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Conditions and ethical challenges that could influence the implementation of technologies in nursing homes: A qualitative study

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Abstract

Aim: To explore the conditions that may influence the implementation of an interactive mobile application (app) and an intelligent videomonitoring system (IVS) in nursing homes (NHs) and the ethical challenges of their use.

Background: There is a lack of knowledge about implementing technologies in NHs and the ethical challenges that might arise. In past studies, nursing care teams expressed the need for technologies offering clinical support. Technologies like an IVS and an app could prove useful in NHs to prevent and manage falls and responsive behaviours.

Design: An exploratory qualitative study was conducted with care managers, family caregivers, and formal caregivers in five NHs.

Methods: Each participant was shown a presentation of a potential app and a short video on an IVS. It was followed by an individual semi-structured interview. A conventional content analysis was performed.

Findings: Potential users found it would be possible to implement these technologies in NHs even if resistance could be expected. To facilitate adoption and achieve clinical benefits, the implementation of technologies should be pilot-tested, and coaching activities should be planned. Ethical risks were considered already present in NHs even without technologies, for example, risks to privacy. Strategies were proposed, for instance, to adapt the code of ethics and procedures. Some potential prejudices about the interest and abilities of older staff, nurses' aides, and family caregivers to use technology were identified.

Conclusions: Through rigorous and ethical implementation, technologies supporting clinical care processes could benefit older people living in NHs, as well as their relatives and the staff.

Implications for practice: Various strategies are proposed to successfully implement technologies. Effort should be made to avoid prejudices during implementation, and procedures should be adapted to mitigate possible ethical challenges.

Key words: Mobile applications; Nursing homes; Qualitative research; Technologies; Videomonitoring; Accidental falls; Behavioural symptoms; Implementation

Summary statement of implications for practice

What does this research add to existing knowledge in gerontology?

- Introducing technologies in nursing homes may meet with resistance, which could be mitigated by involving the potential users in the implementation process and by planning training resources.
- Potential users perceived that an app and an IVS to improve care processes in nursing homes would bring more benefits than risks for older people, their relatives, and staff.
- Potential prejudices exist regarding the interest or abilities of older staff, family members, and nurses' aides to use the technologies.

What are the implications of this new knowledge for nursing care with older people?

- The successful implementation of technologies focused on supporting care processes could positively impact the well-being of older people living in NHs, their families, and staff.
- Potential users can adapt their procedures for using technologies to ensure more benefits than risks for older people, their families, and staff.
- Although possible prejudices about the involvement of some potential users of technologies were identified, they can be prevented to ensure a positive impact on nursing care for older people.

How could the findings be used to influence policy or practice or research or education?

- The findings highlight the importance of involving all types of potential users directly and early on in the process of implementing technologies in nursing homes.
- Care managers and staff need to develop procedures to make sure the benefits of the technologies outweigh their risks for older people, families, and staff.

- The implementation of technologies to enhance care processes must be inclusive of all people involved in the care processes, including older staff, nurses' aides, and family members.

1. Introduction

Nursing homes (NHs) have been shown to lag behind in the adoption of technologies (Bezboruah, Paulson, & Smith, 2014). When NHs want to use technologies, they face a lack of knowledge on the process of implementing them considering the unique characteristics of the context, for example, in terms of types of care (e.g. many residents with cognitive impairment) and nature of the staff (e.g. mainly nurses' aides). Implementing technologies can also trigger ethical challenges (Hall, Wilson, Stanmore, & Todd, 2017).

In their literature review, combined with qualitative findings, Ko, Wagner, and Spetz (2018) found that NHs faced many challenges in technology implementation. For example, many did not use a systematic implementation process or lacked the appropriate infrastructure to support the use of technology. Without the appropriate conditions to implement technologies, the authors stated that the potential benefits of technologies on quality of care is unlikely to occur.

The implementation of technologies in NHs should consider ethical principles such as privacy for older people, families and staff, and older people's autonomy (van Hoof et al., 2018). In an integrative review, Korhonen, Nordman, and Eriksson (2015) emphasized few studies have considered the ethics that should be associated with the use of technologies, and they recommended taking these aspects into account.

The conditions influencing the implementation and the possible ethical challenges that could be encountered should be known beforehand to ensure the technology developed will be useful and to establish an effective implementation plan. In an extensive literature review, it was established that an adequate implementation process increases the benefits for participants and that it can be affected by many factors (Durlak & DuPre, 2008). The conditions and ethical challenges influencing this implementation can vary depending on the technology (Bezboruah et al., 2014). In NHs, most studies about technologies focused on information technologies (e.g. electronic medical records,

administrative information) (Wagner, Castle, & Handler, 2013; Wang, Wang, & Moczygemba, 2014), rather than on technologies offering clinical support.

To identify aspects of the work in NHs that could be improved with technological tools, Degenholtz, Resnick, Lin, and Handler (2016) conducted a study using a nominal group technique, similar to a focus group combined with aspects of a modified Delphi approach, with various health professionals and managers in NHs. Their results showed that health professionals thought that many care processes could benefit from technologies, for example, to inform family members and offer real-time data collection support at the point-of-care. Among the care processes mentioned, those related to falls and responsive behaviours are some of the most common and serious problems encountered in NHs.

1.1 Two care processes that could benefit from technologies

Sixty percent of residents in NHs fall at least once a year (Kosse, de Groot, Vuillerme, Hortobagyi, & Lamoth, 2015) and these falls can have serious consequences, including fractures, traumatic brain injury or depression (Terroso, Rosa, Torres Marques, & Simoes, 2013). Falls are also associated with a higher risk of future falls in the next year (Kwan & Straus, 2014). To prevent their recurrence, health professionals need to know what caused an initial fall, but in 72% of cases the cause is not identified (Ministère de la Santé et des Services sociaux, 2014), thus limiting the quality of their care process. Clinicians need to quickly detect a fall and conduct a post-fall assessment to check residents for potential injury (National Institute for Health and Clinical Excellence, 2015). This can decrease the complications following a fall (Bloch, 2015; Fleming & Brayne, 2008). To improve their care process, clinicians would also benefit from knowing the characteristic of a fall, for example, if the person hit her head. Often, this information is unavailable due to the lack of witnesses and because of the communication difficulties stemming from a large incidence of cognitive impairment.

Responsive behaviours are defined as behaviours manifested by older people with Alzheimer's disease or a related disorder (ADRD) (e.g. aggressive, vocal behaviours) that have underlying meanings (Dupuis, Wiersma, & Loiselle, 2012). The meanings of these behaviours are not always identified, which impedes the care process and can have many negative consequences for older people, as well as for other NH residents and for family

and formal caregivers (Black & Almeida, 2004; Gitlin et al., 2016; Lorenzo-López et al., 2017). According to the International Psychogeriatric Association (2012), up to 97% of people living with ADRD manifest these behaviours. Individualized ecopsychosocial interventions, i.e. non-pharmacological interventions, are recommended to understand these behaviours and care for the people who manifest them (National Institute for Health and Clinical Excellence, 2011; Zeisel, Reisberg, Whitehouse, Woods, & Verheul, 2016). However, this type of care process is difficult to implement consistently since it requires team work and continuity of care (Bourbonnais et al., 2018a; Gravel, Legare, & Graham, 2006; Wilkins, Pollock, Rochon, & Law, 2001).

1.2 Possible technologies to improve these care processes

Two possible technologies, which could help improve the care processes associated with preventing and managing falls and responsive behaviours in NHs, are a videomonitoring system and a mobile application (app). Some of the authors (JR, JM) developed an intelligent videomonitoring system (IVS) that consists of small closed-circuit cameras installed in chosen rooms and linked to a computer or mobile device by an internet connection (Rougier, Meunier, St-Arnaud, & Rousseau, 2011; Rougier, St-Arnaud, Rousseau, & Meunier, 2011). The IVS monitors the environment and can automatically detect a fall or responsive behaviour. When it detects such an event, it sends an alert on a computer or mobile device that provides password-protected access to the images in real time. The videos are not accessible in the absence of an event. To protect privacy, images can be customized as blurred or silhouette. It can be programmed to keep the record of the minutes prior to an event (e.g. 5 minutes) so they can be analyzed. By quickly detecting a fall or a responsive behaviour, this technology could improve the care processes by reducing consequences and pinpointing the clinical assessment.

The IVS could be integrated with an interactive decision-support app: a computer program developed to work on mobile devices such as smartphones or digital tablets (Ventola, 2014). This app could be useful to increase the continuity of care and the partnership between family and formal caregivers for these two care processes, as well as to allow guided real-time individualized care planning at the point-of-care. In their narrative review about apps supporting ADRD caregiving, Brown et al. (2019) found no

apps connecting family members with formal caregivers to promote partnership-based care and no apps specific to NHs. Our proposed app could include an intervention approach based on the meanings of responsive behaviours developed by one of the authors (AB). This approach guides the care process by identifying individualized interventions based on partnership decision-making between family and formal caregivers (Bourbonnais, Lalonde, & Lavallée, 2018b). It could also be adapted for fall prevention and management. However, the conditions required to implement these care support technologies effectively in NHs and the potential ethical challenges associated with their use are not known.

1.3 Aim

Our aim was to explore the conditions that could influence the implementation of a potential interactive app and an IVS in NHs and the ethical challenges regarding their use. We presented elsewhere the perceptions and needs of care managers and family and formal caregivers regarding these technologies (Bourbonnais et al., Submitted; Bourbonnais et al., 2018c; Bourbonnais et al., 2017).

1.4 Framework

We used the diffusion of innovation theory (Rogers, 2003) to orient our recruitment, data collection, and analysis. According to this theory, since the diffusion of innovation is a social process oriented toward the people who will use the innovation, it has to be culturally appropriate to be adopted. Rogers (2003) described five innovation-adopter categories that characterize different rates of adoption for the technologies that were considered during recruitment: a) innovators, b) early adopters, c) early majority, d) late majority, and e) laggards.

2. Method

As described in Bourbonnais et al. (Submitted), we conducted an exploratory qualitative study based on a conventional content analysis (Hsieh & Shannon, 2005). Sampling, data collection and analysis were concomitant. The research protocol was approved by the Institutional Review Board (# CER-IUGM-15-16-13), and we obtained informed consent from all participants.

2.1 Sample

We recruited care managers, family caregivers and formal caregivers in five NHs in Montréal (Canada). Most of older people living in these NHs have severe cognitive impairment. Using a maximum variation sampling method, 20 participants were recruited representing each of the five innovation-adopter profiles described by Rogers (2003). With head nurses, efforts were made to recruit participants having innovation-adopter profiles in the late majority and laggards categories since, as the study was progressing, it became clear based on the sociodemographic data collected that it was more challenging to recruit these participants. Three potential participants in these profiles refused to participate, but two accepted. Based on an iterative process between sampling, data collection and analysis, the recruitment was stopped when we reached data saturation regarding the aim of the study. For family caregivers, the inclusion criteria were to have an emotional and social relationship with an older person living with ADRD in NH. Formal caregivers had to be a registered nurse (RN), licensed practical nurse (LPN) or nurses' aide (NA) and have been working in the NH for at least six months. Care managers included head nurses, assistant head nurses, nursing care coordinators, clinical nurse specialists, or nurse educators.

2.2 Data collection

We collected sociodemographic data with specific questionnaires for each type of participant, including a question on the innovation-adopter profile. We showed each participant a presentation of the potential interactive app and a short video on the IVS. Following the presentation of each technology, we conducted in NH, and audio recorded, semi-structured individual interviews (mean=62 minutes) based on an interview guide. For example, there were questions about what would facilitate or limit the use of technology and about the risks and benefits they perceived. To avoid pressure, the interviews were conducted by a graduate student in nursing that was the study coordinator and that had not been involved in the development of the technologies or worked in NH. The interview guide specifically inquired about positive and negative perceptions.

2.3 Data analysis

We iteratively analyzed the transcribed data from these interviews. To operationalize the content analysis, we used strategies proposed by Miles, Huberman, and Saldaña (2014): condensing data, displaying similarities and differences in data, and drawing and verifying conclusions. The study coordinator performed the initial coding (condensing data) that was refined by a member of the research team until consensus was achieved. To display the similarities and differences in data, we organized the codes hierarchically. After many iterations of this display, themes and sub-themes emerged that were discussed by the research team to further refine them. As recommended by Meyer and Avery (2009), Excel was used for coding and displaying data.

3. Results

The participants' characteristics are summarized in Table 1. Overall, there were participants corresponding to each innovation adopter profile described by Rogers (2003). Most were early adopters or early majority.

[Insert Table 1]

Three themes describe the conditions that may influence the implementation of technologies in NHs. Three additional themes portray the ethical challenges surrounding the potential use of these technologies.

3.1 Conditions that may influence the implementation of technologies in NHs

3.1.1 As with all new practices, we will face resistance to change

All types of participants agreed that both technologies were needed in NHs, but they also mentioned that, as is typical when a new practice is introduced, some family and formal caregivers will resist the changes triggered by implementing the technologies. They explained that the level of openness to change would vary depending on the interest and abilities of the family and formal caregivers with technologies, and on their perceptions of the technologies' usefulness. They also felt staff members would have different learning curves and some might be afraid of damaging the technology that could look expensive and fragile to them.

It is also the responsibility of the person to be careful. Maybe she will be a little bit insecure: "I must not lose it [mobile device], I must not damage it, it's not mine," you know? That could be just for having the responsibility of the device. (Interview 8, nurses' aide)

They also thought there would be some resistance because implementing these technological tools would require reorganizing care processes. According to the participants, these tools could change the ways staff and family caregivers work together and might demand more time initially to learn how to use the technology. They considered it would be important to revisit their usual means of written communication to prevent information duplication.

Of course, there shouldn't be duplication. You know, I mean, if it is for a problem, let's say, screaming or whatever, for sure that in my care plan I would write, "screams, see...". I don't know how you will call it [the app], but I could write "refer to the application," you know, as to not duplicate [the information]. (Interview 19, RN)

3.1.2 To implement them, we will have to be involved

To counteract this resistance, the participants explained that formal caregivers would have to be involved in implementing the technologies from the beginning. They suggested that some potential users should be asked for advice and authorization, so they could express their opinions and needs early on. Once accepted, the implementation of the technologies should be announced broadly in the NH, including to family caregivers and residents. The technologies should be presented concretely, and the clinical goals and benefits of each technology should be explained. For example, a participant mentioned this concerning the IVS:

Of course, they [caregivers] will say "yeah, well if you film me like that, and if she acts like that, you will fire me," that's for sure they will say that. But if we explain that it is not to be used in a retaliating way, that the goal

is to teach, to improve the situation, to say, “Well, with your approach, you shouldn't force the resident.” (Interview 19, RN)

To test these strategies and adapt them to the NH, the participants mentioned the importance of planning a pilot project to implement the technologies. They highlighted the importance of training people how to use the technologies. This training should focus on responsive behaviours and falls, and on the usefulness of the technologies and how they work regarding the care processes for these problems. The training should be given in small groups and include simulations with the technologies, using examples.

In small groups [the training] because when it is about technology, sometimes it can bring a lot, a lot of questions. And it's worse when you're a big group, well it doesn't work because one doesn't understand, and the other will ask a question, and the other, it causes confusion, so [it's better] in small groups. (Interview 17, nurses' aide)

3.1.3 It will also require support and resources to implement them

Once the implementation starts, the participants explained it would require additional support and resources to help them use the technologies. For them, this was necessary to ensure users would have adequate coaching. They thought this support could be offered by colleagues with additional training who could act as “champions” to support their peers. For them, this strategy could mitigate the difficulty of training everyone involved on care units. The inclusion of nurses' aides as “champions” seemed central considering they are the largest group of caregivers.

For sure, it takes nurses' aides, you have to choose nurses' aides. Of course, you have to train champions on each care units, on every shift. These champions will help others, because it is not true that we will train everyone and that we will monitor everyone. (Interview 13, care manager)

The participants felt that these champions could help ensure sustainability in the use of the technologies. Through their enthusiasm and competence, they could motivate their peers to use the technologies and act as resources to increase collaboration between

formal caregivers. Collaboration was identified as an important element among the staff on different shifts since it seemed that the technologies would be more useful if applied as a team to decrease responsive behaviours and falls.

3.2 Potential ethical challenges surrounding the use of these technologies

3.2.1 Risks? There are already some risks even without the technologies

The participants perceived some risks associated with the use of technologies in NHs, but they also considered that some of those risks were already present in their practice even without the technologies. They stated that if the technologies were implemented, they would have to be used correctly to limit these risks. They mentioned the risks of the mobile devices being used for personal reasons, of cyber dependency, of decreased human contact with the residents, but, primarily, the risk to confidentiality.

We must be sure that it is not taken out of context, that it doesn't go elsewhere, I do not know where... Facebook, social media and other there. We must always pay attention to all this. (Interview 3, care manager)

They perceived using the IVS and app would confer more benefits than risks. Formal caregivers thought these tools could improve their well-being at work by improving the behaviours of older people, decreasing the noise in the environment, and reducing the stress associated with the risk of falls.

Because a fall is really stressful for us. The worst nightmare you have with a patient, bang [a fall]. That's our stress. I don't like having a fall on my shift. So, if there is a way to prevent the fall, because I am sure with that [the IVS], we will be able to prevent falls better. Sometimes there are problems that are not solved because we do not know how it happened. (Interview 10, LPN)

All types of users agreed that the two technologies would also improve the residents' care and well-being. More data would allow a better understanding of older people with

cognitive impairment, who often have problems expressing themselves. It would help decrease responsive behaviours and falls, and lead to faster intervention to prevent negative consequences.

Well, it's because if a lady or a gentleman falls, they can stay on the floor a long time. If there are no nurses' aides going down the hallway, and the calling bell is on her chair, she can stay there for half an hour. [...] While this [the IVS] will alert them right away. (Interview 18, family caregiver)

Formal caregivers and care managers considered that often family caregivers were worried or not sufficiently involved in the care. With these technologies, they believed family members would be valued and reassured by being more involved and gaining more transparency. It seemed to them conducive to improving the trust of family members toward staff.

3.2.2 The technologies are good; the problem is people, so we have to mitigate

The participants considered it was not the technologies themselves that could cause ethical problems, but the ways in which they could be used. As such, they presented various strategies to mitigate potential problems. One of the suggested strategies was to use these technologies only with clear clinical objectives and not against the staff. This strategy was considered especially critical regarding the IVS that could film staff members during an event with a resident. For them, it should be clear for everyone that the images from the IVS would be used only as a means to detect an event, to assess its consequences on a resident, and to prevent its recurrence. They suggested that the technologies be used only with specific residents who are more at risk of falls or of responsive behaviours.

The participants also recommended that procedures be developed regarding the use of these technologies, mainly on how to respond when an alert is triggered. Others mentioned that a user code of ethics should be developed. This code of ethics should include using the technologies diligently, not using them for personal use, and respecting the resident's confidentiality. Protecting the older person's privacy and dignity was considered essential, but something that they already encountered in their practice. They

thought that the same principles should be applied to using the app and the IVS. In addition, access to the data from the technologies should be limited to only the users concerned with a specific resident or during a team meeting.

*Uh, I don't see any harm. It's just for the safety of the residents, so I think it's good. You know, in the end, it's not harmful if everyone doesn't have access. If it's well supervised, then managed well, yes, I am OK with it.
(Interview 17, family caregiver)*

To further protect privacy, some participants suggested including a feature that would make the technologies inaccessible to staff outside of the NH or to install them on mobile devices belonging to the NH that would stay on the premises. They also felt that older people or their families should be asked to provide consent for the use of the technologies, especially the IVS that records images. The fact that the system does not record continuous images reassured many participants.

3.2.3 Some have prejudices about the interest and abilities of other potential users

In addition to the potential ethical challenges mentioned about the technologies, data analysis also highlighted an ethical issue about the users themselves: some participants showed prejudice regarding the interest of other potential users and their ability to use the technologies. Based on the ethical principle of equity, this has implications for some potential users with specific characteristics that could be excluded from influencing the implementation of technologies or to use them because of prejudices. Some participants stated that older staff would not be interested in using technological tools because they would be less comfortable with them, having been less exposed to technologies in their youth. However, other participants said that this was prejudicial, and that older staff could also be open to and comfortable with technological innovations.

But sometimes, they say (voice imitation): "Ah well, an old nurse who does not like technology or who will say 'ah no, it's no good...". But it's more of a prejudice [...] because there are people who are 60 years old

and are faster than you [...]. So, it could be a prejudice to say, “Oh maybe if a staff member is older, they will be more reactionary to technology.” I think it’s more prejudice. (Interview 1, care manager)

Some care managers thought that these technologies could be too complex for nurses’ aides and that simpler versions with less text or restricted access to features should be created for them to ensure they would understand their use. Paradoxically, the nurses’ aides who participated in the study were highly enthusiastic about the two technologies and could foresee using them with all their features. They did not bring up any of the concerns mentioned by other participants, for example, about having to read or write when using these technologies.

Care managers also expressed concerns that formal caregivers might be reluctant to work with family members to share the data or images the technologies provide. However, both formal and family caregivers expressed openness in using the technologies to improve working together.

Maybe they [families] can also bring something to this. If they observe things, they can share it with us all, super! (Interview 20, RN 20)

These potential prejudices could impede the role of some potential users (older staff members, nurses’ aides, families) in adopting technologies in NHs and, as such, reduce the positive impact of these innovations.

4. Discussion

Our study indicates the considerations that should be taken into account when implementing two clinical support technologies, an app and an IVS, that could be used together to improve care processes in NHs and promote partnership-based care. The participants mentioned that there would be resistance to change, but that various strategies and resources could be put in place to facilitate the adoption of these innovations and benefit from their use. Some suggested strategies were involving staff from the start of the implementation process and planning pilot projects on some care

units. They also mentioned integrating peer coaching to ensure sustainability and motivation.

Our results are coherent with the strategies reported in the literature about adopting health technology in various settings. For example, de Veer, Fleuren, Bekkema, and Francke (2011), in a survey about the experience of Dutch nursing staff (n=685), found that the determining factors in adopting technologies were involving staff early on in the development and decision-making about technologies, giving enough time to practise using them, coaching users, training instructors and allowing users to share their experience and the problems encountered. To prevent malfunctioning and difficulties, they recommended implementing technology through pilot projects in practice, which was also mentioned in our study. In a case study on implementing monitoring technologies in NHs, Hall et al. (2017) found staff, managers, families and residents (n=42) are considered facilitators to deeper understanding of the benefits and rationale for using technologies. In addition to these factors, our participants also expressed concerns about damaging the devices and mentioned the need to define clear clinical goals for using the app and IVS and to avoid duplication of clinical documentation. They added that training on these technologies should be conducted in small groups, and, especially, that it should include nurses' aides, the largest segment of NH workers. These additional indications about the conditions that would influence the adoption of technologies are likely specific to the context of NHs and technologies that support clinical practice.

Regarding ethical challenges, participants indicated that most of the risks the technologies would present already exist and that procedures would have to be adapted to protect the dignity and privacy of residents, families, and staff. They thought the benefits would outweigh the risks, for example, by improving older people's well-being, providing more transparency for families, reducing staff stress, and increasing trust between families and staff. They thought consent should be asked to use the technology, especially the IVS. No other concerns about privacy of the older people were mentioned. This might be explained by the fact that the participants knew the technology would allow access to the images only following a precise event and of the integrated mechanisms to protect privacy (e.g. blurred or silhouette images and password protected).

Regarding the staff, some were concerned that images could be used against them. The participants exposed concrete strategies to mitigate that risk, for example, having a clinical goal for the use of the technology and prioritizing its use with specific residents which made the IVS acceptable to them. Their openness might have been influenced by a local regulation allowing the use of videomonitoring (hidden or not) by residents or their proxy in NH (Gouvernement du Québec, 2019; Secrétariat aux aînés du ministère de la Famille et ministère de la Santé et des Services sociaux, 2018). As such, the use of the IVS for clinical purposes might have seemed less invasive or threatening to them. Implementation in other contexts should consider the impact of local regulations and laws on the openness of staff to this type of technology.

These results on ethical challenges are consistent with the ethical aspects mentioned by van Hoof et al. (2018) regarding the use of a real-time location system and by Niemeijer et al. (2011) regarding surveillance technology, both in NHs. The results from these qualitative studies highlighted that the residents and families should benefit the most from the adoption of such innovations. The strategies proposed by our participants to ensure this balance mostly focused on ways to respect residents' privacy and the staff's trust. They included using the technologies with the residents that would benefit most from them, not allowing mobile devices to leave the clinical premises, and adjusting the internal code of ethics.

One of the ethical challenges of using technologies in NHs are the prejudices that seem to exist regarding innovation adoption by older staff, nurses' aides, and families. Some participants thought these groups of people would not be interested in or capable of using the proposed technologies which could affect the equity between the various potential users. Our sample had many types of potential users with various innovation adopter profiles: some participants did not have a computer, smartphone or tablet at home, and were between 47 and 66 years old on average. No significant differences were noted between users of the various profiles. Everyone was open to the technology presented, age and the type of user do not seem to be obstacles in themselves. Nurses' aides also did not mention that the proposed technologies would be too complex for them. Thus, the concerns expressed by some participants about the other types of potential users are probably based on prejudice. These potential prejudices should be considered

to avoid systematically excluding potential users from the implementation process and the daily use of technologies. While not discussing these potential prejudices directly, Bezboruah et al. (2014) mentioned that the managers' view of the usefulness and ease of use of technologies can differ from the staff's perceptions. As such, the process of implementing technologies should first account for the perceptions of each group of potential users.

Our study had some limitations that could affect the trustworthiness of the results. Since the technologies are in development, the participants had to think of potential ethical challenges and of conditions that would influence their adoption based on visual presentations of their characteristics, without having actually tried them. This could affect the credibility and transferability of results. The sample also included more staff members and managers than family caregivers, and it could not include older people living in a NH considering their severe cognitive impairment which could affect the credibility of our findings. However, an effort was made to include various types of users with maximum variation sampling to increase this credibility.

5. Conclusion

Before developing and implementing technologies in NHs, the conditions needed for their use to improve the quality of care and the ethical challenges that may be encountered should be considered to ensure that the technologies will meet the needs of the residents, families, and staff. Our study has shown the importance to pilot-implement the technology and to plan coaching and training activities adapted to both the nature of the technologies and to the characteristics of the users. Effort should be made to avoid prejudices in organizing these activities and to consider all potential users as possible adopters of the technologies, without excluding or restricting their involvement based on age or type of user. With a rigorous, ethical implementation, technologies supporting clinical care processes could benefit older people living in NHs, as well as their relatives and the staff.

Implications for practice

- Multiple inclusive strategies should be used to successfully implement technologies and have an impact on quality of care in NHs.
- Effort should be made during the implementation of technologies in NHs to avoid prejudices toward potential users.
- Local procedures should be adapted to mitigate possible ethical challenges with the use of technologies in NHs.

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Table 1. Sociodemographic characteristics by type of participants

Care Managers	n=9
<i>Age: Median [Min, Max]</i>	48 years [41 to 64 years]
<i>Women</i>	8
<i>Job title</i>	
– Head nurse	4
– Care coordinator	1
– Nurse educator or clinical nurse specialist	2
– Assistant head nurse	2
<i>Experience as care manager: Median [Min, Max]</i>	6 years [3 months to 32 years]
<i>Innovation adopter categories</i>	
– Innovator	1
– Early adopter	6
– Early majority	2
– Late majority	0
– Laggard	0
<i>Electronic devices owned:</i>	
– Computer	8
– Smartphone	8
– Digital tablet	7
Family caregivers	n=3
<i>Age: Median [Min, Max]</i>	69 years [60 to 70 years]
<i>Women</i>	2
<i>Relation to the older person</i>	

IMPLEMENTATION OF TECHNOLOGIES

– Spouse	1
– Child	2
<i>Frequency of visits</i>	
– Daily	2
– At least once a week	1
<i>Innovation adopter categories</i>	
– Innovator	0
– Early adopter	1
– Early majority	2
– Late majority	0
– Laggard	0
<hr/> <i>Electronic devices owned:</i>	
– Computer	2
– Smartphone	3
– Digital tablet	1
<hr/>	
Formal caregivers	n=8
<hr/>	
Age: Median [Min, Max]	47.5 years [34 to 62 years]
Women	8
<i>Type of formal caregivers</i>	
– RN	3
– LPN	2
– Nurses' aides	3
<i>Shift</i>	
– Day	6
– Night	1

IMPLEMENTATION OF TECHNOLOGIES

– Floating	1
<i>Clinical experience: Median [Min, Max]</i>	14.5 years [3 to 35 years]
<i>Innovation adopter categories</i>	
– Innovator	2
– Early adopter	4
– Early majority	0
– Late majority	1
– Laggard	1
<i>Electronic devices owned:</i>	
– Computer	6
– Smartphone	4
– Digital tablet	4
– None	2
