Ageing in place safely

Valorisation

The chapter valorisation makes available for social and economic use the scientific findings that emerged from this doctoral thesis. Lessons learned are deduced from the multi-perspective immersion into the use and non-use of Personal Safety Alerting Devices (PSAD) in community-dwelling older persons for the respective target groups. Furthermore, activities and products resulting from this dissertation are described and the innovation potential of the research conducted research is discussed.

Relevance

This doctoral thesis addresses the challenge of technology use and non-use in community-dwelling older persons, based on the case of PSADs, from a multiperspective approach.

Ageing societies are a common issue on political and health care agendas across the globe.[1] One focus of this agenda is on "ageing in place", which promotes the wellbeing of ageing societies and refers to enabling older persons to live independent lives, safe and socially integrated in their accustomed homes in the community.[2, 3] This focus is both a preference of older persons[4, 5] and according to international estimates, advantageous in terms of societal costs,[6] as ageing in place aims to avoid or delay institutionalization. To support ageing in place despite illness or functional decline, the number and extent of assistive technologies has increased substantially in the last decade.[7, 8] The types of available technologies include devices to monitor health and to support safety and mobility, along with the promotion of daily activities and social connectedness.[8]

With regard to ageing in place the safety of older persons at home has been identified as a pivotal component.[9] Although the prevention of falls in community-dwelling older persons is regarded as crucial, to date, multifactorial and multiple component interventions can moderate the fall rate and risk of falling, but evidence for their efficacy is of low quality.[10] In addition, the home environment is widely documented as a common place for falls.[11, 12] When rapid assistance does not come, falls in particular, but also other emergency situations, have negative impacts on the health and psychological wellbeing of older persons.[13] This in turn, may jeopardize ageing in place and lead to institutionalization. It is therefore pivotal that older persons obtain rapid assistance when a fall has occurred. Accordingly, assistive technologies like a PSAD can be considered to be an essential enabler of ageing in place.

However, the use of assistive technologies for older persons in general, and specifically the use of PSADs, is still problematic. Several attempts have been made

to identify reasons for PSAD non-use, focusing mainly on usability issues.[14] User involvement is recommended to solve usability issues, as it promotes a "need-driven" instead of a "technology-driven" approach.[15] Furthermore, recent evidence suggests that no theory yet explains, nor do available technology acceptance models provide, sufficient descriptions or explanations of the technology use and non-use of older persons in the health care context.[16, 17] Health care professionals and relatives can positively encourage and facilitate technology acceptance, but, so far little attention has been given to their perspectives.[14, 18-20] In addition, health care professionals, particularly community nurses, can draw on an increasing multitude of assistive technologies for ageing in place. Thus, it can be argued that understanding technology use and non-use is a key to promoting and supporting ageing in place. Research suggests that understanding technology acceptance requires knowledge about the actors involved in its use. Understanding technology use requires answers to the "when, why and how" of technology use.[16, 21, 22] Technologies should not be considered as black boxes which can be integrated into daily life without modifying caring practice.[14] Moreover, non-use should be investigated and not pathologized as it is often motivated and active.[8, 23, 24]

Therefore, the aim of this doctoral thesis was to investigate the use and non-use of an assistive technology, using the case of PSADs, by community-dwelling older persons from their perspective, the perspectives of relatives, community nurses and general practitioners.

Target groups

The target groups who can benefit from the results of this doctoral thesis are older persons, relatives and health professionals.

Older persons

Community-dwelling older persons were the core of this thesis and were part of all five conducted studies. Their involvement in the development and testing of a PSAD prototype resulted in an innovative device for those older persons who prefer an automatically alerting, waterproof, invisible worn PSAD that can be used both in- and outdoors. In addition, for indoor use, instead of a smartphone, a so-called base station was developed to ensure reliable alert transmission.

Those older persons who participated in the studies improved their knowledge about PSADs from the insights and information provided by the research team about the different PSADS available on the Swiss market at that time. They also benefited from the discussions. Discussing and exchanging with other persons in a similar living

situation may have emphasized that the topics of safety, rapid assistance in case of an emergency and falling are issues which should be taken seriously when aging at home. In addition, the participants may have benefited from an informed understanding of how personal safety and independence can be supported by using a PSAD. In exchange with family, friends and neighbours they may have disseminated this knowledge and pursued the discussions.

Even those who did not participate in the thesis' studies can benefit from the findings. A plain language summary of the legitimation process in the format of an information brochure will be provided for distribution via community nurses, senior organizations and counselling services to older persons. Furthermore, based on this thesis, health care professionals can be taught and trained in the factors and processes of PSAD decision making, and thus older persons can benefit from an improved support and counselling service.

Relatives

Those relatives who did not participate in the thesis' studies will benefit from the findings. Similarly, to the deliverable to older persons, a plain language summary in the format of an information brochure will be provided for distribution via community nurses and counselling services to relatives. This brochure delineates the possible challenges of older persons related to PSAD use and non-use (the legitimation process) as well as recommendations for relatives (negotiation process).

Health Care Professionals

The thesis insights underline that community nurses and GPs should increase awareness regarding identifying technology need, such as a PSAD, counselling and support activities to enable older persons and their relatives to take an informed decision regarding ageing in place safely in general and PSAD use and non-use in particular. In addition, community nurses were described as a neutral source of information related to PSADs, which older persons would prefer in order to take an informed decision. GPs should be aware of their contribution by identifying critical events, by connecting older persons and their relatives with community nurses in the subject of ageing safely at home and positively influencing decision making regarding PSAD use and non-use, as some situations showed that this decision was related to end-of life decisions (hospitalisation or institutionalisation).

The importance of assistive technologies for ageing in place has increased steadily in recent years and can be expected to increase further, due to ongoing technological development and the shortage of health care staff. It can be argued that the example of PSADs emphasizes that, on the one hand, user involvement in the development of

technologies allows the identification of critical issues for later usability and thus use. On the other hand, the findings suggest in a surprising way that using or not-using a technology, such as a PSAD, is less about usability and ease of use, but more strongly about identifying the right moment to address PSAD use, knowing how to address it, having a favourable relationship with the older person, supporting the establishment of the perceived necessity, enabling access and trying out a PSAD in order to take an informed decision and balancing the necessary control in the daily life of the older person against the provision of the necessary care and support (see legitimation and negotiation process).

It is conceivable that these thesis findings are transferable to other assistive technologies, e.g. aids for mobility, hearing and vision or daily living aids, telemedicine or information- and communication technology[25], which should be investigated. Furthermore, it is conceivable that with the growing number of assistive technologies for ageing in place, community nurses and GPs will need more expertise in assessing technology needs and addressing them.

Nursing Discipline

Assistive technologies for nursing care such as a walking cane, hearing aids or lifting equipment are not new. However, due to digitalization and the increasing confluence of nursing and informatics, the variety of assistive technologies is being continuously extended and today includes information- and communication technology (ICT), robotics, telemedicine and sensor technology.[25]

This thesis emphasizes that beyond understanding the technology/device itself in terms of usability and ease of use, nurses have a role to play in enabling an informed decision regarding technology use and non-use. In the case of PSADs, they are required for opening access to devices, providing information and knowing how to support, coach and evaluate their use as well as developing strategies for how to re-act in case of non-use. Additionally, they also contribute by identifying all those persons who are involved in device use, in order to clarify the path and activities of involvement. It is conceivable that with ongoing digitalisation this kind of support will also be required for other technologies relevant to nursing care and the interaction of nurses, patients, relatives and in the interprofessional context. It would seem important that nurses actively shape technological development and clarify their roles and activities.

This doctoral thesis indicates that using a PSAD is often influenced by the social network of the older person, i.e. particularly relatives but also health professionals. However today, relatives seem often to act on their own without professional support and enough knowledge, which may lead to conflicting situations with their parent/s, as their perception of the older person's safety differs. Stronger support and involvement

by community nurses and GPs could facilitate the decision making of PSAD use and non-use. This requires competences and skills of the stakeholders involved, for instance, in identifying and assessing PSAD need, negotiating the decision process, counselling on PSAD usability and consequences regarding daily life and coaching in PSAD use or finding strategies in case of non-use. However, the challenge currently remains that community nurses are often not involved or only involved once the older person presents a more serious support need. Therefore, two strategies are suggested: on the one hand, GPs should refer older persons to community nurses when safety and ageing in place becomes a topic. On the other, community nurses should investigate, clarify and make transparent in public what role they play regarding counselling offers in terms of ageing in place.

It can be argued that the seminal field of assistive technology and digitalization will further influence the nursing discipline. Nurses are required to develop the necessary resources, competences and skills. This can be supported by research, teaching, publication, podium discussions, videos, conferences or event organization. Discussions among researchers and practitioners should enrich and accelerate the development of nursing regarding the seminal field of assistive technologies and digitalization. Furthermore, knowledge transfer and training are required, and should be provided by further education and integrated into the Bachelor and Master's Programs of Nurses. Based on this doctoral thesis, part of the knowledge transfer should be: aspects of ease of use (usability, impact and meaning), components and influencing factors of the decision-making processes and the different roles of the actors involved.

Researchers

Researchers in health and nursing sciences can benefit from this doctoral thesis. Until today, little research has focused on the "bigger" picture of technology use and non-use in the health care context, taking one technology that is very relevant to ageing in place safely. The findings, namely the user involvement approach for technology development, the legitimation process, the negotiation process and the guided support by community nurses could be considered as an important step in establishing the need for detailed understanding of technology use and non-use processes. With the description and possible explanations of the phenomenon of technology use and non-use, further research can address intervention studies and outcome measurements on a meaningful basis.

Researchers from the fields of informatics and engineering who are involved in the development of technologies employed in the health care context as well as in the context of ageing in place might also benefit from the insights of this thesis. It found that user involvement can positively influence usability issues and ease of use

in daily life. However, in the case of a PSAD, it was found that to understand use and non-use of a device it is necessary to go beyond technical issues, such as providing neutral information, and provide recommendations on how to include the device in daily life, transparency about the alerting process and the competences of the involved contact persons and others. Furthermore, this thesis suggested that involving those professionals who are involved in later technology use seems to be essential for communication with the participants, i.e. nurse researchers acted as "translators" of the technical language and created a productive working atmosphere.

Intervention studies are needed to evaluate the economic impact of using assistive technologies for ageing in place as well as longitudinal studies which inform about long-term use. Those findings might be of interest for health insurance companies to evaluate possible financial support of technologies such as PSADs to enable and or support ageing in place. At least in Switzerland, it is not yet common that PSADs can be accessed via the basic health insurance when ageing in place.

Activities/Products

The PSAD prototype was further developed in another study, i.e. a wearable sensor with a base station in addition to a smartphone application, and tested by institutionalized older persons to improve, amongst other things, the usability and the automatic fall detection algorithm. Up to today, a start-up has been founded as part of another company, and this PSAD is available on the market in Switzerland https://www.aidemoi.ch/.

The findings (studies 1-4) were presented at national and international conferences: pflegekongress19; BFH Treffpunkt November 2019 "Gläserne Patienten – Wohin geht die Entwicklung"; Nursing Research 2018; 1st International Conference of the German Society of Nursing Science 2018; European Nursing Informatics 2017; 28th International Nursing Research Congress 2017; Conférence IUFRS 2016; 5th European Nursing Congress 2016; Swiss Congress for Health Professions 2016; Kongress für Gesundheitsberufe 2016; European Conference in Nursing Science (EDCNS) 2015; EDCNS 2018; 1st International German Nursing Science Conference; pflegekongress19.

Furthermore, the findings were published in relevant national professional journals and in a book chapter: Thilo, F.J.S. and Hahn, S. (2018). Notrufsystem im häuslichen Setting - unerwartete Verknüpfungen und grosser Informationsbedarf. NOVAcura, 10, 33-34; Hahn, S. und Thilo, F.J.S. (2017) Mitsprache in der Digitalisierung: Systematischer und praxisnaher Einbezug der Nutzenden von gesundheitsrelevanten Technologien. In 'Digitale Transformation von Dienstleistungen im Gesundheitswesen III, Herausgeber

Pfannstiel, M. Krammer, S., & Swoboda, W. Springer Verlag; Thilo, F.J.S., & Hahn, S. (2017). Innovation durch Einbezug der User. SocietyByte https://www.societybyte.swiss/?s=n novation+durch+Einbezug+der+User; Hahn, S., & Thilo, F.J.S. (2017) Seniorinnen und Senioren entwickeln mit. NOVAcura, 48, 1, 45-47. Publications of study findings four and five are planned in national professional journals: Krankenpflege, Spitex Schweiz, Schweizerische Ärztezeitung and Primary and Hospital Care.

Beyond this, findings were shared in discussions with experts from the national commission "eHealth and Nursing" of the Swiss Nursing Association, of which F.J.S. Thilo is a member and the president from January 2020. The knowledge gained by this thesis also influenced the "position paper" called eHealth and nursing, which was called into being by the commission and published in September 2019 https://www.sbk.ch/pflegethemen/ehealth. It is the first statement in Switzerland which positions and describes current developments and possible consequences of digitalization for the nursing profession in the context of eHealth. Recommendations are made for clinicians, managers, teachers and researchers from nursing.

The knowledge gained through the PhD trajectory supported F.J.S. Thilo in positioning the Department of Health of Bern University of Applied Sciences (BFH) in the BFH Centre Digital Society (https://www.bfh.ch/de/forschung/forschungsbereiche/bfh-zentrum-digital-society/), founded in 2016. F.J.S. Thilo is actively involved in its establishment. The BFH Centre Digital Society brings together different disciplines from the BFH, such as informatics, economics, nursing, gerontology, business studies or architecture, in order to address different aspects of the digital transformation of society, i.e. of the political, economic and health care system. The BHF Centre Digital Society releases the journal Society Byte monthly https://www.societybyte.swiss/. Two editions per year are the responsibility of F.J.S. Thilo.

Furthermore, the knowledge gained through the PhD trajectory has formed a basis for the development of a strategy for a new research field called Innovation Field Technology and Health which is still ongoing. This positioning is important in strengthening the research of technology and digitalization from a nursing and health perspective.

Another activity was also enabled by the PhD trajectory. A community care organization, present in a canton of Switzerland, was identified for collaboration on the topic of digitalization. This organisation is currently supported in the development of its organizational digitalization strategy. On the one hand, the possibilities will be discussed to develop a complex intervention based on the thesis findings. On the other, projects will be identified to advance digitalization in community care nursing and the interprofessional setting as well as to enable nurses to develop their role and necessary digital skills and competences in using technologies and to cope with digitalization to

the advantage of patients, relatives and nursing.

The topic of digitalization and technology use and non-use is also part of the new curriculum of the Bachelor of Science in Nursing and the Master of Science in Nursing at BFH. The development of this curriculum is still ongoing. Following this PhD and the knowledge gained from it, specific contents will be added to the curriculum and reflected in teaching activities.

In order to share the thesis findings with more community-dwelling older persons and their relatives, the following activities are planned: (1) two plain language summaries for each, older persons and relatives, which can be shared electronically and distributed via community nurses, senior organizations and counselling services; (2) in collaboration with a senior counselling organization (https://www.prosenectute.ch/de.html) and the community care organization of the canton of Bern and a GP a café-afternoon under the general heading of ageing safely at home should be organized to address topics such as: what does safety at home include, what kind of PSADs are available, what does the legitimation process mean for the senior and what are the roles of relatives, community care nurses and GPs.

In order to share further the knowledge gained, the following dissemination strategy will be applied: (1) offering a presentation and discussion of the topics mentioned above at each community care organisation and for each general practitioner who participated in the study 5; (2) oral presentations at the (2a) national conference SBK Kongress 2020 https://www.sbk-asi-congress.ch/%20_blank as well as international conferences, i.e. submitting an abstract to (2b) 2nd International Conference of the German Society of Nursing Science https://dg-pflegewissenschaft.de/veranstaltungen/call-for-abstracts-2nd-international-conference-of-the-german-society-of-nursing-science/, and (2c) the GSA 2020 Annual Scientific Meeting https://www.geron.org/meetings-events/future-gsa-annual-scientific-meetings.

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