Exploring Barriers and Facilitators to the Implementation of Pet Robots for People With Dementia in Nursing Homes: A Qualitative Research Protocol

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Abstract

People living with dementia, especially those who live in nursing homes, are susceptible to social isolation and activity dis-engagement. Pet robots are technology-based substitutes to animal-assisted therapy that have demonstrated positive impacts on people with dementia in long term care settings, such as reducing agitation, improving mood and increasing social engagement. Nevertheless, knowledge about the issues influencing their implementation is lacking, as there is a scarcity of research that have explicitly investigated the barriers and facilitators influencing their implementation in real-world practice. The objective of this study is to understand the multi-level barriers and facilitators to the implementation of pet robots for people with living dementia in nursing homes, from the perspectives of key stakeholders. A qualitative study employing a descriptive qualitative approach will be used. The Consolidated Framework of Implementation Research (CFIR) will be used to guide the research process. Multi-level stakeholders, including people living with dementia, healthcare professionals and organisational decision makers in nursing homes, will be recruited for one-to-one interviews. Data will be analysed through framework analysis, using a combination of both deductive (based on the constructs and domains in the CFIR) and inductive approaches. To the best of our knowledge, this will be the first study to explore multi-level determinants to the implementation of pet robots in nursing homes for people living with dementia. Findings will be used to inform the identification of strategies that may be used to guide the implementation of pet robots for people living with dementia in nursing homes.

Background

Dementia is a growing health concern. Worldwide, 50 million people live with dementia (Alzheimer's Disease International, 2016), and these numbers continue to rise with a rapidly ageing population (World Health Organization, 2020). It is estimated that between 47.8% to 73% of the people who live in nursing homes have dementia (Centers for Disease Control and Prevention, 2021; Hoffmann et al., 2014; Prince et al., 2014). Although residential care is important to ensure necessary care provision, people living with dementia (PLWD) who reside in nursing homes are especially susceptible to reduced social health as compared to those who live in the community. Olsen et al. (2016) found that PLWD who live in nursing homes had a significantly lower quality of life, less social contact and higher use of psychotropic medication. Through qualitative interviews, PLWD have also described life in residential care as a 'life of isolation, uncertainty and

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fear'(Clare et al., 2008), and reported a lack of social contact and engagement in pleasurable activities (Cahill & Diaz-Ponce, 2011). Social interactions and participation in activities are therefore considered to be important in enhancing the quality of life of PLWD in residential care facilities (Moyle et al., 2015; Moyle et al., 2011).

In the last three decades, there has been growing interest in the use of pet therapy or animal-assisted therapy to benefit the psychosocial health of PLWD who live in nursing homes (Bernabei et al., 2013; Virues-Ortega et al., 2012). Such interventions have shown benefits for people with dementia by providing companionship to reduce loneliness, improving engagement and eliciting relaxation (Banks & Banks, 2002; Le Roux & Kemp, 2009). Nevertheless, the use of live animals have raised concerns about adverse effects such as transmission of zoonotic diseases and compromised animal welfare (Lai et al., 2019). Pet robots are considered to be viable technology-based substitutes to animal-assisted therapy. The research and use of pet robots in dementia care began about two decades ago. A prominent example includes PARO, a robotic baby harp seal. PARO was developed in Japan and has been in use since 2003 with older people and PLWD (Paro Robots, 2014). To date, it remains the most researched pet robot. Since then, several other pet robots, such as the NeCoRO cat, JustoCat, CuDDler (robotic bear) and AIBO (robotic dog), have been developed and tested. Correspondingly, numerous studies have been conducted to evaluate the effectiveness of pet robots for PLWD. In a recent mixed method systematic review, Abbott et al. (2019) synthesised evidence from 27 articles based on 19 studies, to evaluate the impact of pet robots on residents in care homes. Over half of the included studies investigated pet robot use specifically for PLWD. Based on the quantitative synthesis, although the use of pet robots led to reduced agitation, the effects were not statistically significant. Nevertheless, the qualitative findings showed that pet robots stimulated engagement amongst nursing home residents, provided opportunities for social interactions, and improved overall mood, and quality of life. In another systematic review of 13 articles from 11 randomised controlled trials, researchers found that the use of social robots, including the pet robot PARO, led to reduced agitation, anxiety, loneliness and medication use among older people including PLWD who live in long term care settings (Pu et al., 2018). These effects did not reach statistical significance, which could be attributed to the marked heterogeneity of the interventions and small sample sizes.

Despite the need for more definitive evidence, pet robots have continued to demonstrate promise in improving the psychosocial health of PLWD. This could explain why they are still being used in dementia care in several countries (Shibata, 2012). However, the overall implementation and uptake of technological innovations in dementia care has remained slow or unequal (Meiland et al., 2017; Vernooij-Dassen & Moniz-Cook, 2014). Implementation can be defined as a 'constellation of processes intended to get an intervention into use within an organisation' (Nilsen & Bernhardsson, 2019). A recent scoping review was conducted to broadly examine

the literature on factors affecting the implementation of social robots including pet robots, for older adults and PLWD (Koh et al., 2021). The authors found that much of the research have been largely focused on studying the internal validity of pet robots (i.e., effectiveness), and there has been significantly less research emphasis on their external validity, such as contextual factors (e.g., organisational climate) that can influence their implementation in real-world practice (Koh et al., 2021). There has also been a scarcity of studies which explored the perceptions of multi-level key stakeholders, such as healthcare professionals and organisational decision makers (Koh et al., 2021), who hold important roles in influencing the implementation of pet robots in care settings. A thorough understanding of their perspectives is pivotal to bridge the knowledge gap between research and clinical practice. Hence, the purpose of this study is to gather rich descriptions about how different stakeholders perceive factors influencing the implementation of pet robots in nursing homes in real-world practice.

Theoretical Framework

The use of an implementation framework has been recommended to guide the broad exploration of determinants that can affect implementation. The Consolidated Framework for Implementation Research (CFIR) is a determinant framework that was derived from synthesising 19 different theories on dissemination, innovation, organisational change, implementation, knowledge translation and research uptake (Damschroder et al., 2009). There are 39 constructs within the CFIR domains that are grouped under five key domains:

1. Characteristics of the intervention
2. Outer setting, which refers to influences that are external to the implementing organisation (e.g., political context in which the organisation resides)
3. Inner setting, which refers to the features of the implementing organisation
4. Characteristics of individuals involved in the implementation (e.g., healthcare professionals, organisational decision makers, and PLWD)
5. Implementation process, which refers to the plans and strategies that are used to put an intervention into practice

The CFIR represents a comprehensive approach to understand factors influencing the implementation of interventions (Damschroder et al., 2009). Its breadth compels researchers to broadly explore the phenomena in a holistic manner. As such, it is a suitable framework for this study, and it will be used to guide the conceptualisation, data collection and data analysis process.

Objectives

This objective of this study is to explore the multi-level barriers and facilitators influencing implementation of pet robots in nursing homes for PLWD, from the perspectives of key stakeholders.

Methodology

Qualitative description (QD), as described by Sandelowski (2000, 2010) is chosen as the most suitable qualitative approach, as the principles that underpin this approach is well aligned with the purpose of this research. From a philosophical stance, QD has been aligned with a pragmatic paradigm (Neergaard et al., 2009), as researchers make decisions about the conduct of the research based on its objectives (Ormston et al., 2014) to contribute to change in real-world practice (Chafe, 2017). In this approach, the researcher strives to stay close to the 'surface of the data and events' (Sandelowski, 2000, p. 336), gather rich descriptions of the views of participants and describe the phenomena from the viewpoints of participants. This approach also allows for flexibility in commitment towards the use of framework or theory (Sandelowski, 2010). As such, it allows for the CFIR to be used as a framework to guide the conceptualisation, conduct and reporting of this study using terminology that is consistent with literature (Colquhoun et al., 2014).

Sampling and Recruitment

Sample

Three groups of key stakeholders, including healthcare professionals, organisational decision makers and PLWD, will be included in this study.

Healthcare professionals. Healthcare professionals, including nurses, care assistants and allied health professionals (such as occupational therapists, physiotherapists and therapy assistants), are involved in providing direct care for PLWD. Hence, they can offer perspectives of barriers and facilitators related to direct care provision. Healthcare professionals who meet the following criteria will be included:

1. Provide direct care provision for PLWD in nursing homes
2. Can speak and understand English

Organisational decision makers in nursing homes. Organisational decision makers, such as team leaders, managers and directors, may be considered as indirect care providers who provide care services that do not require interaction between provider and the PLWD. It is necessary to involve this group of key stakeholders, as they can offer perspectives on barriers and facilitators manifesting from a managerial point of view. Organisational decision makers who meet the following criteria will be included:

1. Has experience as a manager or leader in a nursing home, or has managed or led a team of care workers or organisational processes within facility
2. Can speak and understand English

People living with dementia. Since PLWD are the end users of pet robots, it is important to include this group of participants as key stakeholders. Ideally, PLWD should be recruited from nursing homes to gather context specific information in relation to the research objective. However, due to COVID-19, and restrictions to physical access to nursing homes, it is not possible to physically access this group of participants since they are considered to be one of the most vulnerable populations with higher risks of morbidities and mortalities (Banerjee, 2020). As PLWD who live in nursing homes usually have more advanced dementia than community-dwelling PwD (Helvik et al., 2015), face-to-face interviews are especially important to maintain a physical presence and for rapport building (Digby et al., 2016). These principles are more difficult to uphold during online interviews. As such, conducting online interviews with PLWD from nursing homes may not be feasible. Hence, community-dwelling PLWD will be recruited for this study instead. Although this group of participants may not be able to provide context specific (i.e., nursing home) information, their experience-based perspective (lived experience of dementia) will still be invaluable in contributing to the understanding of the phenomena of interest. The inclusion criteria are as follows:

1. 65 years old and above
2. Can speak and understand English
3. Have a formal diagnosis of dementia
4. Not residing in an institutional facility (such as a nursing home)
5. Has the capacity to consent independently, or has a legal appointed decision maker to assist with the decision making process for consent, as outlined in the Assisted Decision Capacity Act 2015 (Ireland, 2021)

Recruitment Strategy

Nursing homes. Nursing homes will be used as a platform to recruit healthcare professionals and organisational decision makers. An overview of the recruitment process from nursing home can be found in Figure 1. According to the Health Service Executive, there are 578 nursing homes in Ireland, of which 44 are located in Galway (Health Service Executive, 2017). At least 33 of these nursing homes provide care for residents with dementia. The researcher will contact the nursing homes individually to explain about the study. Nursing homes that confirm that they have residents with dementia, and/or have a dementia-specific care unit, will be invited to participate as study sites. Permission will be sought from the Director of nursing or manager of the nursing home to identify and contact care staff who are involved in direct and indirect care provision for residents with dementia. With permission, the researcher will arrange for an online meeting or telephone call with each individual, based on their preference, to explain about this research and invite them to participate in this study.
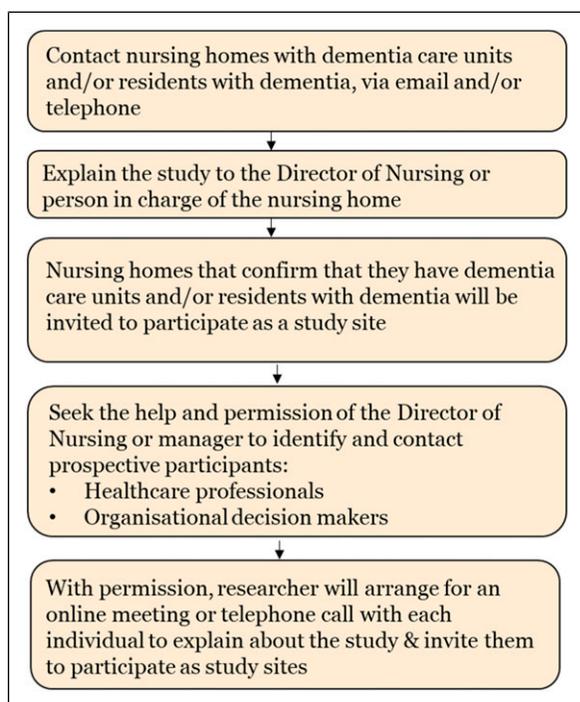
Figure 1. Recruiting care professionals and organisational leaders from nursing homes.

Services for PLWD. The researcher will recruit PLWD primarily through TeamUp for Dementia Research (TUDR), a service that connects PLWD who are interested in participating in dementia research to researchers (The Alzheimer Society of Ireland, 2021b). The process of recruitment will follow procedures outlined by TUDR. The researcher will also recruit PLWD from Dementia cafes, if an insufficient number of participants can be recruited via TUDR. Dementia cafes are a community resource for people with dementia and their caregivers, and provide them with opportunities to meet others who live with dementia (Dementia Pathways, 2021). An overview of the recruitment process from Dementia cafes can be found in Figure 2. Since the start of the COVID-19 pandemic, cafes have been conducted virtually. To recruit PLWD from the cafes, researcher will first contact representatives from individual Dementia Café to explain about this study, and ask for permission to participate in the virtual meet up sessions to share about this research and invite them to participate in the study.

Sampling Strategy

Purposive sampling, based on the inclusion criteria as outlined in the sections above, will be employed. Those who meet the inclusion criteria will be invited to participate in the study. Snowball sampling will also be used as a secondary sampling technique. Participants will be asked if they have any colleagues or friends who would be eligible and interested to take part in this study. If so, they can contact the researcher to discuss participation. This will enable data to be collected
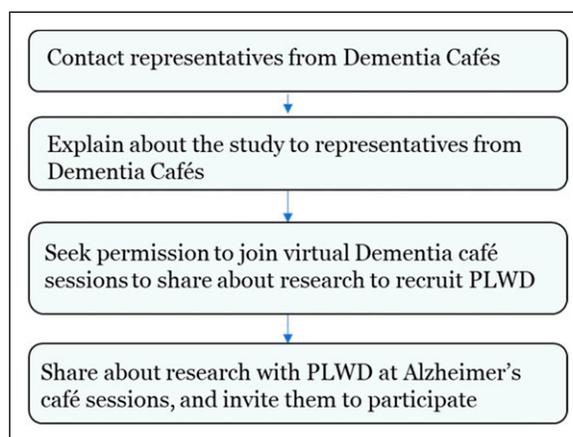
Figure 2. Recruiting people live with dementia from dementia cafes.

from participants in similar settings or have similar roles (Merriam & Tisdell, 2015; Palinkas et al., 2015).

Patient and Public Involvement

According to the National Institute for Health and Care Institute (2021), patient and public involvement (PPI) encompasses carrying out research with patients and members of the public, rather than conducting research to or for them. The researcher has received input from the European Working Group of People with Dementia (EWGPWD) on conducting interviews with PLWD. The researcher has also involved a member from the Dementia Research Advisory Team (The Alzheimer Society of Ireland, 2021a) as an advisor to this research, to understand how to best inform and communicate with participants with dementia in an understandable and accessible manner. This will enhance recruitment (Hassan et al., 2017) and improve the quality of experience for participants with dementia. The research advisor will also be involved in the interpretation of data collected from PLWD to enhance the validity of findings (Stevenson & Taylor, 2017).

Sample Size

It is difficult to determine a priori sample size required for a qualitative study. However, there is a practical imperative to provide an estimate before the study for review by the research ethics committee, and to predict resources that may be required. For this study, the initial sample will comprise of 30 participants (i.e., 10 healthcare professionals, 10 organisational decision makers and 10 PLWD).

The proposed sample size was determined using the numerical guideline and conceptual model approaches outlined by Sim et al. (2018). The numerical approach to sample size determination refers to sample size suggestions based on guidelines based on previous empirical studies. Previous authors who adopted a similar theory-based approach recommended an initial sample size of 10 participants (Francis

et al., 2010). Next, the conceptual approach provides suggestions on estimating sample size requirements based on its informational power, which can be influenced by the specificity of the research objective, use of a theoretical framework, specificity of the sample, and quality of the interview dialogue (Malterud et al., 2016). With reference to these considerations —this study has a specific objective, and will be guided by the CFIR. However, since participants include different groups of stakeholders, the sample may not be considered to be specific. In relation to the quality of dialogue—although the researcher is an experienced occupational therapist who has worked closely with people with dementia and multidisciplinary team members, and has conducted therapeutic interviews with PLWD—therapeutic interviewing differs from qualitative interviewing (Patton, 2015). As a researcher in training, it may take her some time to familiarise and build rapport with participants and to build interview skills (Malterud et al., 2016). Overall, based on considerations from both approaches, the proposed initial sample size is thought to be appropriate. Nevertheless, this decision will be an iterative process, subjected to change based on informational power from the data being collected and analysed (Glenton et al., 2018; Malterud et al., 2016).

Data Collection

Data collection is expected to start in August 2021 and expected to be completed within a 5-month period, by December 2021. Due to social distancing and health regulations from COVID-19, data collection will take place virtually. Individual semi-structured interviews with be conducted with each participant via Zoom, or via the telephone. Zoom is a teleconferencing platform that allows both the researcher and participants to observe each other's facial expressions and nonverbal gestures during an interview (Saarijärvi & Bratt, 2021). As compared to other teleconferences such as Skype, Zoom has been described to be more intuitive and as a highly suitable platform for conducting online interviews (Archibald et al., 2019; Gray et al., 2020). However, this method requires both the researcher and participants to have a stable internet connection, camera and microphone (Saarijärvi & Bratt, 2021). In addition, not everyone may feel comfortable with using teleconferencing platforms. As such, the researcher will also offer participants the option to participate in the interview via telephone (Cachia & Millward, 2011; Drabble et al., 2016). Interviews with PLWD will last for 30–45 minutes, and interviews with nursing home staff will last for 45–60 minutes. Depending on public health guidelines during the data collection period, participants may be offered an option to participate in physical interviews if preferred.

Prior to the start of an interview, participants will be introduced to pet robots through a short video that shows the functions of some pet robots. After that, they will be asked to complete a demographics form and participate in a semi-structured interview. The interview guides were developed based on the CFIR domains (https://cfirguide.org/constructs/). The interview guides will be piloted prior to data collection. All interviews will be audio recorded. Field notes will be taken during and after each interview to note down observations that cannot be captured via audio recordings, such as participants' gestures or facial expressions (Phillippi & Lauderdale, 2018). The researcher will also maintain a reflexive journal to reflect on the overall data collection process (Probst, 2015).

Data Analysis

The process of data collection and analysis will occur concurrently. A qualitative data analysis software, NVivo 12, will be used for data management. Data will be analysed using the framework method (Gale et al., 2013; Ritchie & Spencer, 1994). This method follows a systematic and clearly defined process that can be replicated, thereby providing transparency (Gale et al., 2013). After each interview, data will be transcribed. The researcher will first immerse and familiarise herself with the data. The next step is the identification of an analytical framework, which involves the development of codes and categories. A combination of deductive and inductive approaches will be used. The constructs and domains listed in the CFIR will be used as a priori codes and categories for an analytical framework. Any barriers or facilitators that do not align with the a priori codes will be assigned with open codes for inductive analysis, to ensure that all data are considered (Ward et al., 2013). After coding the first few transcripts, codes will be grouped into categories to form a working analytical framework. After that, this analytical framework will be applied to subsequent transcripts (Gale et al., 2013). Next, data from each manuscript will be summarised by category and charted into the framework matrix to allow for constant comparison through a review of data across the matrix (Gale et al., 2013). Finally, the last step will be 'mapping and interpretation', where data will be interpreted by identifying characteristics and differences between data to explain barriers and facilitators affecting the implementation of pet robots for PLWD in nursing homes (Gale et al., 2013).

Ethical Considerations

This study has been approved by the Research Ethics Committee in the National University of Ireland Galway (Ref no.: 2020.10.014). The study will be conducted in full compliance with the approved protocol. It is not anticipated that participants involved in this study will be at any risk of harm. Special considerations will be made for PLWD to safeguard their interests. The process of consent seeking will follow guidance as outlined by the position paper by Alzheimer's Society Ireland (2021) on the Assisted Decision Making (Capacity) Act 2015. An ethical protocol will be followed to ensure that additional safeguards will be in place to guide the management of distress during data collection. If participants demonstrate or report of any form of distress, the session will be

terminated. The session will be deferred to another date and time in agreement with the participant. If he/she would like to withdraw from the study, data collection for the participation will be terminated. All participants have the right to opt out of the study at any stage without any prejudice or consequence. During interviews, participants may disclose information (e.g., issues that pose a serious risk or danger to the participant) that may be unethical for the researcher to keep confidential. Hence, at the outset of the study, they will be informed that there are limits to the researcher's ability to keep the information confidential. When the researcher is informed about a clear risk/danger to the PLWD, the researcher will be obliged to disclose this information to their caregivers and/or the Research Ethics Committee.

Confidentiality and Data Storage

To maintain research data confidentiality, all participants will be assigned with a study code number to ensure the anonymity of participants during data analysis and for publication of the research at the end of the study. This will ensure that the data that are collected cannot be linked to an individual's identifier (personal information). In addition, for the publication of the study—findings will be presented in a global manner using the study code number to ensure that individuals cannot be identified. All research data will be stored within the research office at the National University of Ireland. All softcopy and hard copy data, including audio recordings, will be stored securely with access for a maximum of 7 years. This is in line with the requirements for research data storage by the National University of Ireland Galway. Only the researcher will be able to access the information. These steps will minimise the risk to participants from the breach of confidentiality.

Rigor

Rigor as outlined below will be maintained to ensure and to clearly demonstrate the credibility, transferability, dependability and confirmability of this research (Lincoln & Guba, 1985). A clear research method and participant selection criteria, such as delineating sample size considerations, interview procedure and interview guides before commencing the study, will ensure transparency and minimise the researcher's subjective biases. The use of an interview guide and prompting questions can reduce the potential for interview bias (Salazar, 1990). To ensure confirmability, a clear research record will be kept as a transparent trail to document decisions (Maher et al., 2018; Noble & Smith, 2015). Use of the NVivo 12 software to support data analysis will further support the confirmability and dependability of this study, since it can store raw data and keep a record of the analysis process to enable an audit of the research trail when required (Bonello & Meehan, 2019). Finally, the Standards for Reporting Qualitative Research (SRQR) checklist (Supplemental Online Appendix 1) will be used to guide the reporting of the study findings (O'Brien et al., 2014).

Discussion

This study is preceded by a scoping review, which demonstrated that existing knowledge about multi-level stakeholders' perspectives on about the barriers and facilitators affecting the implementation of pet robots are scarce. To the best of our knowledge, this is will be the first study to thoroughly and explicitly explore multi-level barriers and facilitators that can affect the implementation of pet robots for PwD in nursing homes. This understanding is a necessary first step to understand how research on pet robots can be translated into practice, as findings will be used to inform the identification of strategies that may be used to guide their implementation. This study is a part of a larger project to develop recommendations for the implementation of pet robots for PwD in nursing homes. Findings will be submitted for publication in an open-access, peer-reviewed journal. We also expect to share our findings with other healthcare professionals, researchers and members of the public via national and international scientific conferences and newsletters.

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Supplemental Material

Supplemental Material for the article is available online.

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