ORIGINAL ARTICLE

"Context, content, and system" supporting digital health hub (DHH)–enabled models of care (MoCs) for fragility hip fractures: perspectives of diverse multidisciplinary stakeholders in South Australia from qualitative in-depth interviews

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Abstract

Summary Combining thematic analysis and a human–computer persuasive systems framework suggests that hip fracture recovery among older people can be enhanced through person-centered digital health hub models of care focused on behavior change education and integrated care. The findings intend to guide settings involving comorbid conditions and low- and middle-income countries in developing innovative digital health solutions.

Purpose The purpose of this study was to understand stakeholders' perspectives on the development of a digital health-enabled model of care for fragility hip fractures and to map out factors that could influence the design and implementation of such a model.

Methods Qualitative in-depth interviews were conducted with stakeholders from various clinical disciplines, allied health, and computer science. A hybrid process involving thematic analysis of the raw data using inductive coding was the first step. In the second step, the tenets of a theoretical framework (health behavior change supporting systems) were deductively applied to the thematic constructs generated as part of the first step of the analysis.

Results In total, 24 in-depth interviews were conducted with stakeholders. We identified 18 thematic constructs presented under the categories of context, content, and system. Context covered patient characteristics such as frailty, digital literacy, and patient or carer participation, whereas healthcare delivery aspects included the structure and culture of existing practice and the need for innovative holistic models of care. Content outlines the active ingredients and approach in developing a digital health hub, and it highlights the importance of targeted education and behavior change. The system is a complicated matrix crossing different aspects of healthcare and offering a value proposition design through personalization across modes of content delivery. This must foster trust, ensure adequate financing, and support ownership and privacy by establishing appropriate mechanisms for embedding change.

Conclusion The findings from this study provide insights around potential factors related to patients, community support, and healthcare delivery influencing the design and next-stage implementation of a digital health hub model of care for fragility hip fractures.

Keywords Digital health · Models of care · Hip fractures · Qualitative method · Frailty · Multimorbidity

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Introduction

Fragility hip fractures among older adults present a significant burden to society in terms of disability, mortality, and economic repercussions for both community and health systems [1–4]. While the rate of fragility fractures in Australia is expected to rise by at least 10% every 5 years, hip fractures are among the most devasting of these fractures, with almost 50% requiring a permanent shift to residential aged

care within 12 months [2]. The combined health and social care costs in the first year following a hip fracture injury are enormous and unsustainable; the costs are reported to be $43,669 on average, which is higher than equivalent estimates for ischemic stroke and acute coronary syndrome [3]. Hip fracture events are complex, manifested by disequilibrium of normal physiological processes at the individual patient level, and accompanied by inadequate management of multimorbid conditions at the health system level [1–4].

Multimorbidity is the presence of more than one chronic condition in an individual. It is influenced not only by health-related characteristics but also by socioeconomic, cultural, and environmental factors, as well as patient behavior [5]. It is argued that the current health system is predominantly geared toward labeling and addressing chronic disease through siloed care pathways rather than having a wider view of disease etiology and interacting factors [6]. Thus, it is vitally important to acknowledge that the management of older people with fragility hip fractures is a complex, multidimensional issue that extends beyond the acute care facility and immediate discharge care [1, 5, 7].

Recognition of the role that patients, their family members, and other carers play as part of an ecosystem, or "networked units," is becoming critically important for improving outcomes [7–9]. Individuals have unique life circumstances influenced by differing levels of health literacy, which affects their perception of health and wellbeing and their disease outcomes [4, 9–11]. Moreover, with increasing access to information technology through computers and mobile applications, there is a growing recognition that people will become more curious to seek information related to their present health condition. Before undertaking this research, we conducted a comprehensive systematic review to evaluate the effectiveness of targeted patient communication supported through digital health interventions versus the standard provision of health information on the recovery from fragility fractures among older adults [1]. The findings from this review were divided into three categories as defined by the latest World Health Organization (WHO) guidelines on digital health interventions. A meta-analysis suggested that targeted patient communication with primary care physician support using digital health was twice as effective as the standard provision of health information, such as patient information leaflets, in preventing secondary fractures post-hospital discharge. It was further highlighted that providing health information alone does not equate to educating patients. The other two digital intervention categories also improved functional outcomes among older fragility fracture patients. However, significant challenges were involved in using sophisticated forms of interactive digital health technologies, such as personal health tracking and healthcare provider decision support. There is a need to proactively engage

different stakeholders, including healthcare providers from multiple disciplines, patients, and their family members, to cocreate a digital health solution that could potentially become an integral part of local service design and delivery [1, 4, 5, 9].

This study is the first phase (formative research) of a research program aimed at informing the development of digital health-enabled models of care (MoCs) to improve patient education, functional outcomes, and quality of life and foster continuity of supported and integrated care among older people with hip fractures [4]. Our previously published protocol paper examined different theoretical frameworks around computer–human persuasive systems (Health Behavior Change Supporting Systems (HBCSS)), implementation science, and best practice guidelines on hip fracture management and the management of older people within the community [4, 12–15]. For this research component, we utilized three constructs of HBCSS (content, context, and system) to guide the design and execution of the study. The "content" essentially refers to the evidence-based information that will be embedded into the digital health solution and the way consumers will be engaged to inform its further evolution and iteration. The "context" includes factors influencing the local setting in which we intend to develop, pilot, and later implement such a digital health solution, while the "system" encompasses the supporting infrastructure requirements, including aspects of operational mechanisms [4, 12].

The objectives of this study were to understand the perspectives of diverse stakeholders on the development of digital health-enabled MoCs for fragility hip fractures and to map out potential factors that could influence design and implementation within the local healthcare setting [4, 12]. Stakeholders in this study are healthcare practitioners from different clinical disciplines, allied health, health education, public health, computer science, and other fields who could influence policy and key decision-making at the local contextual level. The perspectives of patients, their family members, and residential aged carers were covered in another study [7].

Methods

Study design and participants

This study involved a wide range of stakeholders from the Central Adelaide Local Health Network (CALHN), which is responsible for promoting and improving the health of the central metropolitan Adelaide community and provides specialized care for South Australians through integrated healthcare and hospital services. Additionally, a substantial number of people from outside these geographic areas also

access services offered by CALHN. Stakeholders in this study were healthcare practitioners from multiple disciplines at different levels, ranging from senior administration to frontline staff. Their disciplines included orthopedics, geriatrics, physiotherapy, occupational therapy, dietetics, public health, and social and computer sciences. These study participants were among the key actors who could influence the micro (local clinical practice), meso (service delivery), and macro (policy and research agenda) levels. An in-depth qualitative interview method was used to enable participants to describe their views and experiences in detail; this method has been previously described [4, 16]. We followed the Consolidated Criteria for Reporting Qualitative Studies (COREQ), a 32-item checklist, throughout this manuscript (Supplementary 2) [17].

Recruitment and setting

A purposive sampling strategy was used, and we identified potential participants through various routes, including clinicians working in the multidisciplinary hip fracture care environment across various settings (primary, secondary, and tertiary care), researchers, and policy or decision-makers. With this sampling strategy, we selected study participants belonging to different but relevant disciplines, with different areas of subject expertise, and with varying years of experience, including some early career participants and some highly experienced participants. This approach ensured the diversity of participants in terms of their roles, professional background, and level of experience.

Participants were approached using multiple strategies, such as email, phone, or in-person invitations. Participants were provided an information sheet with a detailed description of the study and an opportunity to ask questions and written and/or verbal consent was obtained as appropriate. The principal investigator (LY) then identified a suitable time and mode for interviews with interested participants.

Data collection

An interview guide (Supplementary 1) was developed based on the contemporary literature on digital health, social and behavioral change theories, implementation science, and best practice guidelines for the management of hip fractures. This interview guide consisted of open-ended questions divided into three broad categories—content, context, and system—with embedded prompts [4]. This approach provided flexibility during the interview process to allow participants to raise issues that were personally salient to them.

Data analysis

All of the interviews were audio-recorded. LY transcribed the recordings verbatim, checked for inconsistencies, and anonymized the data. Details of individuals, places, or any other identifiable information were removed before sharing transcripts with team members. A hybrid process of inductive and deductive thematic analysis to interpret the raw data was used. This involved thematic analysis of the raw data using inductive coding as a first step and then deductively applying the tenets of HBCSS to the theme constructs generated as part of the first step of the analysis [12, 18]. An initial coding framework was developed while the stakeholder interviews were still being conducted by identifying themes through careful reading and rereading of the first three interview transcripts. This coding framework was further tested and refined as interview transcripts aligned with emerging themes under the broad categories of content, context, and system (HBCSS), and comparisons were made within and across the interviews. The team members (LY, TG, MJC, RV) derived detailed insights and interpretations from the data considering the aims of the analysis and their knowledge of the domain and literature. Data collection ceased when emerging themes were saturated. A range of tools were adopted, using a conventional approach to coding and using modern software technology for data management. An open coding approach helped the researchers understand and search for hidden conceptual meanings, which allowed the freedom to think along different lines and develop new concepts. NVivo 12 [19] was used as a tool for data sorting and management, aiding the further analysis and interpretation of the study findings.

Results

In total, 24 in-depth interviews were conducted with stakeholders representing diverse roles and responsibilities within the CALHN in Adelaide, South Australia. The participants included 11 females and 13 males across a wide age spectrum, from their early 20 s to their late 60 s. Some of them were involved in private clinical practice in addition to their role at the CALHN. Each interview lasted approximately 45 min to an hour on average, ranging from 30 min to an hour and a half. All interviews were conducted in English, and participants provided written informed consent.

The findings from this study are presented in the form of 18 distinct thematic constructs, followed by descriptions and corresponding quotes (Table 1) under three broad categories—context, content, and systems—aligning with the HBCSS framework [4, 12]. The results presented in this

Table 1 Theme constructs

HBCSS category	Theme constructs	Theme description	Quotes
Context Include factors influencing local setting in which we intend to develop, pilot and later implement	Frailty	Frailty in an individual, influenced not only by health-related characteristics but also by socio-economic, cultural and environmental factors, as well as patient behaviour	"Ageing physiology is a tricky business. So you will have population of people who are very fit, quite ambulant and so the challenge is to restore them back to their function, absolutely to the other end of the spectrum where people are completely bed bound. So I guess we do end up seeing quite a lot of quite frail, pretty much bed bound, and dementia, so medically comorbid patient" [R19]. "Whereas the medical model is very much the biomedical model. if you don't have any illness or an injury, you are well. We look at the biopsychosocial view of health and it's much more than a lack of illness, it's about well-being" [R13]
	Digital literacy	Skills needed to live, learn, and work in a society where communication and access to information is increasingly through digital technologies like internet platforms, social media, and mobile devices.	"Those [Patients]at the one extreme you have a wonderfully intelligent and rich conversation with people that are very savvy, communicating with their smart phones, emails and active even on Facebook and to the other side where they are completely under the reliance of formal carers". [R1]
	Social support	A network of family, friends, neighbours, and community members that is available in times of need to give psychological, physical, and financial help	"Although a lot of people would probably have a mobile phone these days. They may not have a smart phone. So, there is that inability there and I think, there is, you know, obviously; proportion who don't have any family support of some kind or friends supports, and don't have access to all those sorts of things. So, there is always going to be a group that don't but again into the future, that proportion is likely to be small because having computers these days is a standard thing, it's not a new thing". [R7].
	Patient and carer participation	The involvement of the patient and their carers in the decision-making process regarding health issues	"They [Patients] have to accept the responsibility for large aspect of their care. Their diet, doing exercises, stopping sedentary behaviour, make the distinction between exercise and not being sedentary". [R1]. "It's a paradigm shift, I think may be some clinicians find it different, like sometimes I get patients, families, children who have done google searches and everything" [R5]. "I think, telerehab is the one thing that is visual and audio so that's beneficial in that place. But I think a combination of things, even phone calls follow through ....home visits, depending on the client situation, and providing that education to not only the clients but also to the families and carers involved...... there are the people that are having to reinforce that education daily. So, having those core people involved is really, important ...... depending on their situation, and the client's needs, their family's needs, and , cultural barriers, language barriers, or their levels of motivation, what they are willing to accept,". [R18].
	Structure & culture of existing practice	Structure represents hierarchy and scope of work whereas culture is the traditional and customary thought process to execute work	"In the changes over the years, I think there is more multidisciplinary approach to care now than it ever used to be. And there is now since last service redesign in South Australia, there is more focus on allied health service for the patients as well. So it is truly a multi-D (multidisciplinary) team approach to care for the patients. I think we are getting better at that we still have some way to go to include the geriatric component of care. We currently have a five-day service; we need a seven-day service and the anaesthetic component of care. Whilst the patients get anaesthetic input, ideally, I think it could be more pre-operatively than the model currently is". [R3] "UK system has really embraced the orthogeriatrician and doing ward rounds lot more and the interns going the ortho [ward], where juniors going on the ward rounds and there has been formal protocol for what needs to be done. And I think that isn't being fully embraced here yet. Certainly having an orthogeriatrician on the weekend doesn't happen here. There is really, if you ask the interns about calcium and vitamin Ds, you know they check their calcium, bone profile of these patients, is often almost advised- no we don't any of these, the orthogeriatrician does that". [R4]. "So there is also two different mindsets- there is a mindset that says, the quicker we get on operate these patients the better. And delay usually, the risk-benefit of delay usually favours complications rather than getting better. So early surgery tends to favour better outcomes. Whereas the other mindset says, no we think it's better we delay them, medically optimise them before we take them for theatre. And this is a really important issue that we are not on the same page. There is lot of practice variation, here. And that is to do with the anaesthetist department and because of the factor that we don't have yet, a really good, coherent shared care model around the anaesthetist-orthogeriatrics- and orthopaedics with very clear practice guidelines that we can work together to reduce that practice variation". [R1] "The NoF [hip fracture] patients that I am managing will be sort of looked after by different interns and different RMO and they do change every day. So it will be different doctors that I am, will be liaising with on a daily basis. Mind you because I think ... technically sort of I am a bit of senior than them so I would lot of the coordinating, in terms of making sure that the plan for discharge planning is sort of on track and making sure that the interns or the RMOs are following the plans that we suggested. But at the end of the day, I think, the bottom line is that we are still a consulting service, we are not the home team as such. So the main primary responsibility remains in the home team sort of care. I mean, this model is still very different to other hospitals where the orthogeriatric team is actually a shared, a shared service which means that one patient is under a combined bed card; ortho and geriatrics, so then two teams are equally responsible for that particular patient whilst in this case, it's still primarily the orthopaedics, sort of taking the main responsibility, even though we do guide them a lot from medical perspective". [R14]. "I think it's also we need to change in culture, generally in hospital medicine, because lot of people now being on shift patterns....... It means even the juniors are doing more changeover and handovers. So really that field of looking after the patients and knowing that patient quite well and in-depth is becoming harder because you are constantly turning handover to the new person every12 hours and it may not be back on the following day. So trying to actually remember all those nuances and know about that patient and not just know about the patient in terms of how they are doing but also subtle things that you know, you see them day before". [R4].

Table 1 (continued)

HBCSS category	Theme constructs	Theme description	Quotes
	Innovation	As a novel set of behaviours, routines, and ways of working that are discontinuous with previous practice, are directed at improving health outcomes, administrative efficiency, cost-effectiveness, or users' experience and that are implemented by planned and coordinated actions	"Well one of the things that we do on rehab in the home is we use telerehab, so clients on our program, which is rehab in the home, which is my other role, get an ipad and we can telerehab them through the ipad, we have to one, two.... rehab though.... I think that is great, that's works really great, because you develop that rapport with the clients and you get to see the client and they can show you around the home. So the clients could be linked into the services like that..... with someone where they are given, you know, if they are on, if they are linked into something for saving.... couple of weeks given an ipads, someone can check in on them, review how things are going, that would be a great way of developing that rapport as well as seeing the barriers, seeing how they are coping and they can show you something, they can show you how they are functioning. So, and I find its very, it is very successful, in the rehab in the home". [R18].
			"I think, it can because the world is going digital. And even those, maybe there is generation of older people, maybe not be into eplatform but I think some of them are. But the next generation will be really into it. Because they are using technology, you know, all those people can google. So if you have a platform, a one stop solution to information, where you see, you had a hip fracture, what next I do, you know, go to this website to get all this information you need, you know that will be really helpful or you have had a hip fracture what next should I do? Or there is this app, open it up, read about it even if the families or carers can read and interpret to the patient, so is about, I think it's a good good, you know innovation" [R12]
	Holistic model of care	Provision of care to patients that are based on a mutual understanding of their physical, psychological, emotional, and spiritual dimensions. In addition, holistic care emphasises the partnership between care provider and patient and the negotiation of healthcare needs that lead to recovery	"So for me I very much consider the family the unit of care, not just the patient and I guess from my perspective, from a social work perspective, we do tend to stand outside the medical model which obviously is a predominant model. So we do look at the social view of health. We consider that more than just absence of illness or disease which does set us apart a bit. And I think what brings out value to the multiD [multidisciplinary] team, so we do look at the patients in context..... we look at ecosystems, we look at general system series, very much. One of our foundation theories". [R13].
			"We create this....now we will put this health... their hip fracture information which will include stuff about important.... nutrition and around sarcopenia and osteoporosis and about vit D and sunshine and what sort of exercises, probably balance and strength exercises is being there... environmental things, all those sorts of things that you would.... we know... are key around holistic approach, lifestyle approach to hip fractures.. medications that they are taking, the risks, the danger zones! But no reason if they concurrently have a problem with their respiration problem from asthma or suffering from COPD or whatever it is... that then down the track, a respiratory physician or somebody would be able to provide them, whomsoever looking after them managing them from that point of view, will also have a portal into this space that allows appropriately integrated, coherent, information that is suitable for that patient in the context that there are multiple... their wellness issues. Some of them would be the generalised lifestyle bit and others would be disease or injury specific" [R2].

Table 1 (continued)

HBCSS category	Theme constructs	Theme description	Quotes
Content How consumers could be engaged & likely aspects of information becoming part of the potential solution	Digital health hub	Digital health hub built around patients supporting health literacy with integrated care goals and providing a more holistic approach to care	"We are saying, we are going one step further, it's not just my health record- this is my health space! Which will allow me to not only be able to have this information about my previous health but actually interact through provider prescription form. You know, it's much further than that… so, it's something that my health record could potentially be expanded into or alternatively you take this, and the patient has the option of linking my health record into as part of this personal hub. So the personal hub is about health information and technology integration. And integrating it with my health record would be just one aspect of it. And that… but this is about patient space, so therefore, completely up to them as to how they wish to use this space and who they wish to engage as their healthcare provider. You know, as people, facilitate their wellness journey in life". [R2]. "I see technology as the fourth part of the, aside from the clinical side of it or medical staff, just put that to one side. I think the four bits for me are the exercise, nutrition, a different mindset around health and this is my view, health and well-being and technology". [R20]. "There may be ways to combine all of that into a, an ebook, that could go to nursing home, family, carers, GP, anybody who is involved in that persons care, hospital in the home, rehab, they get a comprehensive guide, now the issues with that is the not all aspects of the guide would apply to every single patient. So then with any guide, you are going to piece together as an eguide, you would need to be able to pull the relevant components and exclude those that are were not relevant. So would need to be almost an editable, you know, booklet. So, I don't know whether it's possible but just a checkbox of all the content that you would want to provide there so that gives to the patient. And then it essentially creates that document specialised to that patient as opposed to all these different professional". [R15]. "And often these people have multiple different care providers or family members involved, and communication between them, can often be like Chinese whispers, so things change throughout the time. So if there's something, you know something they can access, where they can get correct, right information, i think that will help these patients. One of our key things is communicating with these patients, local health providers and their GP's and our communication with them at the moment is generally a discharge summary. And the information in that is so that we have to, with interns, all then type up and write and there can be things that are missed. You know, i think having some other form of record directly links to you know, what's happened to them in the hospital could be useful. Again, that access to the GP immediately is very useful as well". [R8-]. "She [Orthogeriatric nurse practitioner] does but this would be specifically to as part of working out what content needs to be on the website to do a follow-up phone call few weeks after discharge. They want the questions, you know, you have and what sorts of things that you would like to know at this point and then based on that you can then work out what sort of content in terms of answering questions, you can then put on the website." [R9]
	Patient Education	Process by which health professionals provide specific and detailed educational activities and information to patients, carers and family members so they can actively participate in their healthcare and any treatment they may be receiving	"Truly educating somebody means that there is going to be change of behaviour. There is also change as a result of what they have got they now have changed in terms of their understanding or their ability and likelihood and actual actions following that process. Having just read and or understood the information without actually making any change or different, is not educating somebody. And those beyond that information provision, they need the processed test to see that their understanding is there and the ability to apply that information, test how they will apply, get feedback on that and then allow them to make it adjustments as required to ultimately reach the goal of applying that information to and achieving the outcomes, the information is designed for or to facilitate." [R2]. "I think, often, individual education is challenging. I think actually society education has worked lot better. You know, we seen that with smoking becoming a societal sort of change, doing one-to-one trying someone to stop smoking, didn't really work. Doing a society change of stopping where people could smoke becoming less of a cool thing to do, stop people smoking. We have done with patients getting sore throats and colds, going and saying it's a waste of your time going to GPs and having an antibiotic. Number of times GP's will still get the drugs if they turned up, is still there. And so I think educational changes should probably be considered more as targeting as a societal approach rather than one-on-one approach. You go and see a doctor and he spend lot of time explaining you understand you don't need medicines. You go home and now tells that partner or your mate on the phone, ah, the doctor didn't give me the drugs. They immediately go… ah… why he didn't…. you don't remember half the education what commits you at that point. And so you end up with that bad feeling again because your mates and peer pressure being that you have mistreated or unfairly judged". [R4]. "I think definitely there is role for ehealth in patient education and reinforcing sort of their understanding I think we can include things like what is your expected, sort of, care pathway while you are in the hospital, just as a general sort of rule, so you know, before the operation what are you expecting, you will expect to see this doctor, that doctor, that nurse, what are the things that they want to do, the fasting and what are you allowed to do and what you are not allowed to do, and then what will happen after the operation, you know, physio will see you on day one, you will be assessed by different teams, and have that sort of simple outlines on what their expected journey will be and then perhaps at the end, leave it depending upon your progress, these are potential discharge destinations that you may be referred to…. but sort of then leave it as that and they will sort of discuss it according to progress. And I guess maybe another section on, sort of, what to do after you leave hospital, so that the things like hip precaution, clexane for DVT [deep vein thrombosis] prophylaxis and the wound care and that's sort of things. I think if you break it down in separate sections like that and make it so generic that it will apply to everyone but at the same gives them fair idea on what they are going to have, in terms of their journey". [R14].

Table 1 (continued)

HBCSS category	Theme constructs	Theme description	Quotes
	Behaviour change	A comprehensive strategy involving behaviour change approach, supportive policy environment and the empowerment of people to gain more control over making informed decisions about their health and well-being	"Absolutely and that's often with these patients there are multiple losses involved with these patients so they come in, they have have lost their independence, they have lost their health, and they have just lost their function. They face the prospect of loss of their home if they are not going home. So there is multiple layers that we often have to deal with these patients. So, there is quite a bit of almost grief counselling if you like with patients like these. Because if they don't get back home, they gonna be in huge transition, a life transition for them and we all appreciate our independence. So, it is really hard for some patients and for their families too acknowledge and to deal with" [R13]. "So we always work from a safety first perspective if you like so if we are talking to patients about being as safe as possible at home, that can be, covers a huge range of things, but so, like we do a psychosocial assessment and work from there but it could be anything, from talking to a patient about, you know, buying a personal alarm for example and making sure they wear it to talking to families about making sure there aren't mats in the house, that can, you know, could cause them to fall or lots of older persons are very reluctant to use walking aid, even though that would increase their safety so walking stick or walking frame, you know, I can't tell you the number of times they have said, no, that makes me look old, you know, they are in their 90s they won't use the frame. So trying to just educate them around how their use of that frame will increase their safety at home and potentially allow them to remain at home and all of that. And trying to get them open to the idea of accepting home save us...." [R13]. "If you want to change in activity you then looking more habit creating. Habits as you know, very hard to recreate and remake. The best way to make habits is to actually use habits that people already have. yeah.... So one of the greatest ones that say.... habits already have is someone, you know, everyone brushes the teeth, everyone usually hot drinks at some points of the day, everyone gets to the toilet, everyone sits down at some point during the day, to watch TV or read a book, whatever, you know. So if you can link it to the those habits, people already have to prompt them to do something extra on top of that habit, then that's probably not a bad win, easy win to be with". [R4- Orthopaedic consultant].
System Encompassing aspects of operational mechanisms and supporting infrastructure requirements	Personalisation	A whole-system approach, integrating services around the person including health, social care, public health and wider services	"For older person, there are different aspect of life, for example, it could be the nutrition, it could be exercise, and different things like that. I think they will, we will, if I am the older person, I would like to have some general information plus it's very important that this information is also personalised to me. Otherwise, it's like me reading the google, right. There are so many stuff which I don't know whether its relevant for me. So personalisation of this factors like exercise routine and nutrition and what else, even sleep, I don't know. And then asking me questions about whether I am doing things whether I am on top of things or whether I am missing certain things, and if something is not going right then if the system could alert me because I am an older person, I can't remember stuff. So that alerting me that you have to do this. So reminders, and tracking the progress and feeding that information to the family and rest as well as. We can't feed all the information to the healthcare providers but we have to filter and then feed in the most critical bits that require their attention". [R16]
	Mode of content delivery	Aspects of wider digital infrastructure such as access to network connectivity, digital channels making use of multimedia or mobile app-based communications, and offering messages in a variety of formats (such as text, audio and video)	"So different formats, first of all, at a level of mobile or web, right! different types. So older people may, we have, I think, maybe this, I don't know, how many, how many people have laptops and how many have mobile, I am not too sure whether, I am pretty sure there should be evidence to this. So support, what I am thinking, maybe they are more into web kind of applications rather than mobile, mobile is small, don't know, have to check that out. Anyways so that's one of the choices, first of all we have to make when are going for the prototype. because after that we can always switch, we can have both. But at the start we need to decide, okay, are we going with mobile or are we going with web. First choice and then different formats means different ways of presenting the information, right! So, depends on the information, depends on the type of information". [R16]
	Value proposition design	A complex design strategy requiring that stakeholders are brutally honest in determining the value of a new digital tool for their everyday work	"Okay, developing the first bit its easy, from a technological perspective, it's a kind of a knowledge hub. So you need to have this content available and then have roles and permissions who could view this content, and identify which content has to be there. So from technology side, it would be very simple, not a very simple problem but a simple problem. But then the other bit that you are talking about is quite complex. So then because these set of requirements are kind of clear to us, right! But that set of requirements is not very clear, we don't know, specially from a technology side of point, I don't know what exactly is happening and we don't have that knowledge so if we have developer, we have to be very clear on the requirements. So yeah, I think developing the first bit is easy, second bit is going to be hard." [R16]
	Trust	Strong foundations leading to meaningful engagement with the digital health solution by participants, including management of data	"I think the big problem now is misinformation and there's a lot. If you look up any symptom online, you can find, you know some horrible things about anything you want. I think that is misinformation and it's a big problem and now that social media.....anyone can have a voice about anything. And maybe people who do not specialize in those areas having voice and then saying incorrect things. So i think, that is something that has potential dangers and potential risk to patients. So i think having a hospital based or state or SA health based or whatever it is platform that patients know they can trust, and that is appropriate information by the government or by you know, by doctors that is targeted to them for things that they are, you know, interested in knowing at a level that they can understand, I think that's useful and I think if we can just say direct patient with these questions". [R8]. "So, it's about getting endorsement may be from professional associations. You know if its... because, I mean, you wouldn't want it to be duplicated, its wasted effort. You know that's why I said, you growing... you done hip fractures, somebody else should do something else like to build on rather than to just keep on build hip fracture, so maybe we went to some organisations or whatever then it will be a collective effort, more likely to have buy-in from more groups that would improve its trustworthiness". [R5].

Table 1 (continued)

HBCSS category	Theme constructs	Theme description	Quotes
	Financing	Access to capital required to develop, implement and maintain digital health solutions for healthcare including public funding and innovations through private and social enterprise	*"The biggest issues is really for the system is how you pay for it. Not so much the consumers have to pay for their own app, which is fine, but how you pay for the health providers to provide inputs into the app. So if you have a platform, biggest thing, for example, with general practices, the ones I know, they can't claim an email consultation. They can claim for teleconsultation, they can't claim a text based conversation, so you can't claim an ongoing relationship that is digitally run. So I think we need to unlock a little bit. There is where I think there is big stumbling pocket. Its fine for, minor GPs, loves new toys, toys for people with, tech people but they had to bring it to the sustainable model post the intervention. You had to find out financial model that underpins it. So that's where we have run into brick wall. Because we can't, there is no financial, medical benefit scheme are here to tackle frailty. Just as an example". [R20].*
	Privacy	Ways in which digital health solutions collect, store and access data to inform best healthcare outcomes for patients, health system without any coercion while maintaining transparency through appropriate governance mechanisms	*"I, you gonna make digital solution acceptable to the health system, per say, privacy issues, need to be dealt with, trust needs to be dealt with, usability, I don't use my health records, I don't add anything to it because I don't have time and is not in my flow of work. It's not perceived to be valuable to me at the moment. The moment I get a patient, I do, it will hit me, one moment the patient gets to hospital and they will say, look we access my health record and we saved their lives because we found that on the ward, per say. Then I will opt in. So there is a whole issue of who all are area doctors, the issue of the group that waits and picks up later than ..... so, there is a whole process of digital. So I am waffling. One of the thing is try to get and say that- from a health system service perspective, we have to trust and move their mindsets to technical solutions to health problems. And where I think, if I look at the marketing side of it verses the health side of it, I will have look at the apps I use because they are valuable, they are easy to use, they are easy running app, to download my running app, garmin". [R20].*
	Ownership	Digital health enabled model of care must have ownership determined by relevant stakeholders based on robust assessment and best-practice evidence	*"Who takes who, I guess what I am trying to say is who shoulders that risk, who is modulating, reviewing, accepting changes, and actually seeing patient information and acting on it, appropriately. And who is taking the risk..... and to be able to ask people that you might need to speak to some of us, say for example the community services, for example, the hospital, and the home services. So how does what is the risk management strategy from that point of view. Because if you are going to make it interactive, someone needs to take ownership of that model. So where does that ownership, lie. And is SA health prepared to take that risk". [R19].*
	Mechanisms for embedding change	Broad strategy using systems approach to embed digital health solutions and services harmoniously	*"Well I think as I said, it comes back you can have a big thing and try to tackle the whole world, you never going to anywhere, because it's never going to join up. So at the end of the day, you honed in on hip fracture, then you have to decide next where in hip fracture, so is it going to be a clinician, is that your target group? so who is your target group? then OK, you have decided its the consumer, I actually think even in developing the prototype, you actually try to just deal with that message and use, create a platform that will deliver on that message effectively and then if it can do that then you build on.... like its like building the foundation and then building on top of it and expanding it out right.". [R5]* *"This is a facilitator of person-centred and integrated care.... you are empowering patients and putting a lot more the onus of the care of their own wellness back on the patients in the community. So in it's own right, shift the burden of care away from specialists and in specialists centres and put that responsibility back onto the patient and in their local community because you will empower them with the health literacy they require and in a longer term, you empower them to have a healthier lifestyle that is more achievable because of better understanding and better support through. .....more, and create more liaison type of roles and using technology; we will be able to deliver healthcare..... this is an idea or concept that would fit completely with the direction, need, perceived direction of future of healthcare. So I imagine this should be lot of support by, you know, at a government level, ultimately, for such a system. And that it would also allow at a disease or an injury level or specialist level commercialization of, you know, modules or units or apps that will have specific purposes around specific health challenges that can be created. And so therefore, you allow commercialisation or commercial opportunities to also help grow into the system". [R2].*

section are based on the further grouping of close thematic constructs under the categories of the HBCSS framework.

Context

Frailty and digital literacy

Study participants felt that hip fracture care is complex, reflects heterogeneity in terms of health and digital literacy, and is determined by the patient's intrinsic capacities and social circumstances. On one end of the spectrum, some patients are independent, whereas on the other end, they are frail, have poor nutritional status, and require permanent residential aged care support.

Participants agreed that digital literacy among patients is also variable; patients range from being technologically savvy to finding emerging technologies difficult to comprehend. Additionally, participants expressed the opinion that older people may not have access to smartphones, or the social support required to navigate such devices. However, participants felt that this scenario will change in the future, with older people more likely to have experience using technology.

Patient/carer participation and social support

Participants highlighted the empowerment of patients and their family members to take responsibility for patients' own health, especially in relation to exercise, nutrition, and the avoidance of sedentary behavior. By improving access to credible information and involving patients with their family members and designated carers, self-management and recovery could be optimized.

Participants felt that digital technologies would enable patients to better engage in conversations with their healthcare providers about their care processes. These solutions could range from telephone follow-up to interactive telerehabilitation guided by the expectations of patients and their family members and consider cultural and language preferences.

Structure and culture of existing practice

Study participants responsible for the coordination of multidisciplinary care mentioned that the model of care in the local setting is consistent with best practice evidence. However, there were significant gaps around improving the quality of healthcare and patient satisfaction. Some of the suggestions were process measures, primarily focused on the context outside of in-hospital care, the inclusion of minor fragility fractures, and the extension of multidisciplinary care from 5 to 7 days a week in the acute care setting. Participants also felt that there was a need to improve the coordination of

care between different disciplines. An orthopedic consultant suggested that unlike the health system within the UK, the health system in Australia must embrace orthogeriatricians. Geriatric services must be available on weekends, as this may address missed opportunities, such as checking the bone profile of patients.

Another orthopedic consultant felt that there is a difference of opinion regarding delaying or not delaying surgery based on the trade-offs between ensuring better health outcomes versus preventing complications. Furthermore, it was highlighted that the role of the anesthetist must become part of a coherent shared care model aligning with best practice guidelines to reduce variations in the availability of anesthesia care across different practice settings.

The study participants also felt that there is a dilemma around how interns understand the care processes in comparison to the registrar within the orthogeriatric model of care due to their training orientation and experience over time. Although interns are an essential part of the orthogeriatric model of care, communication with patients often lacks the depth required to understand the nuances of coordinated care and patients' expectations due to frequent handovers as interns work in shifts. Participants suggested that patients expect uniform coordinated services across disciplines and are unaware of the subtle differences among healthcare practitioners. Participants also felt that besides hip fractures, there are other priority areas for the orthopedics department requiring more attention from the workforce. They opined that even with a dedicated orthopedic nurse practitioner looking after the multidisciplinary care coordination of hip fractures, staff from different disciplines may struggle to appreciate each other's roles and have conflicting priorities; thus, there is a need to improve mutual agreement over the care of these patients.

Innovation and holistic model of care

A study participant considered the implementation of a telerehab program at home to be innovative. Describing the experience, the participant emphasized rapport building with patients at the beginning of the process, tracking patients' progress over time, and connecting patients with other services. This type of approach was also supported by another participant who suggested that hip fracture needs to be considered beyond local tissue damage (medical model of care) and toward a more holistic biopsychosocial model of care. This involves taking into account the family as a whole unit of care.

Content

Digital health hub (DHH)

When mentioning a patient electronic health record initiative recently rolled out across Australia (My Health Record), a study participant described the potential digital solution as a digital health hub. This hub could provide comprehensive care centered around patients through the provision of quality information and education and integrate different services as per the expectations of patients corresponding to their needs and circumstances. A general practitioner (GP) opined that a model of care supported by digital health would require embracing technological advancements, and such a change in mindset would help focus on overall health and wellbeing, including exercise and nutrition.

Study participants suggested different communication strategies for the hub where multiple care providers, including GP practices or family members, could be engaged through a trustworthy source. There could be an electronic booklet containing comprehensive information on various aspects of care, and relevant components could be pulled out and applied as per the needs of individual patients. An orthopedic registrar suggested that there are different care pathways where patient-centered communication is at the heart of coordinating services, which are often determined by the changing circumstances of the patient. Such a digital health hub could possibly overcome some of the gaps in existing mechanisms, such as with respect to the sharing of one-size-fits-all discharge summaries. A key care coordinator within the hip fracture context, such as an orthogeriatric nurse practitioner, could be engaged and interact with the content of the digital platform based on the follow-up requirements.

Education and behavior change

Patient education must adopt a biopsychosocial view of health rather than merely focusing on the hip fracture injury. Many of the participants argued that education does not equate to the provision of information. Educating patients is a process that involves taking into account their changed circumstances with respect to the injury and likely adjustments they will make on their care pathway. Education must include both patients and their family members, who already may be contemplating several changes and behavioral patterns during the transition process following a hip fracture injury.

A consultant suggested that health promotion and community education, which have worked in contexts such as controlling tobacco use or countering over prescription of antibiotics for the common cold, would yield better results

than educating individuals. At times, the latter strategy may not work, as some patients return to the community and follow alternative advice from family members or friends. A clinical social worker had a different perspective around patient education and behavior change, suggesting that it is almost like counseling a patient who is on the brink of losing multiple things, ranging from functional independence to the house in which they spent their life prior to the fracture.

Digital health can be utilized to educate patients and their family members. This education can begin during the hospitalization period, informing them about the details of each care process within the care pathway. Essentially, this will help manage the expectations of patients and their family members. However, caution needs to be taken to avoid overwhelming patients with information that may not be appropriate to their stage of care.

System

Personalization, mode of content delivery, and value proposition design

With respect to the mode of content delivery, the participants believed that digital health solutions need to be personalized at the level of individual patients. The provision of information can be comprehensive, but information must align with the respective stage of care. A computer scientist suggested that developing a digital health knowledge hub may seem easy from the point of view of sourcing content and defining roles around access; however, operationalizing the hub would be complex. Therefore, there is a need to consider establishing effective mechanisms of communication and agreement over requirements and expectations between the software developer and relevant stakeholders responsible for designing and delivering the model of care.

A consultant in orthopedics suggested that information packages, if aligned with the regular habits of the individual, can be more effective than trying to create a new habit or routine. A range of different formats, such as texts (written information in the form of existing handouts or electronic reading), podcasts, and multimedia (videos or interactive solutions to facilitate the active involvement of an individual who can interact and exercise choices), need to be developed for the optimal engagement of patients and their carers on several aspects of care while maintaining general health. Another participant suggested the emerging role of avatars—life-like characters that can digitally interact with patients or become part of virtual reality solutions. The digital health platform could also be a resource center for healthcare practitioners, particularly those at the frontline, including junior doctors.

Trust, financing, privacy, and ownership

There were some areas highlighted by the participants requiring further debate and discussion. These included financing the digital health hub, essentially from the perspective of different healthcare providers. Experiences shared by a GP suggested that intricacies within telemedicine require careful consideration. For instance, compensation is provided for teleconsultation but not for any ongoing digital interactions such as emails or text-based conversations. Furthermore, this participant suggested that when piloting the digital health hub, GPs would be enthusiastic and support the initial implementation phase; however, after the initial pilot, a roadmap should indicate not only how this will be scaled up but also how it will be financed and incentivized.

Participants agreed that internet access is likely to continue to increase in the future, and people may become confused at times due to information overload and misinformation. Thus, there is a need for an authentic digital health solution that could address these issues and guide people in the right direction to access accurate information. A geriatrician suggested that endorsement by professional associations would likely improve information trustworthiness and possibly reduce duplicate efforts by mutual sharing, enabling people to build upon each other's learning. There is also a need to shift the mindset of healthcare providers toward technology-focused solutions wherever possible.

Similarly, another geriatric consultant believed that ownership issues should be addressed once a digital health solution is implemented within the healthcare system. Risks associated with accessing patient information and acting upon it, modulating, reviewing patient education resources, and tracking progress would require careful safeguards.

Mechanisms for embedding change

The study participants believed an appropriate mechanism needs to be in place to allow different stakeholders to interact with the digital platform uniformly and seamlessly according to their role in the hip fracture care pathway. Their engagement also involves assessing patients' health and health literacy and providing them support wherever possible. In participants' opinion, deploying this type of innovative digital health platform would involve intricate processes that would enable positive changes to hip fracture care and improve patient outcomes. It would include communicating with a software developer in a language that can be understood and that is based on mutually agreed-upon priorities. A solution-focused approach, instead of one-way communication or direction, should guide collaboration. It was also suggested by participants that the engagement of experts in education and computer science must be consistent throughout the development, piloting and wider roll-out of a digital health model of care. Furthermore, the participants commented that the digital health content must be easy to understand. It must be assumed that patients and their carers engaging with this platform have a primary education level, and the platform must align with their day-to-day activities.

Another participant suggested that although the intent is to develop a comprehensive digital health solution, it is important to consider the development process in stages, similar to the way a house is built. Study participants reinforced the notion that it is critically important to keep patients at the center of care by empowering them through healthcare practitioners. The platform could also help upskill healthcare practitioners through a mutual learning process. With these embedding mechanisms in place, new liaising roles would be created using technology to deliver new models of care and behavior change.

Discussion

This study involved the perspectives of various stakeholders from multiple disciplines, including clinical, allied health, computer science, education, research, and policy. It contributes to an ongoing program of research focused on a personalized digital health hub (DHH)–enabled model of care facilitating recovery from fragility fractures and potentially other health conditions [1, 4, 5]. We followed a knowledge translation approach to engage people who could influence micro (clinical practice), meso (health setting), and macro levels (thought leaders influencing policy and research agenda). Some of these stakeholders could remain key players during the next stage of implementation, facilitating the integration of the digital health hub and advocating for a person-centered integrated model of healthcare delivery. The findings from this study were classified into 18 thematic constructs embedded within three categories, context, content, and system, which correspond to a theoretical human–computer persuasive systems framework, HBCSS [4, 12]. These thematic constructs covered a range of patient factors, including the role of family members, social support, and the characteristics of existing healthcare delivery, as well as the enabling of computing functionalities and requirements to operate within a multidisciplinary environment.

Stakeholders within our study agreed that new models of care using digital health could strengthen the existing hip fracture care pathway. However, collectively, all of the different healthcare providers associated with the care pathway must take into account patients' needs and outcome expectations, moving beyond the medical model focused on the repair of local tissue damage. Overwhelmingly,

contemporary evidence suggests that a significant number of hip fracture patients, once admitted to acute care hospitals, do not return to their pre-fracture residence and are unable to attain optimal health status [2, 20]. Thus, an MoC must go beyond clinical practice guidelines and incorporate practical delivery issues regarding for whom, when, where, and how care is best delivered and re-evaluated [21]. This can become complex due to a multidisciplinary workforce, links with secondary and tertiary care services, the biopsychosocial needs of the patients, and frequently changing organizational structures. However, our study findings take a step further, highlighting that mere change within the organizational structure is not sufficient, and a new mindset embracing technological advancement is crucial for shifting an organizational culture toward envisioning a holistic model of healthcare delivery. There are huge gaps; for instance, primary care offers a generalist approach, and while older adults with multimorbidities represent a large proportion of GP consultations, the required access to other community services is patchy [6, 21]. It is often left to the patients and their carers to coordinate and navigate the range of services, which could be influenced by their social circumstances and priorities [21]. Thus, patient education and the provision of accurate, timely, and adequate information could play a vital role in improving engagement and participation in the recovery or rehabilitation process within a MoC [8]. The DHH-enabled MoC could potentially be a powerful tool empowering patients to take greater control of their health goal(s). Moreover, the processes within a DHH can link patients to a more extensive network of specialists, general practitioners, and community carers [4, 5].

According to the World Health Organization (WHO) Integrated Care for Older People (ICOPE) guidelines, when working toward solutions for older people in the community, we need to acknowledge that older people's health is on a wide spectrum, ranging from perfectly healthy to moribund status based on their "decline in the intrinsic capacities" [15, 22]. Our findings from this study also suggest that future healthcare must focus on an evolving aging physiology, yet the current understanding within the practice environment may be inadequate to fully incorporate this view. The care processes become complex due to different interacting components defined by each patient's unique needs and sets of expectations as well as the health workforce capacity. Our study findings suggest that the coordination and integration of multiple disciplines would require innovation and the effective engagement of patients along with their family members as a whole unit of care. A similar view is supported by some of the contemporary guidelines and recommendations around innovation diffusion and health workforce innovations [23–26].

Musculoskeletal conditions, including fragility fractures, are among the key contributors to the global burden of disease [27] and are predicted to increase, in terms of both their impact and prevalence, due to an aging population and the increased prevalence of noncommunicable diseases [27, 28]. Emerging evidence suggests that digital health interventions improve care outcomes for fragility fractures, osteoarthritis, and chronic low back and neck pain [29–35]. Nevertheless, critical questions need to be raised around what constitutes a digital health "intervention package," and its effectiveness must be tested pragmatically according to the local implementation context [1]. The debate around patients' engagement in their own care has predominantly remained within the confines of narrow pilot research projects or at the level of a philosophical argument without full realization of its practical effectiveness [36]. This may be attributed to a misguided perception of engagement strategies such as cocreation and/or coproduction, which essentially represent "values" and not necessarily intervention strategies [36]. Therefore, while we consider these value-based strategies an important way to empower patients, their family members, and healthcare providers together, understanding other aspects of complexity within an MoC would drive successful implementation [36–38].

Access to technology is a multifaceted factor, as there is likely to be a digital divide due to varied levels of e-literacy or an inability to trust and navigate the plethora of information available online [9]. Existing digital health solutions target healthcare providers and consumers differently. Electronic health records mainly allow communication, data management, and clinical decision support among healthcare providers; these records are not primarily meant to engage patients [39]. The Australian My Health Record (MyHR) is a national, personally controlled electronic health record that can track the journey of patients within the healthcare system through a shareable summary of an individual's health information [39]. MyHR envisages that different healthcare practitioners will eventually move away from the traditional "push" method of accessing patient medical information and towards a "pull" method of information sharing [40]. The latter approach allows healthcare practitioners to access relevant information by pulling information from individual health records rather than pushing a request to other care providers for similar information [40, 41]. A similar change in consumer behavior can be seen in relation to accessing current affairs information. Consumers are rapidly shifting from using conventional media platforms that push current affairs information through television sets to digital platforms such as YouTube or exclusive interactive platforms. The latter multimedia platforms have enabled consumers to pull information according to their choice, thus forcing the content creator to ensure quality, authenticity, and a safe interactive environment [42]. Nevertheless, one must also learn from the recent rollout of MyHR in Australia that

despite a 90% subscription rate by patients, less than a quarter of healthcare providers were using the system. The top priorities for this system have been clinical integration and the improvement of patient experiences; however, there could be a significant gap in terms of educating practitioners to use digital systems and facilitate patient engagement. Acknowledging these gaps and working around effective solutions could incrementally improve patient outcomes and service delivery [7]. The findings from our study highlight the complexity of the financing potential digital health hubs, privacy, ownership, and the establishment of trust along with the need to create new business models. Different business models utilizing digital technologies are now emerging in the commerce, entertainment, and media sectors and are demonstrating success with financing, trust, and privacy. This gives us an opportunity to discuss how these business models can be adopted and best translated into health settings [43, 44].

This study involved an in-depth interview methodology with a wide range of stakeholders to map out potential factors that could influence the design and implementation of a DHH-enabled MoC for fragility hip fractures within a local healthcare setting. We did not recruit participants from other local health networks within the region, which could limit the generalizability of our findings, particularly in relation to application across South Australia or Australia. There is a digital divide posed by challenges due to geography, internet availability and uninterrupted internet access, people living with disabilities, and factors related to sociopolitical and economic disparities. However, some of the participants in this study had experience in diverse settings, including other developed countries and emerging economies. We believe this diversity enhanced the richness of the data and provided wider applicability of findings in terms of opening lines for multiple inquiries and future research areas. Our study also attempted to integrate early on the perspectives of frontline healthcare delivery staff and the research context, aligning with the implementation strategies for the next stage of the research program [1, 4, 9].

Conclusion

Our study, which was conducted before the COVID-19 pandemic, highlighted that the organizational structure and existing practice culture across the health system may resist change when introducing digital healthcare. However, as we are living through the current pandemic, the use of digital technologies has not only accelerated the willingness of healthcare practitioners and organizations to adopt telehealth options but also improved the engagement of consumers [7]. Compared to the last decade, there has been a rapid increase in the availability of digital health solutions by a variety of vendors, including health agencies, fitness advocates, and software companies. These applications are primarily designed to support consumers in the domain of general lifestyle and wellness, while some have been developed to support self-management of chronic disease conditions such as diabetes [5, 18, 45]. At the time when this study was conducted, we only had a theoretical concept of a digital health solution to be co-designed with relevant stakeholders. However, with critical insights from this study, including the characterization of DHH and findings from other research components [1, 4, 5, 7, 9], we have been able to advance our concept to the stage of a prototype to be tested in a real-world practice setting in the next stage of our research program. The DHH-enabled MoC will be structured to provide information related to not only hip fractures but also general health and wellbeing, including nutrition, exercise, sleep, and mental health, combined with past medical history [5]. We recommend wider consultations across a range of practice environments or specialty groups so that tailored innovative services can be negotiated, developed, and tested for implementation.

Declarations

Ethics Ethics approval for the study was provided by the Human Research Ethics Committee of the Central Adelaide Local Health Network (Ref: R20181005, HREC/18/CALHN/687). Governance review and authorization were granted by the Royal Adelaide Hospital (SSA/19/CALHN/59, Ref: 11183) and The Queen Elizabeth Hospital (SSA/19/CALHN/57, Ref: 11184) and further approved by the Human Research Ethics Secretariat and Legal and Risk Office of the University of Adelaide (Ref: 3338).

Conflicts of interest None.

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