REVIEW PROTOCOL

eHealth interventions for the prevention of pressure injuries: a scoping review protocol

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Abstract

Background Pressure injuries (PI) are an important quality and safety issue in healthcare, with an annual cost of treating PI in Australia estimated to exceed $A983 million. Electronic health (eHealth) interventions are increasingly being used to assist consumers and services in the prevention and management of PI. Digital health or eHealth involves health services and information delivered or enhanced through the internet and related technologies. This scoping review aims to: identify and map existing eHealth interventions for the prevention of PI; map learnings from these studies related to the non-adoption, abandonment and challenges to the scale-up, spread and sustainability of these devices; and determine gaps in research related to the use of eHealth interventions in the prevention of PI.

Method A scoping review will be guided by the methodology outlined by Arksey and O'Malley and the PRISMA-ScR framework. MEDLINE, CINAHL, ScienceDirect and the Cochrane library databases will be systematically searched using a piloted search strategy. Two reviewers will independently screen all titles, abstracts and full text articles. Any conflicts will be resolved by a third author. Consultations with authors holding clinical expertise in PI prevention and wound care will further inform the synthesis and reporting of findings. Findings will be presented in tabular and narrative format.

Results This scoping review will assist in the translation of existing clinical practice guidelines into practice. By harnessing the power of technology and data, effective eHealth solutions will facilitate greater client and carer involvement and earlier intervention in PI by supporting clinicians to tailor care to an individual's needs and preferences and providing the right intervention at the right time.

Keywords eHealth, pressure injury, scoping review

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Introduction

Pressure injuries (PI) are a global health issue. They are defined as "localised damage to the skin and/or underlying tissue, as a result of pressure or pressure in combination with shear. PI usually occur over a bony prominence but may also be related to a medical device or other object"[1]. They can be a painful, costly and often preventable healthcare complication[1]. PI are an important quality and safety issue in healthcare, highlighted by their inclusion within the Australian national safety standards[2]. The prevalence of PI remains a concern, affecting multiple service settings (1.1–26.7% in hospital settings; 6–29% in community settings; 7.6–53.2% in the nursing home setting) with significant healthcare implications and consequences[3]. Hospital length of stay and readmission rates are greater in individuals who develop a PI than those who remain PI free[4–6]. At the national level, the annual cost of treating PI in Australia was estimated to be A$983 million in 2012/13[7]. The prevention of PI is a rapidly developing area of research. However, the evidence base supporting the use of technology in the prevention of PI has not yet been systematically reviewed and mapped.

A variety of population groups are deemed at high risk of PI. Those with spinal cord injury are at greatest risk for developing PI due to the combination of immobility, loss of sensation and other physiological factors including alteration to vascular supply, temperature control and autonomic

response, and nutritional status[8,9]. Ageing also increases the risk of PI due to biological changes to the skin such as decreased cross-links of collagen fibres, the flattening of the dermal-epidermal junction and decreased sebum production which renders the skin increasingly fragile, dry and inflexible[10,11]. Further physiological changes in ageing such as weight loss, reduced muscle strength, and reduced physical activity also places the older person at an increased risk of developing a PI[12]. Diabetes populations can also be at increased risk, particularly when individuals have complications such as neuropathy and/or peripheral arterial disease[13].

Interventions to reduce the incidence of and manage patients with PI tend to focus on pressure re-distribution to reduce the magnitude and duration of mechanical load[14]. This is generally achieved by repositioning body parts and implementing dynamic surfaces that help to redistribute pressure[15]. There are a range of interventions available; however, these have varying degrees of effectiveness and there is a lack of cohesiveness in their implementation[16]. eHealth interventions are increasingly being utilised in PI prevention through modalities such as mobile phone applications that enable timely access to education, remote consultation with health professionals, and social and emotional support from other peers[17–21]. In community settings, where there is less opportunity for healthcare professionals to view the skin, and where clients may be reluctant to share signs and symptoms of PI online due to modesty issues, supporting client and carers to express care needs early is essential[22–25]. Early detection of PI is known to lead to reduced costs to health services and impact on individual client wellbeing[26,27].

To better support those at risk of PI, who are often managing competing health needs, health promotion efforts must provide education and actionable strategies that enable client engagement in care processes[1,28]. Building a sense of self-efficacy and social support to initiate and maintain desired self-care strategies has been found to have some benefit in the management of cancer, multiple sclerosis and obesity[29–32]. eHealth interventions may have an important role in addressing these issues. eHealth is defined as:

> ... an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve healthcare locally, regionally, and worldwide by using information and communication technology[33].

The setting or context for adopting eHealth interventions is another important consideration. The Australian healthcare system, for instance, is a mix of public and private health services. While this hybrid system is successful at offering a high standard of care, there remain areas for further improvement. For example, the fragmentation of care remains a persistent issue within the Australian healthcare system and the further privatisation of healthcare services, as well as necessary reforms to public agencies such as the national disability insurance scheme, have compounded these issues, creating barriers to centralised information sharing and lessening equity of access[34,35].

However, technological innovations being explored in private healthcare settings offer opportunities and resources that can support preventative approaches when applied to the public health system. Notably, a thoughtfully designed eHealth intervention could enable clients and carers to participate more effectively in injury prevention and facilitate greater collaboration among multidisciplinary healthcare teams. As the development of new eHealth interventions can be costly, it is important to first identify existing interventions that have the potential to be applied in the Australian context and are fit-for-purpose, meeting the specific needs of local stakeholders that are currently being underserved. Further, the identification of strategies that may support the implementation of eHealth interventions is necessary in averting the potential to compromise the quality, safety and efficiency of patient care if they are not implemented effectively[36,37]. Conversely, abandonment of eHealth interventions is described in the literature; the need for user-centred design has been identified as a way to support the implementation of eHealth interventions and reduce the likelihood of its abandonment[38,39]. Thus, it is also necessary to broaden and focus our understanding of the barriers to implementation and best approaches to incorporate eHealth into PI prevention by learning from those at the forefront of research in this field[17–21,40].

Some well-documented challenges in the use of eHealth interventions include non-adoption and subsequent abandonment by clients and clinicians, as well as potential failures to become part of mainstream practice and sustain such interventions within and across services[37]. The need to capture the complex interplay of factors that contribute to the challenges of integrating eHealth into everyday healthcare is widely recognised with frameworks available that assist in the development, implementation and evaluation of eHealth interventions[37]. Furthermore, co-design has been identified as a useful approach in the development of supports for self-management of various health conditions that better meet patient, carer and clinician need[41–45]. Co-design approaches enable design based on the end users' situations, needs and interests, and can help to ensure access for those from diverse socioeconomic backgrounds[46,47].

To enable co-design approaches to the development of an eHealth intervention it is necessary to synthesise and evaluate research undertaken to date and use this as a foundation for involving consumers in the design and/or implementation of eHealth solutions within local contexts. The Nonadoption, Abandonment, and challenges to the Scale-up, Spread, and Sustainability (NASSS) framework is

designed to assist in theorising and evaluating healthcare technologies[37]. The framework includes the following seven domains: the condition or illness; the technology; the value proposition; the adopter system (comprising professional staff, patient and lay caregivers); the organisation(s); the wider (institutional and societal) context; and the interaction and mutual adaptation between all these domains over time, and is not intended to be used as a checklist rather should be used reflexively to guide conversations and help generate ideas[37]. Therefore, it is an appropriate framework to guide the collation and consideration of current eHealth devices used in PI prevention and the factors influencing their successful adoption over time.

Objectives

This review will generate a knowledge base, built on existing literature and expanded through the identification of gaps in knowledge, to assist in the development of new eHealth interventions and ensure their successful implementation and sustained use in the prevention of PI. The current review will also help to identify key topics and questions to explore with consumers (clients and clinicians) when developing an eHealth intervention that aims to support enhanced self-management of PI prevention[42]. The research question that will be answered in this scoping review is "What eHealth interventions are available to prevent pressure injury in individuals at risk?

The scoping review will address the following aims:

- Identify and map research evidence regarding the use of eHealth interventions for the prevention of PI in individuals at risk of PI.
- Describe considerations given to the design, development, implementation, scale up, spread and sustainability of existing eHealth interventions by mapping included studies using the seven domains of the NASSS framework[37].

Methods

This scoping review will be conducted using the scoping review framework articulated by Arksey and O'Malley[48] and will be reported in accordance with the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist[49]. Consultations with team members with expertise in PI prevention and wound care will inform the synthesis and reporting of findings. Quantitative and qualitative findings will be presented in tabular and narrative format.

The protocol for this scoping review is registered with the Open Sciences Framework (OSF) registry (https://doi.org/10.17605/OSF.IO/D6WHK). Prior to registration, the protocol was reviewed by three researchers with assistance provided by a university librarian specialising in search strategies, and health and medical research.

Search strategy

This study accessed databases from CINAHL, MEDLINE, ScienceDirect and the Cochrane Library. Search terms were derived for MEDLINE (Table 1) and later adjusted for other databases utilising database-specific search modifiers and Booleans as necessary. No language or date limiter was applied, with studies from the inception of each database until the date of the search being included. Individual reference lists from suitable articles will be manually searched for relevant sources appropriate to the aims of this study.

Inclusion and exclusion criteria

All types of original research studies, case studies and case series exploring the patient or practitioner experience of eHealth will be included. All adult patient populations which are at risk of PI and all service settings (i.e. hospital, community and residential aged care) will be included in the analysis. Studies that predominantly focus on other wound types (diabetic foot ulcer, skin tear, venous leg ulcer, arterial ulcer) will be excluded. Furthermore, studies that relate to the management of existing PI only as well as studies completed in children or those under 18 years will be excluded.

Study selection and data extraction

A plan for article storage, data collection and analysis has been piloted prior to searches being run to test the feasibility and acceptability of the planned approach[48]. For consistency and adopting efficient workflows, Covidence® will be used to store the articles and facilitate the team-based study screening and data extraction process. One author will conduct the literature search and export the title and abstract data into Covidence® (AR). Two authors will then screen the titles and abstracts for inclusion according to the criteria (AR and AK). If differences arise, a third party will judge the abstract for inclusion or exclusion (ER or AH or PT). Full texts of relevant studies will then be obtained, and two authors will screen these for relevance with differences judged by a third party. Articles deemed to satisfy the inclusion criteria will be included.

Data charting in the form of an Excel spreadsheet was formulated and piloted by AR and AK prior to its transfer into Covidence®. Data will be extracted by two authors independent of each other. Authors of papers that contained missing data or unclear information will be contacted based on provided contact information (where available). For each eligible study, the following data will be extracted from the full text article: author; year of publication, journal, title, country of study, setting, study design, participants, type of eHealth, intervention, comparator, PI stage, design, participant numbers, randomisation information, age (mean and range) and key quantitative (numeric) results and qualitative (textual) findings. Information relevant to the seven domains of the NASSS framework – the condition or illness, the technology, the value proposition, the adopter system (comprising professional staff, patient and lay caregivers), the organisation(s), the wider (institutional and societal)

Table 1. MEDLINE search strategy

#	Searches
1	mobile health.mp.
2	(mhealth or m-health).mp.
3	esupport*.mp.
4	Telemedicine/ or telemed*.mp.
5	(ehealth or e-health).mp.
6	telehealth.mp.
7	Text Messaging/ or short message system.mp.
8	Mobile Applications/ or mobile application*.mp.
9	text messag*.mp.
10	multimedia messag*.mp.
11	Social Networking/ or facebook*.mp.
12	email*.mp. or Electronic Mail/
13	Social Media/ or social media*.mp.
14	((mobile* or cell* or smart*) adj3 phone*).mp.
15	Cell Phone/ or Smartphone/
16	andriod.mp.
17	iphone operating system.mp.
18	ipad.mp.
19	iphone.mp.
20	ipod.mp. or MP3-Player/
21	tablet*.mp.
22	personal computer.mp. or Microcomputers/
23	computer*.mp.
24	((online or web*) adj5 (education* or train*)).mp.
25	personal digital assistant*.mp.
26	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25
27	“Pressure Ulcer”.mp. or Pressure Ulcer/
28	“pressure sore”.mp.
29	pressure injur*.mp.
30	“bed sore”.mp.
31	bedsore.mp.
32	“decubitis ulcer”.mp.
33	“decubitis sore”.mp.
34	27 or 28 or 29 or 30 or 31 or 32 or 33
35	prevent*.mp.
36	Post-Exposure Prophylaxis/ or prophylaxis.mp. or Pre-Exposure Prophylaxis/
37	control.mp.
37	35 or 36 or37
38	26 and 34 and 38

context, and the interaction and mutual adaptation between all these domains over time – will also be charted[37].

Summarising, synthesising and reporting of results

The summarising and synthesising of the findings will be guided by the research aims. A content analysis approach will be used to analyse and synthesise any qualitative findings[50,51]. Extracted data will be presented in tables where the key findings will be synthesised and summarised in tables and narrative format. The discussion of the findings will be within the context of the current trends in the literature and implications for research, policy and practice. Clinical expertise will ensure that clinical relevance and compatibility is considered in the interpretation of the findings[48,52]. This systematic process will assist to inform future research needed to support the implementation of eHealth interventions at the local level.

Conflicts of interest

The authors declare no conflicts of interest.

Ethics statement

Ethics and dissemination: Approval from an ethics committee was not required as we are undertaking a review of published journal articles. Findings of the study will be disseminated through a peer reviewed journal, at conferences, and as part of follow-up future research projects involving a co-design approach.

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