

Supplementary information of evidence used to develop the framework for enhancing technology implementation in home-based aged care

Supplementary information of evidence used to develop the implementation framework for enabling technology Supported Aged Care implementation in home-based aged care

The development of this framework was based on an evidence-based mixed-methods research approach that consisted of six components. This document briefly explains the research evidence of each of the enablers and barriers across the 7 themes, to show how the themes and evidence-based suggestions were derived. Evidence was gathered from 6 components outlined below:

CLIENT SURVEY

A client survey was conducted by Silverchain, a large Australian in-home care provider. The purpose of the client survey was to determine the digital literacy amongst Silverchain clients receiving home care and determine their perspectives on the use of technology in in-home aged care. A total of 631 Silverchain clients completed the survey.

LITERATURE REVIEW

The scientific literature was reviewed to identify the types of technology used in in-home aged care and identify the enablers and barriers to technology implementation in in-home aged care. The review included international perspectives of in-home aged care and found 40 peer-reviewed publications.

STAFF SURVEYS

Silverchain staff were invited to complete a staff survey to determine the level of digital literacy amongst home care workers and determine the staff's perspectives on the use of technology in in-home aged care. The survey was open for 3 months, and 267 staff completed the survey from a variety of disciplines.

STAFF INTERVIEWS

As an extension to the survey, Silverchain staff were invited to complete interviews further exploring in detail the perspectives of aged care staff delivering in-home services, particularly enablers and barriers within the context of roles and tasks. A total of 18 staff completed interviews.

CO-DESIGN WORKSHOP

The purpose of the co-design workshop was to validate the technology implementation themes identified from the previous four components, confirm the language to be used in the framework, discuss the enablers and barriers, and identify practical strategies. A total of 12 Silverchain staff participated in the workshop.

CASE STUDY

A draft of the framework was provided to a Silverchain team who were preparing to implement a specific piece of technology into in-home aged care. This provided case study information. The team implementing the technology used the draft framework to develop an implementation plan and provided comments and suggestions regarding the framework including its format, content, ease of use, and acceptability. This information contributed to the final version of the framework.



Sub-Theme	Enabler/ Barrier	Evidence sources	Summary of Evidence
1.1 Familiarity and ease of use	User-friendly technology – with simple functions and designs – is more likely to be used by staff and clients and provides a better experience.	Literature review ,and staff interviews	Evidence from the literature and the interviews indicates that technological devices or systems that are designed to be simple and user-friendly with good accessibility is an enabler to the implementation and adoption of technology.
	It is important to understand how platforms are used by end-users (compared to how they were designed to be used).	Staff interviews	Staff members and clients prefer using technology that they are most familiar with. For example, staff familiar with using Apple devices prefer to use Apple devices if they need to embed technology in in-home aged care. In addition to technological devices, different forms of technological communications should be offered to aged-care clients.
	Technological features do not always work as intended. Clients may call on in-home aged care workers for help so consider the impact on workload.	Literature review	Technological features may not work as intended or designed, due to design limitations or connectivity issues. Clients may be reliant on staff to help them troubleshoot any issues, which may impact on staff workload.
	Some features of technology may not work with home care clients with disabilities or physical limitations.	Staff interviews	Home care clients with disabilities or physical limitations may have difficulties in using certain types of technology, for example small screens may be difficult for clients with limited visions to see well, and poor contrast can be difficult to distinguish different functions and features.

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1.2 Technical Issues	Unexpected glitches during use can interrupt the provision of care provided by in-home aged care workers.	Staff interviews	When unexpected glitches occur during aged care visits by home-based aged care workers, this can lead to lost time in resolving or finding alternate solutions to the glitch.
	Poor internet connectivity can interrupt the transmission of data.	Literature review, staff interviews, and co-design workshop	A lack of internet connectivity can interrupt transmission of data, and interfere with usage of smart devices that require reliable internet connectivity to realise their full potential.

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1.3 Infrastructure	A lack of technology infrastructure, including inadequate data infrastructure and digital infrastructure may lead to poor connectivity, and difficulties in storing and transmitting client data.	Literature review	Digital data requires sufficient infrastructure to house and transmit the data to ensure consistent connectivity and flow of information. This is particularly relevant for client management systems that store user data, and smart devices that transmit information to servers over the internet.
	Wider infrastructure issues may impact performance of technology (e.g. poor connectivity such as black spots or slow internet speeds)	Literature review and staff surveys	A lack of internet connectivity can interrupt transmission of data, and interfere with usage of smart devices that require reliable internet connectivity to realise their full potential.

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1.4 Familiarity and interoperability	Home care clients have access to a range of technologies in the home already, such as smart phones, computers, and tablets, so using them for novel purposes can reduce lead time for successful implementation.	Literature review, client survey, and staff interviews	Home-based aged care customers have at least one type of technology available at home, with the most common type of technology including mobile phones and Wi-Fi internet.
	Systems or technologies which are not able to exchange information with other systems or technologies can inhibit the uptake and usefulness of technologies.	Literature review, staff surveys, and staff interviews	Inability to exchange information across systems can lead to communication barriers, particularly if the technology is based around information exchange or care continuity. A lack of timely access to information can lead to poor care continuity.



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2.1 Client privacy	Clear and concise information regarding organisational policies and procedures on how client data is managed, stored, and communicated may aid engagement.	Literature review and staff interviews	Having standard organisation processes and procedures for the technology provides a consistent reference point for the implementation for technology, and reduces technological issues with unguided use.
	Home care clients are particularly concerned about being scammed. They may resist the use of technology due to concerns about their privacy and personal information being compromised.	staff interviews	Clients may be unreceptive to being introduced to technology due to concerns about being scammed, particularly with technology that transmits personal information.
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2.2 Reliability and Trust	Unreliable technology can inhibit trust in technology for improving the delivery of care.	Staff interviews	Unreliable technology can increase technical difficulties, causing barriers to adoption. Regular unreliability and reduce staff trust in the technology prevents technology being used successfully and as intended.



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3.1 Training for staff	Ongoing training and support accelerate familiarity and confidence with technology.	Literature review and staff surveys	Providing on-going training sessions provides staff the opportunity to familiarise themselves with the technology. This will give staff the confidence and skill to become good at using the technology, understand its limitations, and familiarise themselves with troubleshooting. Spreading training over time rather than in one session also prevents overloading staff with information.
	Giving staff paid time to test and orientate themselves with the technology increases their confidence, helps to identify potential technical issues.	Literature review and staff interviews	Staff need to be given time outside of initial training when technology is implemented to become familiar with the technology. Independent time is often not provided in the context of delivering care whilst learning to use new technology.
	Staff often prefer group training sessions where peers can learn together.	staff interviews and co-design workshop	Having training sessions together enables staff to engage and learn from each other in a supportive environment.
	Training sessions that are long and information intensive can be overwhelming.	Literature review and staff interviews	While training sessions are important in improving competence in technology, long and information dense training sessions can overwhelm staff, and smaller, repeated sessions are preferred compared to longer single sessions.
	Lone workers who are travelling have limited opportunities for formal face-to-face training.	staff interviews	Lone workers often have limited collegial support or formal training opportunities. Lone workers need to be supported as much as possible, by providing offline modes of troubleshooting, and avoiding technology dependent on real-time information due to signal dropout.
	Training can be time-consuming, and impact staff workload.	Literature review	The implementation of new technology requires training, which can be time-consuming because it takes time out home-based aged care staff's busy caseload in providing care.

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3.2 Training for clients	Enthusiasm from older clients in wanting to use technology supports uptake of training opportunities.	Literature review, staff interviews, staff surveys, and co-design workshops	Staff report that ongoing training is important to use digital technology. Being able to continue training helps to build competency and retain competency in the technology being implemented.
	Making training sessions engaging improves learning.	Staff surveys	Having engaging training sessions can help to improve learning and retention of new information.
	Training can be time-consuming, and impact staff workload.	Literature review and staff interviews	Learning new types of technology including at the start of a new job can be time-consuming as both staff and client need to be trained and familiarised with the technology. Troubleshooting issues can also take time, which can have a negative impact on staff in completing their care-tasks with clients.
	Enthusiasm from older clients in wanting to use technology supports uptake of training opportunities.	Literature review, staff interviews, staff surveys, and co-design workshops	Staff report that ongoing training is important for the use of digital technology. Being able to continue training helps to build competency and retain competency in the technology being implemented.

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3.3 IT technical support	Ongoing IT technical support can help staff if they are unsure of certain features of technology or troubleshoot issues that arise.	Staff interviews	Staff have varying levels of digital literacy, technology and learning styles. Therefore, having individualised training, or providing multiple training styles is important in upskilling staff.
	Responsive IT technical support can help staff resolve issues quickly when they arise.	Literature review and staff surveys	Having IT technical support can help staff feel supported in resolving issues quickly then they arise.
	Frontline staff and champions can support each other and develop a positive implementation culture.	Literature review, staff interviews, and Staff surveys	Having champions or frontline staff with more digital literacy and skills can help to develop a positive culture towards implementing technology, who can help with troubleshooting and provide support to staff.
	Technical jargon is not often understood by home care workers, which can slow down resolving technical issues.	Co-design workshop and staff interviews	Avoid using technical language when introducing new types of technology.



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4.1 Digital readiness	Positive organisational culture that is open to innovation and a culture of digital readiness within an organisation and their clients facilitates implementation.	Literature review	A positive organisational culture that is open to technological implementation and innovation reduces organisational resistance to implementing technology, and provides leadership and support to staff. Digital readiness includes perceived usefulness, technological competence of staff, and perceived confidence and skill of staff to implement and use the proposed technology. Readiness to change is also an enabler.
	Engaging in-home aged care staff with clear communication to be part of the implementation can improve the process.	Co-design workshop	Communication about changes planned and giving staff time to experience and train with the technology can facilitate implementation. Holding communication forums to explain why the organisation is considering the technology and allow people to provide feedback. This should occur as early as possible in implementation plan. Prepare communication plan to ensure information is shared adequately.
	Lack of senior management commitment to support technology implementation may limit its success	Literature review	Without senior management support, momentum to implement technology can be slowed or resisted. Having strong senior management can create a positive environment for technology adoption and implementation, with a focus on innovation.
	Lack of planning can also reduce staff digital readiness towards technology implementation.	Literature review	A lack of preparedness for technology implementation by the organisation and staff such as identifying the need for technology, understanding the IT skills and competencies of the staff, and infrastructure to support the technology leads to a barrier to implementation.

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4.2 Confidence and acceptance of technology	Individuals who have confidence in using new technology are more likely to support and champion the implementation.	Literature review and staff interviews	Identifying a champion to lead and facilitate the implementation of technology will help to improve confidence and acceptance of technology use. In addition, a champion provides leadership and improves culture to support adoption, and reduce barriers to uptake.
	A lack of IT and peer support are barriers to sustained technology usage and adoption.	Staff interviews	Frontline in-home aged care staff support each having those with lower confidence in the use of technology seek information and support from those more confident with its use.
	Technical jargon is not always understood by in-home aged care staff and clients, which can slow down the resolution of technical issues.	Co-design workshop	In-home aged care staff should be consulted to ensure the messages shared are suitable and understood, ensuring jargon and highly technical language is avoided.
	Individuals who have confidence in using new technology are more likely to support and champion the implementation.	Literature review and staff interviews	Identifying a champion to lead and facilitate the implementation of technology will help to improve confidence and acceptance of technology use. In addition, a champion provides leadership and improves culture to support adoption and reduce barriers to uptake.

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4.3 Impacts on workload	New technology can temporarily increase staff workload and reduce productivity.	Literature review	New technology can increase workloads due to implementation, orientation, and troubleshooting of technology for both staff and clients. This increases the workload as staff may be both providing their usual care whilst having to spend more time in learning and using technology, as well as supporting clients in the use of new technology. Understaffing can lead to time-poor staff who have multiple responsibilities, which can increase the workload and reduce readiness to technology implementation. Organisations or staff with busy workloads are time poor, leading to time constraints in implementing technology.

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4.4 Communication	Appropriate, varied, and tailored communication strategies with stakeholders can enhance the effectiveness of technology implementation.	Literature review and Co-design workshop	An enabler to implementation is active engagement of stakeholders during all stages of implementation. This includes staff, end-users, and management to identify the need for technology, and the potential barriers and enablers to implementing this technology. Consultation with all stakeholders is vital for technology implementation success. Staff require good communication skills to be able to communicate implementation plans and the technology with end-users and guide them in their use and implementation.
	Due to the nature of in-home aged care, communication strategies should be tailored to those who work on-the-road.	Staff interviews	Delays in updating changes in client function or circumstances can lead to a decline in quality of care. More than one way of communication such as email, group sessions or specific meetings can improve implementation.
	Poor communication of the implementation plan to all stakeholders can negatively impact implementation.	Literature review	Poor communication is a barrier to technology implementation particularly if the technology is based around information exchange or care continuity. A lack of access to timely information or poor care continuity results in barriers in using the technology for its intended purpose.



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5.1 Client preferences for technology	Some clients are enthusiastic about technology and are willing to adopt and learn how to use technology that may be of benefit to them.	Staff interviews	Many clients are asking for technology as they see it as “the future”. Many older home care clients are “tech savvy” and keen to learn more.
	Some types of technology have greater uptake among clients. <i>Example - many in-home care clients prefer technology to monitor their health issues.</i>	Client survey	Technology adoption within older clients homes is common, with a variety of types of technology. In general, the most common types of technology adopted include mobile phones and internet/Wi-Fi connection. Using technology to monitor health issues was also common amongst older clients.
	Use of technology may be seen to depersonalise care. Many clients prefer face-to-face rather than remote contact.	Client survey and staff interviews	Staff using a phone in front of client for work related tasks may be perceived as rude by the clients and it can diminish rapport. It is important to be mindful that any form of technology should not replace all actual face-to-face Fully remote care using technology should only be used as a last resort. Digital literacy needs to be assessed at intake into in-home aged care and regularly for care planning to support changes.
	One-off or insufficient screening of preferences for clients may fail to identify level of readiness for technology.	Co-design workshop and staff interviews	Organisations need to include processes which identify or assess client's preference or capability to receive and send different forms of communication e.g. emails. A client's preference and choices related to technology need to be clearly indicated in client records and ensure this information is not lost amongst other information and is updated regularly. Staff and clients are not screened for preference for technology which was the case during the government restrictions period of the COVID pandemic.

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5.2 Suitability of technology to enhance care	Technology considered fit for purpose by staff, and has an identified use case, is more likely to be adopted.	Staff interviews, client survey, and staff surveys	Technology should not replace personal connections between workers and clients, and certain uses of technology can depersonalise care which is perceived as a “tick and flick” exercise, without focusing on the client. Face-to-face interactions should be kept as much as possible. Over 80% of surveyed staff agree that digital technology can improve the quality of care provided by Silverchain staff and enable the delivery of individualised care.
	Not all in-home aged care tasks can be digitally supported for all clients.	Staff surveys	Staff reported most of their direct care tasks can be digitally enabled. However, domestic assistants, care workers, and therapy assistants feels their tasks are less likely to be digitally enabled
	In-home aged care clients may have lower general technology use and may not want to use technology to receive care.	Staff interviews	Staff acknowledge that technology can improve quality of care. However, overuse of technology and not allowing face-to-face or hybrid options can be detrimental to the quality of care provided to the client. Case managers need to assess and understand how clients interact with technology and their level of skill for many types of technology.



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6.1 Technology use	Staff with a preference for (or willingness to trial) technology-supported care may be useful 'early adopters'.	Staff interviews	Staff acknowledge that clients are keen to learn and use more technology, acknowledging that more activities are becoming technology based.
	Sufficient digital literacy support and administration time allocated during implementation will improve self-efficacy of stakeholders.	Staff interviews	If in-home support workers have a little extra time and patience can greatly improve the confidence of clients in using phones or other devices to do the activities of living "Help with the technology of life".
	Mandating the use of technology for some activities may be detrimental.	Co-design workshop	Fear of technology needs to be addressed before technology can be implemented successfully.

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6.2 Level of digital literacy	Successful implementation of technology involves ensuring that all staff possess basic technological competency and skills.	Literature review and staff survey	Having basic technological skills, in addition to IT awareness, and regular use of technology will reduce technical issues and lead to improved success with technology. On average, the self-reported digital literacy in in-home aged care staff is relatively high.
	Understanding clients' technology skills and competencies is important.	Literature review and staff interviews	Being unfamiliar with the technology can lead to resistance to implementation change amongst aged care workers, due to lack of experience and technological skills. Training is important in reducing unfamiliarity with technology amongst staff and clients.
	Using a variety of communication methods and modes targeted at different levels of digital literacy can improve communication.	Literature review and staff interviews	Staff with low digital literacy or confidence in skills benefit from having more time and opportunities for training. Pairing staff with high digital literacy with staff who have low digital literacy can help with overcoming barriers to implementation. Having a technology implementation champion can assist with this.
	Being unfamiliar with technology can lead to resistance to its implementation.	Literature review, and staff interviews	Staff who are unfamiliar with technology or the specific type of technology may resist implementation due to their lack of familiarity and use. Time and extra training to get familiar and confident with technology for those who have low technology confidence can enable implementation.
	Some in-home care clients may only use a device (e.g. a smart phone) for a single task, rather than making use of all functions.	Staff interviews	Staff reported that just because someone has a mobile phone doesn't mean they can get or send text messages.



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7.1 Usefulness	Clients or staff who have experienced the usefulness of technology can support implementation.	Staff interviews	Having frontline staff support each other helps to build technology confidence. This can also include having a central contact or champion to facilitate implementation.
	Technology is considered less useful if perceived as time consuming, unreliable, and poorly integrated into existing workflows.	Literature review, staff surveys, and staff interviews	If the technology is unreliable and poorly integrated with existing workflows and technology, it can be time-consuming to implement. Technological solutions can be perceived as being “useless” if they are unreliable and cannot be integrated.
	Staff perception that the technology is not useful inhibits implementation.	Literature review	Readiness factors that enable implementation include self-efficacy, social norms related to technology, interest in the specific technology, and its impact on employment. There are socio-demographic factors that may affect levels of readiness, such as age, work experience and technological skills.

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7.2 Awareness of benefits	Active consultation with stakeholders including clients, staff, and management is crucial for the successful implementation of technology.	Literature review	Engaging stakeholders including clients, staff, and management in identifying suitable technology will increase the perceived usefulness of the proposed technology, which is an enabler to implementation.
	End-users may be apprehensive about new technologies if they don't understand the benefits for themselves, and if they are not provided with an opportunity to discuss their concerns.	Literature Review	Readiness involves aspects such as perceived usefulness, technological competence of staff, and perceived confidence and skill of staff to implement and use the proposed technology. Staff, end-users, and management need to be engaged to identify the need for technology, and the potential barriers and enablers to implementing this technology. Consultation with all stakeholders is vital for technology implementation success.