performed over the timeline of interest (since Dec 2019) of ICT and aged care industry online publications and websites such as Australian Ageing Agenda,

Community Care Review, HelloCare, and Pulse+IT, with chaining of links of interest provided by those sources. Third, citation snowballing was undertaken from recent relevant government sources including submission documents and reports (e.g. Royal Commission into Aged Care Quality and Safety), and some academic articles. Generally items published prior to the past three years were excluded in this arm, but a few relevant earlier reports were considered ad hoc.

Decisions on inclusions were made by one expert reviewer (the first author) and the resulting summary of those was checked by the other two authors. A major limitation of this search strategy was that programs and services which had not publicised themselves or did not describe their program as telehealth, telecare or telemedicine service, were not captured. Given the large volume of exposure that has been given to the use of health technology during the pandemic, this was deemed an acceptable limitation. It was also decided not to try and analyse social media feeds such as Twitter and Linkedin, because of the large amount of "noise" clutter that would need to be eliminated, and because most information of value appearing in those sources tends to be repeated or re-presented in edited media and would be expected to be captured in the second arm. Consequently the results of this investigation should be regarded as more representative than comprehensive, and may have excluded some other types of digital technology based services that have been made available to support older people.

Thematic analysis of the search results found four major classifications of digital technology supported telehealth use in the aged care sector:

- remote healthcare consultations,
- remote monitoring of the health state of people,
- support for the independent living of older people,
- communications with older people and between their carers.

The results classified according to each of the four themes are presented in Tables 1 to 4 and discussed in further detail below.

3.1 Remote consultations

The Royal Commission (2019b) suggested that developing in-reach multidisciplinary health teams and improving the uptake of existing in-reach services from the health system for the care of older people could include:

- embedded escalation to specialists,
- access to relevant ageing specialists,
- use of telehealth services or other technological advances

To date the major digital technology-based intervention in aged care has been the application of communications technologies to support health consultations funded by the MBS. Consultations with specialists, supported by GPs have been the initial focus, although in a few cases GPs have been able to undertake primary healthcare activities with residents in residential care. Use of these technologies occurred in less than 1% of consultations prior to the COVID-19 epidemic. At the peak of the epidemic in Australia during April 2020, about 40% of consultations were provided using the recently new items in the MBS enable health professionals to arrange telephone of video consultations direct to people at home (Snoswell et al, 2020).

Examination of early MBS data by Outcome Health showed that people over 60 years have received 240,000 consultations in 2020, compared with 500,000 face to face consultations for all age groups. Only 9,000 consultations to this older age group used video conferencing, which perhaps reflects the lower availability of this technology and other factors important to this age group. Using information from a number of general practices in south-eastern Australia following the introduction of MBS telehealth items, indicates that the highest usage rates of telephone or video conferencing were for Mental Health, Alcohol and Other Drug, Dementia or Alzheimer's Disease, with the Dementia and Alzheimer's disease groupings showing the highest video conferencing numbers (Outcome Health, 2020a).

While the majority of these GP consultations have used the telephone, Outcome Health recommended remote consultations should become part of mainstream practice with a target of 50% of telehealth consultations using video by 2021, but acknowledged that "social determinants will impact on uptake across all cohorts and we encourage evaluation of this increase to carefully consider the health implications of the digital divide" (Outcome Health, 2020a, p. 4)

Aged care assessments are an example of consultations that can be performed using video conferencing. However many clinical services have been provided in this way for several years. Bywood et al (2013) noted that "other services such as ophthalmology, renal medicine, and wound management would also have been provided to elderly people, but were not identified … as geriatric services" (Bywood et al., 2013, p. 15). Another clinical service that can be provided using video conferencing is medication management. According to Gray and Peel (2019) medication management by pharmacists or specialists, "should be synchronised to ensure the best results" (Gray & Peel, 2019, p. 3), which is easily achieved using video conferencing.

Table 1 provides 16 examples where telephone or video conferencing technologies are being used to support primary health care in the aged care sector, specialist consultations, aged specific interventions, such as medication management and assessments, allied healthcare such as nutrition, rehabilitation and also dentistry services. The majority of providers are healthcare organisations, but some providers come from a technology background, and while coverage of many providers is limited to specific Australian states, several provide national coverage.

Table 1. Examples of remote consultations in aged care

Context	Technology	Intervention	Provider type	Coverage
Residential care	Video consultations	Comprehensive geriatric assessments	Healthcare provider (Melbourne Geriatricians Group)[1]	Australia wide.
Residential care	Video consultations	Comprehensive geriatric assessments	Healthcare provider (Aged Care Specialist Medical Service)[2]	Australia wide.

Rural residential care	Video consultations	Specialists consultation, indigenous patients and GPs	Healthcare provider (Access Telehealth)[3]	Australia wide
Home care	Video consultations	Specialists consultation, indigenous patients and GPs	Healthcare provider (Telecare Australia)[4]	Australia wide.
Residential	Video conferencing systems	Primary and specialist care	Technology provider (Telehealthnetworks)[5]	Australia wide
Residential care	Video consultations	Rehabilitation and geriatrics	Healthcare provider (University of Queensland)[6]	Queensland
Residential care	Video and telephone consultations	Primary health care	Healthcare provider (Aged Care GP)[7]	Victoria
Residential care	Video and telephone consultations	Gerontology, rehabilitation and aged care assessments	Healthcare provider (West Wimmera Health Service)[8]	Victoria
Residential and primary care	Video and telephone consultations	Aged care reviews	Healthcare provider (Darling Downs and West Moreton PHN)[9]	Queensland
Residential care	Video consultations	Hospital specialist outreach	Aged care provider (Anglican Care)[10]	NSW
Residential care	Telephone consultations	Aged Care Emergency	Healthcare provider (ACE) program (Western NSW PHN)[11]	NSW
Residential care	Video consultations	Primary and allied health care	Healthcare provider (Hunter New England Central Coast PHN)[12]	NSW
Residential care	Video consultations	Dentistry	Healthcare provider (Melbourne Dental School)[13]	Victoria
Residential care	Video consultations	Dentistry	Healthcare provider (Downs Hospital and Health Service)[14]	Queensland
Residential care	Video consultations	Nutrition	Healthcare provider (Dial-a-Dietitian)[15]	Australia
Home care	Telephone	Check-up call	Healthcare provider (Red Cross)[16]	Australia wide

3.2 Remote monitoring

The second major digital technology-based intervention, largely un-funded by government, is remote monitoring of health conditions and communications with older people and between their carers, which enables older people with chronic diseases and other conditions to live independently in their home and outside of hospital. Application of remote monitoring is not new. Successful programs and trials have been undertaken for many years (Davis, Morgans, & Stewart, 2016; Jankowski, Schönijahn, & Wahl, 2017). The pilot by Feros Care (2014) of 'My Health Clinic at Home' identified 19 clients who may have avoided hospital admission; six clients whose length of hospital stay may have been reduced; and 53 clients who changed their medication as a result of their participation, and has been extended across all of that organisations facilities. While remote monitoring has been shown to be a useful intervention it is not yet a mainstream component of aged care. For remote monitoring to become mainstream would:

> involve changes to current Health Care and Aged Care funding models, guidelines and service models to ensure telehealth and emerging technologies are considered a standard service option available to clients and patients in all community care programs (e.g. for Home Support, Care Packages, Hospital in the Home, Chronic Disease Management, Early Discharge, Palliative Care, Transitional Care and ComPacks programs) (Feros Care, 2014, p. 16).

Table 2 shows 9 examples where remote monitoring technologies are being used to support healthcare in the homes of older people through the use of medical vital signs monitoring and associated communications. Providers are mainly healthcare organisations, although technology providers such as Tunstall may provide technology and support services directly to people or via healthcare organisations.

Table 2. Examples of the use of remote monitoring

Context	Technology	Intervention	Provider type	Coverage
Residential care and home care	Monitoring systems and devices	Support of independent living	Care services provider (Integrated Living)[17]	Australia wide
Residential care and home care	Monitoring systems and devices	Support of independent living	Health technology provider (Tunstall)[18]	Australia wide
Residential care	COVID-19 screening app	Support pandemic care	Health technology provider (Tunstall)[19]	Australia wide
Residential and primary care	Vital signs monitoring	Primary and home care	Aged care provider (Catholic Healthcare)[20]	Australia wide
Residential	Vital signs monitoring devices	Primary and home care	Aged care provider (Feros Care)[21]	East coast of Australia
Home care	Vital signs monitoring devices	Randomised control trial	Research organisation (CSIRO)[22]	Australia wide
Residential	Vital signs monitoring devices	Primary and home care	Aged care provider (The INS Group)[23]	Australia wide
Home care	Vital signs monitoring devices for COVID- 19	Home care	Healthcare provider (Bendigo Health)[24]	Victoria
Home care	Vital signs monitoring devices for COVID- 19	Home care	Healthcare provider (Royal Melbourne Hospital)[25]	Victoria

3.3 Independent living support

A third area in which digital technologies have been actively used in the aged care sector is in the support of persons living independently, in home or community settings.

The Royal Commission (2019b, 2020) has suggested that information and communications technologies can support:

- access to 24/7 on-call services,
- coordination of self-care and home care;
- cooperation of older people in remote monitoring of their health conditions;
- reduction of loneliness and social isolation;
- better access to health care and integration of care for older people less able to travel for services; and
- independent living for individuals who are ageing in place under the supervision of informal or formal carers.

Several studies concerning independent living, and reduction of social isolation have been undertaken, the most recent and relevant to the Australian context being:

- (Noone et al., 2020): Hypothesised that video calling reduces social isolation and found that the evidence was uncertain.
- (Barnett et al., 2017): Argued that the use of information technology in general reduces social isolation, and found mixed results.
- (Feros Care, 2014): Tested if an integrated health care platform (including video calling) would improve quality of life and found strong evidence to suggest reduced social isolation.
- (Valenzuela, Okubo, Woodbury, Lord, & Delbaere, 2018): Examined adherence to technology-based exercise programs promoting physical activity to also prevent falls, and found that good adherence to programs may reduce falls.

A study of the role for technology in the Australian aged care sector (Barnett et al., 2017) focussed on the use of technology for managing chronic health conditions, supporting independent living, including falls prevention and management, reducing social isolation, reducing depression and enhancing wellbeing, supporting people with dementia, supporting family care givers, robotics and smart homes to support independent living. Many technologies can be employed for these purposes. In some instances, multiple technologies have been packaged into one integrated program. For instance, the Feros Care 'Staying Healthy Living Well' program is designed to support the health and wellbeing, and chronic disease management of seniors over the age of 70 years of age, provides a twelve-week program including group education sessions using online coaching with a Telehealth Nurse and vital signs monitoring in collaboration with GPs, based around patient care plans (Healthily, 2020). In many other cases technologies serve a single purpose, predominantly provision of alarm services which may or may not include audio or video interaction. While these types of systems have been in the market for some time, reliance on them during the COVID-19 pandemic has increased due to the higher proportion of older people maintaining self-isolation, or being subject to quarantine controls in aged care settings.

Table 3 provides 6 examples where devices and communications that provide alarm services to ensure the safety of older people in their homes. Providers are technology companies such as ASCOM and aged care organisations such as Silverchain.

Table 3. Independent living services for older people

Context	Technology	Intervention	Provider type	Coverage
Home care	Personal devices	Alarm services supporting independent living	Health technology provider (ASCOM)[26]	Australia wide
Residential care	Pendant and mobile communications	Respiratory monitoring alarms supporting independent living	Aged care provider (Silverchain)[27]	Australia wide
Residential care	Pendant and mobile communications	Alarm services supporting independent living	Aged care provider (Calvary Health)[28]	NSW, ACT, SA
Residential care	Pendant and mobile communications	Alarm services supporting independent living	Aged care provider (Jubilee Community Care)[29]	Queensland
Home care	Computer based hearing aids and configuration	Supply and configuration of hearing aids	Technology provider (Blamey Saunders)[30]	Australia wide
Residential care	Monitored power outlets (Umps)	Alarm services supporting independent living	Aged care provider (Villa Maria Catholic Homes)[31]	Australia wide

While many companies offer digital technology-based human intercommunications and social interaction solutions as consumer services, including embedded functions such as social media or entertainment streaming, there are relatively few products for dedicated care team interaction.

One reason for this is the need to achieve interoperability between potentially several different software systems already adopted for independent use by each of the cooperating parties.

Another reason is that the business model involves a number of parties cooperating in a shared ecosystem which requires controls over sensitive aspects such as billing, scheduling and information privacy. This requires adoption of underlying standardised information exchange and control protocols, with associated impacts on complexity and expense (Lyons, 2017).

Table 4 shows 7 examples where communications technologies are being used to support independent living by older people by connecting carers or families with the older person with the intent of reducing social and ensuring their safety. Providers are technology start-ups such as Konnect (video phones) and aged care organisations such as Bolton Clarke.

Table 4. Communications technologies supporting independent living and home care

Context	Technology	Intervention	Provider type	Coverage
Residential care	Smart phone app and COVID-19 adapted version (Checked in Care)	Home care	Aged care provider (IRT Group)[32]	ACT and South East Queensland
Residential care	Voice connected devices (Google Assistant)	Supporting independent living	Aged care provider (Feros Care)[33]	East coast of Australia
Residential care	Video communications and iPads (Microsoft Teams)	Supporting independent living	Aged care provider (Bolton Clarke)[34]	Queensland
Residential and home care	Video communications and captioning	Supporting independent living	Technology provider (Konnekt)[35]	Australia
Home care	Video communications and iPads	Supporting independent living during COVID-19	Health technology provider (Lumin)[36]	Australia
Residential care	Communications systems and devices (ASCOM)	Supporting independent living	Aged care provider (Anglicare)[37]	South Australia
Residential and home care	Communications and management software	Supporting independent living	Health technology provider (Carevision)[38]	Australia
Residential care	Video communications and iPads	Supporting independent living during COVID-19 epidemic	Aged care provider (Life Care)[39]	South Australia
Residential care	Video communications	Supporting independent living during COVID-19 epidemic	Aged care provider (Catholic Care)[40]	New South Wales

4. Enabling of digital technology supported interventions

Governments have a major role to play in setting legislation, funding and regulations as enabling mechanisms for major practice changes in health care. At the beginning of the Federal government response to the COVID-19 epidemic Minister Hunt was reported as saying “everything that can be done by telehealth, will be done by telehealth” (Williamson, 2020) during a press conference.

Earlier, in 2019 the Royal Commission into Aged Care Quality and Safety terms of reference authorised an enquiry into several related matters including:

- what the Australian Government, aged care industry, Australian families and the wider community can do to strengthen the system of aged care services to ensure that the services provided are of high quality and safe;
- how best to deliver aged care services in a sustainable way, including through innovative models of care, increased use of technology, and investment in the aged care workforce and capital infrastructure (Royal Commission into Aged Care Quality and Safety, 2019e).

Some relevant commentary has appeared on these matters, within the overall mass of COVID-19 response dialogue, which is particularly pertinent to digital technology adoption.

4.1 Coordinating digital technology supported interventions

While governments have a clear role in introducing supportive measures to enable technology supported interventions in aged care, the measures that the aged care industry and the wider community could contribute are less obvious. In part this uncertainty stems from the complexity and diversity of the aged care sector and its relationships with primary and acute healthcare. For instance, it can be argued the role of acute health care in preventing unnecessary hospital admissions depends on improving the capacity of home care and residential aged care programs to manage chronic conditions of people living at home and in residential care. End of life care requires a different approach to the use of technology than chronic disease

management. Support for younger people with disabilities using independent living services demands a different design of technology compared with technologies that can be adopted by older people who may have less familiarity with contemporary information and communications devices. Allied health services such as rehabilitation have unique requirements in their application of technology to support therapy at a distance.

The measures that are proposed in subsequent sections should therefore be regarded as 'broad brush' initiatives that will require customisation for particular programs, clients and patient cohorts. This customisation will also need to take account of how existing programs operate and relate to each other. Transition care is a case in point where acute care, residential and home care services need to collaborate to provide the person centred care needed to maintain the health and quality of life of people who have experienced an acute care episode.

The measures proposed focus on the issues outlined in section 2 of this report which can encourage the adoption at scale of the technology supported interventions identified in section 3 for the Australian ageing population. These measures comprise initiatives that will build confidence in practices using telehealth services and invest in resources for these services. For telehealth services to be adopted at scale in the diverse landscape of aged care will also require corresponding changes to policies and models of care.

4.2 Building confidence in the use of telehealth services

The development of confidence is inextricably bound to the existence of trust. The Royal Commission (2019c) heard from one witness that telehealth services currently do not work well owing to "the need for relationships of trust" (Royal Commission into Aged Care Quality and Safety, 2019c, p. 186). The strength of trusting relationships differs across different cultural contexts whether age or community related. A submission to the Royal Commission from Multicultural Aged Care Inc (2019) suggested that "so much of the technology that is taken for granted in the daily life of the mainstream population is not part of the daily experience of CALD people (Multicultural Aged Care Inc, 2019, p. 4) and another submission from the Congress of Aboriginal and Torres Strait Islander

Nurses and Midwives (2019) argued that "There needs to be a focus on decreasing the role of technology because it incrementally diminishes human to human feeling" (Congress of Aboriginal and Torres Strait Islander Nurses and Midwives, 2019, p. 10).

4.2.1 The need for collaboration

These observations suggest that the first step to building confidence in the use of telehealth services is the establishment of trustful relationships though collaboration, and partnerships between organisational stakeholders or colleagues and strengthening relationships between health and aged care providers and older clients or residents. For instance, Feros Care found that one of the factors limiting the effectiveness of telehealth services was poor levels of health service provider engagement (Feros Care, 2014). The need for collaboration and partnerships between providers is highlighted by the ACIITC conclusion that the "adoption by aged care providers of technologies that support aged care and enhanced quality of life has been patchy, dependent on the willingness of individual providers to engage with technology… in the absence of leadership by aged care policy makers" (Barnett, 2017, p. 31).

4.2.2 Building clinical frameworks

One measure that can support trust and confidence in new services is the existence of standards, guidelines, codes protocols or clinical governance frameworks. Outcome Health (2020a), when analysing the growth in the use of telehealth services during the response to the COVID-19 epidemic, argued there is:

> pressing need for clinical governance frameworks that consider the quality and safety issues related to the use of telehealth ... (because) … while respiratory effort may be well assessed over a video link, there is other sensory evidence lost (the smell of a patient's breath, their ease of movement, and other key critical diagnostic elements) in this mode. How do practitioners mitigate these risks currently? (Outcome Health, 2020a, p. 10).

Another element to building confidence in the use of technology is that healthcare practices need to rethink workflows and their associated protocols. For instance, "given

the move to telephone rather than a digitised workflow there have been flow on effects to work practices that such as pathology and radiology ordering, that still have largely paper based workflows" (Outcome Health, 2020b, p. 10).

4.2.3 Improving digital literacy

Additionally, the interaction between users and technological tools contribute to the building of confidence in technology, improving or maintaining digital literacies. Feros Care observed that "technology is not a barrier to the use of telehealth for older people when it has a user-friendly interface and appropriate support" (Feros Care, 2014, p. 133). The ACIITC has provided a series of recommendations pertinent to the acquisition of appropriate digital literacy skills for older people wishing to apply technology in their lives including:

- Digital Literacy Strategy combining information, training and support for older consumers and their supporters.
- Technology Awareness Raising Strategy designed to ensure that aged care consumers, their supporters and service providers are informed about technology-based products and services targeting older people (Barnett, 2017, p. 39).

4.3 Providing resources for telehealth services

Provision of resources to support the healthcare of older people using both in-person and remote support systems requires access to physical infrastructure and to information and communication technologies wherever the person is living.

4.3.1 Physical and internet infrastructure

The need for appropriate physical infrastructure in residential accommodation for older people to host visiting primary health, allied health and specialists and remote consultations (Royal Australian College of General Practitioners, 2019) has been identified in section 2 of this report.

Physical infrastructure has to include the internal connectivity infrastructure such as Wi-

Fi systems that can provide residents with the same services they could enjoy in their own home. The same infrastructure is required to support healthcare activities. For instance the Aged Care Financing Authority (2016) reported that “inconsistent internet connections and unreliable services can have an impact on the amount of time it takes to complete documentation, which has the flow on effect of reducing staff availability. It also impacts on access to tele-health support or clinical evidence- based information” (Aged Care Financing Authority, 2016, p. 156).

The first steps in addressing this issue in the arena of digital technology infrastructure could be:

- developing a survey of aged care providers to establish the quality of accommodation in residential accommodation for older people available to host visiting primary health, allied health and specialists and remote consultations;
- developing a survey of aged care providers to establish the quality of internet connectivity in residential accommodation for older people, workers and visiting healthcare professionals.
- using the results from the survey in consultation with all stakeholders develop a minimum set of standards for accommodation of healthcare activities in residential aged care;and
- designing a national strategy for funding and implementation for improvement of accommodation of healthcare activities in residential aged care.

4.3.2 Information and communication technologies

Access to information and communication technologies for healthcare workers visiting older people at home or in residential care and residential aged care workers remains a significant problem. The Australian Digital Health Agency is commencing some work to interconnect primary and aged care information systems, but national interoperability and platforms are yet to emerge. There are two parts to this problem: connectivity for health workers who are mobile or working within residential accommodation, and availability and interoperability of health and aged care informationsystems.

Actions to address this set of access issues could include:

- surveying the extent to which electronic age care and health information systems are available in residential facilities and the extent to which information can be exchanged with primary healthcare systems;
- using the results from the surveys and in consultation with all stakeholders to develop a minimum set of standards for internet connectivity and client information systems used in residential aged care;
- designing a national strategy for funding and implementation of for improvement of internet connectivity and client information systems supporting healthcare activities in residential aged care; and
- assisting older consumers in the purchase of digital devices that can be used to access and engage with aged care services, as suggested by the ACIITC (Barnett, 2017).

4.4 Revision of funding models

Provision of skilled human resources, physical infrastructure and access to information and communication technologies are conditioned by the available funding and the rules around that funding. Fee for service funding models are limited in the contribution they can make to the establishment or enhancement of these resources. For instance, Wade (2015) found that:

> Fee-for-service seemed a poor fit for GPs to work with RACFs. On-site, GPs spent considerable time discussing patients with staff, and once off-site, they received a constant stream of requests for patient care, none of which were remunerated, and this was so regardless of whether the GP was physically visiting or attending by telehealth … ongoing reimbursement for video consultations by itself will not solve this problem. (Wade, Whittaker, & Hamlyn, 2015, p. 493)

Changes to funding models require corresponding changes to guidelines, clinical service and business models. The addition of MBS items to support the COVID-19 response provide a good example of the impact of funding changes, where primary care in particular has been forced to re- evaluate practice business models.

Organisational strategies and standards for the use of technology have yet to be created. The Aged Care Quality and Safety Commission has yet to set standards for the use of telehealth services, although these already exist internationally. In lieu of standards, MBS item payment rules and the allowable items funded by aged care programs determine how telehealth services and associated technology can be funded.

One particular funding issue is highly evident. The use of block funding and incentive payments to encourage particular types of service models formed a part of the initial support for telehealth services from the Commonwealth Government by enabling purchase of equipment and re- imbursement for additional on-going costs, but this funding is no longer available. Aged care services using telehealth services depend on funding to train personnel, improve physical facilities, provide information and communication technologies, and support behaviour change (for instance client case management across programs), for which there is no obvious source.

The Royal Commission (2019) has given initial consideration to this issue by recognising the “lack of cost-effective models for reimbursement or service delivery funding to cover the quite extensive underlying business support services ecosystem. This could be overcome by consideration of a blended public-private approach to cost sharing” (Royal Commission into Aged Care Quality and Safety, 2020, p. 44). Other funding models will need to be generated to fund the provision of skilled human resources, physical infrastructure and access to information and communication technologies.

5. Conclusion

Considering the findings described above, it is apparent that technology support for health care and independent living interventions is being deployed successfully across a number of service organisations using products from a number of technology vendors. With the advent of the COVID- 19 epidemic, the need for this type of remote interactive healthcare support has increased and signs are that the adaptation and use of technology for remote health consultations and remote health monitoring in particular has increased.

Considerable diversity exists in the application of digital technologies to address the problems of older people. For instance, communications technologies can be used in remote medical consultations, communications between cares, family and friends to reduce loneliness, and to transmit health information and alerts. Similarly, solutions to support the healthcare and safety of older people can employ telephone, video, messaging and medical devices.

A key conclusion that can be drawn about this landscape is that diverse combinations of digital technologies can be developed rapidly and effectively to support the many needs of older people to stay healthy and live independently. For instance the Royal Melbourne Hospital has recently deployed a simple monitoring systems for COVID-19 symptoms using pulse oximeters, thermometer, SMS messaging and Web forms for data entry of vital signs (McDonald, 2020). Other existing technology sets have also been re-purposed for use during the COVID-19 epidemic (CheckedIn Care, 2020; Healthcare, 2020; IRT Group, 2020). While there are system complexities to be addressed in any new digital technology solution, the technical aspects are seldom the major barrier to its realisation.

This report also suggests that while significant benefits could arise from increased application of digital technologies in health and aged care, there has been insufficient attention paid to addressing or strengthening the enabling factors. The extent of the achievable benefits will depend very much on building confidence in the use of

telehealth technologies through collaborations, developing clinical frameworks, skills and digital literacies, providing appropriate physical, information and communications infrastructure and supportive funding models for services that use digital technologies to assist maintenance of the health and well-being of older people.

Overall this investigation shows that interventions relevant to chronic health conditions, supporting independent living, falls prevention and management, reducing social isolation, depression, supporting people with dementia, and supporting family care givers are tentatively established in the aged care sector, but have yet to become embedded in the sector as common practice. The introduction to this report identified a number of current concerns about health and aged care impacted by digital technologies, many of which are being considered by the Royal Commission. These areas of concern included the need for:

- better integration of aged and healthcare services through improvements to care models, physical infrastructure, connectivity and information systems leading to improved quality of healthcare;
- better access to healthcare using remote consultations and remote monitoring interventions leading to improved quality and safety of healthcare;
- improve the confidence of the health and aged care workforces, clients and patients in the use of contemporary technologies; and
- promotion of the ability to live independently in later life through the use of contemporary communications and independent living services with maintained or improved health status.

The suggested measures applied in any of the above four areas of concern could improve the quality and safety of health and aged care, also reducing the number of episodes of care in acute healthcare. However, evidence for any of the desired outcomes at a system level is unclear. The reasons for this lack of evidential clarity are:

- it is difficult to aggregate condition specific studies to reach general conclusions due to their diversity; and
- the outcomes arising from specific implementation studies are often contingent on the implementation contexts, whether or not that contextual information has been provided by a study.

Therefore, an additional measure would be for government to stimulate research at the societal and organisational level that could extend research based on medical models, such as randomised controlled trials using economic, behavioural, social and contextually sensitive methods and models.

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