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An exploration of experiences and perspectives of assistive technology for community dwelling older adults and their carers at night time

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by

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An exploration of experiences and perspectives of assistive technology for community dwelling older adults and their carers at night time

By

Joanne Gunning

A thesis submitted in partial fulfilment of the University's requirements for the Degree of Doctor of Philosophy

May 2022

Certificate of Ethical Approval

Applicant:	Joanne Gunning
Project Title:	An exploration of values and perspectives of people with long term conditions and their carers regarding home technology at night-time.

This is to certify that the above named applicant has completed the Coventry University Ethical Approval process and their project has been confirmed and approved as Medium Risk

Date of approval:	12 Feb 2021
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Abstract

Introduction

An increase in the application of technological services to support older adults in the community has sparked debate and discussion of its use and effectiveness amongst its many stakeholders, and there is particular interest in night-time technologies. Despite the desire to integrate these services, the evidence of successful implementation is varied and unclear. There is the need to understand the variety of perspectives from carer to service user to understand barriers and enablers of its use. The aim of this PhD was to answer the question, '*what are the experiences and perspectives of home assistive technology at night time for community dwelling older adults and their carers?*'.

Methods

Three qualitative studies were conducted to answer the research question. Study 1 is a qualitative evidence synthesis exploring existing knowledge of the experiences of home assistive technology with people with long term conditions and their carers. Study 2 explores the perceptions and experience of carers – those who do not use technology and telecare call responders who do use it to support older adults in the community overnight. Data was collected via on-line focus groups and analysed by thematic analysis. Study 3 explores the experiences of service users of night time assistive technology and their telecare call responders. Individual interviews and on-line focus groups were utilised to collect the data which was analysed by thematic analysis. Findings from the three studies were then explored and discussed to identify overarching themes and recommendations for practice.

Results

Study 1 found four analytical themes, 1) safety and security are more important than privacy, 2) education is essential for successful implementation, 3) concern for the implications of technology on traditional healthcare roles and resources, and 4) successful implementation is paramount in effective disease management. Study 2 found four key themes, 1) face-to-face versus technological care services, 2) fear of change and repercussions, 3) going digital, and 4) is technology reliable? Study 3 identified four themes, 1) social isolation, 2) sense of community, 3) technology and individual need, and 4) technology not used as intended. Six broad themes were identified from the findings of the three studies exploring the values and perspectives of home assistive technology at night time for community dwelling older adults and their carers, 1) safety and security, 2) education, 3) face-to-face versus technological care, 4) change, 5) social isolation and 6) individual assessment for telecare solutions.

Conclusion

The research has identified three unique recommendations for organisations to implement when introducing technology into their service, 1) education and training for service users and service providers, 2) individual assessment of service user needs, and the tailoring of services provided and 3) consideration of social needs and the building of communities when prescribing technology services.

Contents

Structure of Thesis

Chapter 1: Introduction and background

This chapter puts the research into the context of what is already known about the use of technological services for older adults living in the community. It clearly states the aim and objectives of the research.

Chapter 2: Methodology

This chapter considers the epistemological and ontological decisions made to address the research objectives and inform study 1, 2 and 3. It discusses research strategy, procedures and analysis including debate surrounding the trustworthiness of qualitative research.

Chapter 3: Study 1 Home technology: the experience of people with long term conditions and their carers. A qualitative evidence synthesis

This chapter is a systematised review of existing qualitative literature exploring the experience of home technology (telecare, telehealth, telemedicine and telemonitoring) for community dwelling people living with a long-term condition. Thematic synthesis of empirical research produced descriptive and analytical themes that were critically analysed and discussed. Findings from this qualitative evidence synthesis are considered with the findings from study 2 and 3 in chapter 5.

Chapter 4: Study 2 An exploration of the perceptions of non-technology using community carers and the experiences of technology using telecare call responders on the support of older adults in the community overnight

This chapter reports on study 2, a qualitative study which explores the perceptions of non-technology using community carers and the experience of technology using telecare call responders on the use of technology to support older adults in the community over night.

Chapter 5: Study 3 An exploration of the experience of community dwelling older adults with social care needs, who use night time assistive technology, and their telecare call responders

This chapter reports on study 3, a qualitative study exploring the experience community dwelling older adults using telecare at night and their call responders are explored within this chapter.

Chapter 6: Discussion and conclusion

This chapter considers findings from the 3 previous studies in relation to each other and existing evidence. Overall limitations of the research process are discussed and areas for recommended future studies are recommended. This chapter also consider the implications of the research findings on practice and how findings may be used to inform service development in relation to technology implementation.

Research timeline

2022

Data analysis for study 2 and 3

Write up of research

Thesis submission

2021

New organisation recruited

Research proposal and ethical approval gained

Data collection for study 2 and 3 completed

2020

Study 2 data collection started

COVID impact

PHC withdrew support and change of Director of Studies

2019

Ethical approval gained for study 2 and 3

2018

Ethical approval gained for study 1

Study 1: Qualitative Evidence Synthesis

2017

Commencement of research

The research journey; a reflective narrative

As any research journey, this project has endured many nuanced twists and turns. Many factors have influenced and impacted on the process and also outcome, resulting in this additional and unique contribution to existing knowledge. This reflective account aims to chronologically guide the reader through the many facets over the 5 years which it took to complete, to give context and understanding to the process.

In 2017, I was successfully granted a studentship to conduct research for Coventry University and a private healthcare company (PHC). The PHC part funded the research as they specifically wanted to explore the use of technology with their service users at night time, as such my research was bound by this constraint. During the first year of this research, successful relationships were formed with the PHC, in particular the Chief Nurse who acted as gate keeper to the company and had a clear motivation and interest in research. On completion of study 1 (chapter 3), which was a qualitative evidence synthesis, it was identified that there was a particular dearth of knowledge in assistive technology and its use at night, thus supporting the proposed research focus.

The initial research proposed was a mixed-method co-creative study comprised of 3 phases;

Phase 1: a qualitative study using focus groups with PHC participants and dyadic semi-structured interviews with the PHC service users. The intended outcome of this study was the generation of themes representing the data from the focus group and interviews.

Phase 2: a quantitative study using a questionnaire to rank the values and perspectives, as generated in phase 1, in order of perceived importance. It was proposed that PHC workers and service users were to be included in this phase.

Phase 3: a qualitative study using focus groups with both service users and PHC participants to explore the ranked values and perspectives. The intended research output was co-created recommendations for the use of assistive technology at night time for people with long term conditions and their carers.

Ethical approval was gained for the above research project in 2018 and I commenced to recruit participants for the first phase of the research. It is important to note that the Chief Nurse from the PHC who co-ordinated the research had now left the company and had been replaced be a new employee. Communication with the new gatekeeper had become challenging and I found the progression of the research had been halted. I struggled to recruit to the focus group with the PHC with the limited input and interaction I could have with this population and the lack of proactive support and drive from the Chief Nurse. These challenges resulted in the recruitment of only 2 PHC participants to engage in the focus group which was not aligned with what had been proposed. After much consideration with my supervisory team, it was decided I would proceed with this sample and take a more case-based approach to this stage of the research, and the focus group was conducted in March 2020. Whilst this was not what was originally proposed, this focus group produced rich and valuable data.

The second focus group in phase 1 was proposed to be with service users of the PHC. Recruitment to this was initiated however paused with the onset of the covid-19 pandemic. The focus of all health and social care providers, including that of the PHC involved in this research, was realigned in this uncertain and unprecedented time. Imposed lockdowns meant I would not be able to access the service user population as proposed. I had originally considered and decided against on-line focus groups for data collection pre-covid. As the wide geographical area covered by the PHC would impose logistical challenges to bring participants together in a face-to-face environment, the prospect of virtual communication was appealing on a practical level, but the concept was rejected from the concern that the nuanced 'human element' would be lost. With lockdowns now mandated, on-line communication was the only option and with a systematic review of the literature it could be reasoned that virtual focus groups produce the same outcomes as face-to-face, and no contraindications were found. Overall, this method of virtual data collection was advantageous to the research as it meant easy and quick access to the intended population which was a benefit given the previous timeline issues. Communication with the PHC was now, and understandably, very limited as they shifted their focus in response to the pandemic. I also experienced personal challenges during this time as I was the prime care giver to 2 young children which now had to be home schooled, which had a significant impact on my ability to dedicate the required time to my research.

In August 2020, the PHC officially withdrew all support from the research and confirmed they would no longer be participating in the project. The PHC had gone into administration. This was a difficult time with the future of the research being uncertain. I was now in my third year of my PhD with only one data set and the prospect of not being able to continue. This was also the same time my Director of Studies left the university which had an impact on the research journey. Whilst this presented challenges at the time, the appointment of a new supervisor brought new insights and fresh perspectives to the research, ultimately shaping it to the end result.

The support provided by the University enabled me to continue with the project. A new organisation was approached and agreed to be involved with the research. This company was a telecare provider who evidently had a keen interest in research to improve service provision. As the focus of the research had to change in line with the involvement of the new organisation, I composed a new research proposal which was approved in January 2021. The structure of the research was now proposed to be;

Phase 1 (Chapter 4, study 2): a qualitative study which explores the perceptions of non-technology using community carers and the experience of technology using telecare call responders on the use of technology to support older adults in the community over night. The data from the already conducted focus group with the PHC was used and thematically analysed with data from a focus group conducted to gain the perspectives of non-technology using carers and technology using telecare call responders.

Phase 2 (Chapter 5, study 3): a qualitative study exploring the experience of community dwelling older adults using assistive technology at night and their call responders. This phase consisted of individual interviews with service users of the telecare service and a focus group including service users and telecare call responders.

Data collection was completed from May to August 2021 and data analysis was conducted during 2022 with thesis submission being August 2022.

Preface

Occupational therapy and assistive technology

Assistive technology is an increasingly integral part of the UKs health and social care provision and therefore Occupational Therapy (OT) practice (Hamblin 2017). Assistive technology such as telecare and telehealth has been on policy agenda since the 1960s with the introduction of pull cord systems in sheltered accommodation facilities (Fisk 2003). The provision of such technologies has been noted to be inconsistent in respect of uptake and usage, and it is therefore imperative that research into the phenomena is conducted to enable OTs to understand the multi-faceted nuances and work to provide services that reach the right populations in a way that will promote compliance and effective use (Hamblin 2017).

Assistive technology is considered a core competency within OT practice to enable people to engage in occupations within their environments by using profession specific skills to promote appropriate access and use of the technologies (United Nations 2017). The World Federation of Occupational Therapy (WFOT) position statement on OT and assistive technology supports the profession to promote global diversity by increasing access and placing people in the centre of assistive technology design and implementation (WFOT 2019). OTs are in a unique position to understand abilities, occupations, and environments, and can play an important part in achieving the World Health Organisation's (WHO) proposal of universal sustainability with access to technologies (WHO 2017). Occupational science provides an occupational lens to view the phenomena in terms of the impact of occupational injustice, apetheid and deprivation, and how these experiences may influence the provision and use of assistive technology (WFOT 2019). The complex challenges that face OTs in the provision of assistive technology requires the profession to develop strategies that promote access to quality services and support people in their occupations (WFOT 2019).

OTs using assistive technology must comply with the WFOT code of ethics to ensure proficiency of practice and the welfare of service users (Sarsak et al. 2023). Client selection, collaboration, provider competence/standard of care and authentic OT practice are areas of ethical consideration set out by the WFOT (2019);

Client selection; it is reported that OTs should utilise clinical reasoning skills to assess and determine the requirement of telecare services based on individual needs. It is imperative that diagnosis, dysfunction, occupations and ability to access technology are considered when assessing for and prescribing technology.

Collaboration; to promote cohesive and sustainable telecare services, technology service providers and OTs are encouraged to collaborate to ensure services are relevant and effective.

Provider competence/standard of care; OTs are expected to adhere to ethical principles by maintaining competency to ensure service user safety.

Authentic OT practice; telecare provision should be client-centred and occupation-centred which reflects the breadth and values of the profession.

Evidence suggests a need for a greater focus of assistive technology training at pre-registration level with a recent study highlighting OTs included in the research did not believe curricula adequately prepared them to effectively utilise this in clinical practice (Dishman et al. 2021).

In order to better understand the phenomenon of assistive technology from an occupational therapy stance, research is required to inform thinking and underpin practice. The three studies that comprise this research look to explore the experiences and perceptions of community dwelling older adults of using assistive technology at night go some way to add to the existing body of knowledge to aid OTs when working alongside service users with assistive technology needs.

In attempt to promote better access to information and care, increase convenience and foster opportunities for growing control for individuals to take responsibility for their own health, the NHS and wider healthcare system is committed to delivering digital services wherever appropriate (NHS Digital 2023). It is estimated that eleven million people (20% of the UK population) do not possess basic digital skills or have access to technology, with older people, less educated people and those in poor health being those who may benefit most are least likely to be on-line (NHS Digital 2023). It is proposed that local services should take into account and proactively include the communities who may be excluded with the RCOT position statement on assistive technology stating digital inclusivity is not about disability but universality, and OTs are required to promote access and enable participation in digital environments (RCOT 2023). OTs are perfectly positioned to work alongside people to achieve the 'capabilities that fit someone for living, learning, working, participating and thriving in a digital society' (Health Education England 2023). In this respect, it is important that all OTs should also possess the required digital literacy skills required to capitalise on the benefits that technology may bring to occupational therapy and specific areas of practice (RCOT 2023). By exploring the experiences and perspectives of assistive technology in this research, an understanding of digital literacy when using telecare is considered in study 3 (chapter 5) with telecare service users, thus adding to the existing knowledge in this area.

The International Classification of Functioning (ICF) is a biopsychosocial model of disability that provides a framework for describing and classifying function and disability and is a conceptual basis for the definition and measurement of health and disability (Karlsson and Gustafasson 2021). The biopsychosocial model integrates principles from both the medical and social model of disability to synthesise and give a coherent perspective of the multi-faceted factors of health: biological, social and individual (WHO 2002). The shift from condition and diagnosis to function means all conditions are viewed as equal and participation is not determined by diagnosis alone. The underlying principles of the ICF include 1) universality: the framework is applicable to all people irrespective of health condition or diagnosis, 2) parity: disability is not differentiated by aetiology, 3) neutrality: neutral terminology is used to describe both positive and negative experiences of functioning and disability and, 4) environmental factors; the impact of all environments is considered in relation to functioning and disability (WHO 2013).

The functioning of a person is the starting point of the prescription of assistive technology which assist with daily functioning, therefore the ICF is an important framework as it can be used to describe and classify activity and also environmental factors that influence functioning (WHO 2002). Whilst the use of the ICF framework to select assistive technology is widely debated (Bernd et all. 2009), it is thought that the use of ICF terminology in the provision of technologies may result in the successful pairing of a person and product's characteristics (Heerkens et al 2011). The ICF includes domains that are central to existing OT models and as OTs were integral to the development of the framework, incorporates OT language (Prodinger et al. 2015) making it a plausible model for OTs to use in the provision of assistive technology.

OTs endeavour to facilitate occupational balance by using technologies to enable occupational engagement and participation (RCOT 2023). The potential of technology must be harnessed by OTs however a recent study suggested education and training is imperative to do so in order to overcome barriers (McGrath et al. 2017).

Conclusion

In conclusion, the use of assistive technologies is an emerging area of interest for OT and undoubtably will continue to be immersed in OT service provision as the technological landscape evolves. Overall, the context of this study is to explore the experiences and perceptions of assistive technology for community dwelling older adults and their carers at night to add to the existing body of knowledge and hopefully inform future practices of OTs prescribing and implementing technologies within services. The co-creative approach taken by hearing the voices of different stakeholders is hoped to capture a holistic and well-informed view which will lead to recommendations that will be meaningful and accessible to those who use assistive technology in their own capacity. It is important to note that whilst this research was completed by an OT and therefore influenced by this viewpoint, the overall focus was not intended to be profession specific.

Chapter 1: Introduction and Background

Preface

This research was co-funded and co-designed by Coventry University and a private community health care provider and commenced in October 2017. The private community health care provider who participated in this research is an outsourcing firm that is funded by the government to provide public services in the UK. It has a workforce of 68,000 across 40 countries and was founded in 1884. The company sells services in healthcare, construction, fire safety, civil engineering, water, catering, energy management and cleaning industries. The community-based organisation provides ‘compassionate person-centred complex care services’ and in 2018 it supported 2900 clients, provided 2,000,000 hours of complex care, supported 1500 staff to work in the client’s home and completed 620,000 care visits. The nationwide care provision for adults and children ranges from respite and complex life sustaining support to social care and companionship.

Government outsourcing is a very significant component in the delivery of central and government services with the UK government spending £251.1 billion per year on outsourcing and contracting (House of Commons Administration and Constitutional Affairs Committee 2018). The growth has seen a consequential increase in the provision of healthcare provided by private companies with a rise from 5% in the early 1990’s to more than 80% today (UNISON 2018). In recent years the Government has been criticised for putting pressure on private sector partners which has encouraged reckless acquisitions and efforts to attain unsustainable growth (House of Commons Administration and Constitutional Affairs Committee 2018). In January 2018, the facilities and construction management outsourcing firm, Carillion, entered liquidation affecting the 420 contracts held with public services (Comptroller and Auditor General 2019). With public trust in outsourcing seriously damaged due to high profile failures, the House of Commons ordered a report into public sector outsourcing and contracting to provide measures to prevent the collapse of outsourcing firms (House of Commons 2018). However, in April 2019, the private healthcare organisation moved to a new company in a pre-pack administration plan meaning a Carillion style collapse could be avoided with 68000 jobs being secured and minimal disruption to the vital public services the company provides to the public sector.

In 2017, the researcher spent 3 days shadowing various roles across two branches with the aim to gain an understanding of the current structure and processes in the organisation. At that present time, the private health care provider did not utilise any form of technology (other than medical equipment) to support the services they provided and were keen to explore the current evidence and engage in empirical research to guide and inform the potential implementation of technology in the service. The health care provider was particularly interested in exploring the use of technology at night time to support the service-user, family carer and their home care staff, and were proactive in supporting the researcher in the development of the study and were explicitly mindful not to influence the research to create sponsor bias or affect the findings in a way that would have predetermined favourable outcomes for the company.

In August 2020 the private health care provider went into administration and underwent major restructuring in the company and were unable to continue practically supporting this research. A second organisation was then enlisted on this project and brought new insights, enriching the process and findings. The second organisation is a telecare technology careline provider that delivers support to over 200,000 customers in the UK. Often described by its own staff as ‘the fourth emergency service’, they monitor older adult service users in the community through the use of assistive technology. With the aim of empowering people to lead independent and fulfilled lives through a blend of people and technology, call centre staff are available 24 hours a day and provide experienced assistance in the case of an emergency. In 2019, the telecare’s annual survey shown 98% of their customers felt their call alarm enabled them to live a more independent life, and 98% of service users felt that access to their alarms made them feel safer and reassured should there be an emergency.

Background

Introduction to assistive technology

Assistive technology is viewed as a fundamental human right with potential positive life changing benefits, however, is often disregarded on global health and development agendas with limited and fragmented investment (World Health Organisation (WHO) 2018). The significant discrepancies between the need for and provision of assistive technology is determined by various social, structural and demographic influences, which demand regional, national and international policies to encourage effective implementation (MacLachlan et al. 2018). It is estimated 2 million people will need assistive technology by 2050, and whilst technology can be viewed as an investment into a participatory society, equity is currently an issue as 90% of those who need assistive technology do not have access to it (WHO 2018). With lack of awareness, fragmented supply and sparse economic and political support, assistive technology remains outside the mainstream of health and social care

(WHO 2018). Research into assistive technology has been supported with funding from national research bodies however implementation of recommendations is developed at local authority level leading to dissociate service provision with small scale pilots leading to challenges in scaling up to the wider health and social care arena (Write 2021). Funding for social care was cut by £7.7 billion between 2010 and 2019 resulting in local authorities utilising assistive technologies to maintain statutory service provision (Write 2021). MacLachlan et al. (2018) states the use of assistive technology has the potential to positively impact the economy with these benefits not only translating into decreased health and social care costs, but also increasing employment and industry development, benefiting the economy overall.

Research conducted by The King's Fund (2010) identified 5 key themes that must be embraced to ensure care quality and sustainability; 1) Co-ordinated care, 2) Patients engaged with their care decisions, 3) Supported self-management, 4) Prevention, early diagnosis and intervention, and 5) Emotional, psychological and practical support. This research will go some way in identifying if technology can support these themes.

Assistive technology is the umbrella term encompassing the systems and services that can be employed to support individuals to maintain or improve functioning with the aim to foster wellbeing (WHO 2022). There is an absence of a universal definition of 'technology' in health and social care which can lead to challenges when exploring its use, application and effectiveness. The terms for assistive technology are often used interchangeably which can also impact on the clarity of research findings. It is essential when conducting research into technology that the specific technology being focussed on is clearly defined enabling the reader to make judgement of the research findings. The table below defines the forms of technology explored throughout all three studies of this research and indicates which each study focusses on.

Table 1 Assistive technology definitions

Technology	Definition	Focus in study
Telehealth	'The delivery of healthcare from a distance using information communication technology, which enables the provision of synchronous and asynchronous consultations between patients and clinicians' (WHO 2021)	Study 1
Telemonitoring	'The transmission of symptom scores, physiological data including heart rate, blood pressure, oxygen saturation and weight directly to	Study 1

	care providers either via automated electronic means or by web-based data entry' (Mathew et al 2018)	
Telemedicine	'The delivery of health-care services where distance is a critical factor, using information and communication technologies for the exchange of information for diagnosis, treatment and prevention of disease and injuries with the interest of advancing the health of the individual and their communities' (WHO 2012)	Study 1
Telecare	'The use of information, communication and monitoring technologies which allow healthcare providers to remotely evaluate health status, give educational intervention or deliver health and social care to patients in their home' (Solli et al 2012)	Study 1,2 and 3

Older adults and long-term conditions

An increasing incidence of older adults living with long term conditions has become a pressing challenge for the existing health and social care framework which was designed around the medical model of illness. Long term conditions are more prevalent in the older adult population with 58% of people over the age of 60 living with multiple co-morbidities (Department of Health 2011). The growing number of elderly people is coupled with falling birth rates creating a situation where there are less adults of a working age to care for elderly people with health and social care needs (Magnusson, Hanson and Borg 2004). 15 million people in England live with a long term condition and present the highest healthcare needs of the population, accounting for 50% of GP appointments and 70% of hospital occupied bed days (NHS England 2019). A long term condition has been described as 'any health condition that cannot at present be cured, but can be managed with medicines and/or therapy. This includes conditions such as diabetes, heart failure, COPD, arthritis, depression.' (Department of Health 2011). Living with a long term condition can impact a person and their occupations, including engaging in activities of daily living, relationships, housing and education (Department of Health 2015). Projections indicate that this problem will increase as the UK over 65 years population will increase from 17% to 25% by 2035 (Newman et al. 2018). It is therefore imperative that service development and care coordination is steered with a view of managing and maintaining the health and wellbeing of older adults living with a long term condition. People with long-term conditions, especially the elderly population, are likely to have individual and complex care needs. The Care Act (2014) brought together relevant policy and guidance that aims to enhance the following outcomes for people with long-term conditions and their carers;

1. Social care-related quality of life.

2. Health related quality of life.
3. Involvement of decision making.
4. Safety of people using services.
5. Hospital admissions.
6. Residential care admissions.
7. Older people being supported to live where they wish.
8. Service user and carer satisfaction.

(NICE 2015)

There appears to be a link between these outcomes desired by the Care Act 2014 and those aimed for through the use of technology implementation to support community living.

Medical and technological advances mean that people are living longer and in better health and it is acknowledged that a better informed and healthier generation of elderly people will likely demand improved access to healthcare and involvement in their own health management (Nymberg et al. 2019). Although technology is a potential means to improve access to health information and healthcare staff (Magnusson, Hanson and Berg 2016) research has shown reservations from the elderly population in utilising this form of service provision. It is reported that 75% of people with access to assistive technology, which includes the technologies outlined in table 1, abandon the service they have been provided, leading to poorer health outcomes and increased social isolation (WHO 2018). It is therefore crucial that service users are individually assessed and prescribed assistive technology appropriately to reduce the risk of abandonment due to inappropriate provision and use. Trust in face-to-face visits, mistrust in own competence to use the technology with the aging body being a barrier and lack of IT knowledge demonstrates satisfaction with regular care and lack of need or motivation to change (Nymberg et al. 2019). Despite these challenges, there appears to be an acceptance of the inevitability of integration of technology into healthcare services and some researchers purpose the generalised attitude that older adults view technology negatively is a misconception (Magnusson, Hanson and Berg 2016). Research conducted by Whitten and Mickus (2007) concluded the elderly participants with access to telecare believed it was a beneficial way to receive care and felt comfortable with the equipment they were using, there was no strong belief that face-to-face visits were superior to telecare and were overall very satisfied with the service received.

Informal carers

Around 6.5 million people in the UK care for a friend or family member in some capacity with 1.5 million providing over 50 hours of care per week (Carers UK 2020). The United Kingdom Census

(2011) highlights 12% of the population identify as a carer (Buckner and Yeandle 2015) but it is believed this figure is a gross underestimation as many people who provide care do not self-identify as a carer (Colombo et al. 2011). The importance of care they provide is well recognised as they save the economy £132 billion per year, equating to £19,336 per carer, it is therefore imperative these informal and unpaid carers are supported in their care provision (Carers UK 2020). Public policy in England has acknowledged the importance of informal carers with The Carers Act (HM Government 1995), Carers (Equal Opportunities) Act (HM Government 2004) and The National Strategy for Carers (HM Government 2010) all supporting their role. In 2014, The Care Act (HM Government 2014) mandated that informal carers should be supported in their own right and it became a statutory duty for local councils to assess carer needs.

Caring for a friend or family member can have a detrimental impact on the health, wellbeing and financial situation of the carer. In 2012, Carers UK conducted a survey of 3400 UK carers to explore the impact of caring on health and wellbeing (Carers UK 2015). The following section will discuss the research findings.

Caring impact on health

83% of carers reported that providing care had a negative impact on physical health, and 87% reported a negative impact on mental health. This can be further dissected to 91% of participants experienced anxiety, 53% depression, 36% sustained a moving and handling injury and 26% experienced exacerbation of an existing health condition.

Neglecting own health

Survey participants reported neglecting their own health and social needs by failing to keep regular medical appointments, socialising with friends or not finding time to relax. The survey found that 2 out of 5 participants had delayed medical treatment due to their carer responsibilities which either made their condition worse, extended the duration of the illness or caused additional complications. Inevitably this would impact on their care recipient and also their own access to healthcare resources. 52% of respondents reported the role impacted negatively on sleep causing a negative impact on wellbeing.

Caring impacts on work

Three million informal carers are in either full or part time employment which presents a set of unique challenges. 37% of the participants had to reduce hours or cease employment to successfully maintain their carer role. Those carers that did remain in employment report a direct impact on their paid jobs with 50% reporting being stressed as a result of their caring role.

This research recognised that 16% of informal carers in the study felt that Telecare would make a difference to their health, further supporting the need for research into this phenomenon to guide future application of technology services.

Sriram et al. (2019) conducted a systematic review of informal carer's experience of assistive technology use in dementia care at home. Assistive technology, such as Telecare, has been proposed to be an innovative way to support someone with dementia and their carer to stay independent and remain in the community (Woolham et al. 2005). It is believed that assistive technology offers the potential to support informal carers by alleviating caregiver burden (McKechnie et al. 2017). Knowledge and acceptance, competence in using technology and ethical issues were emerging issues concluded from the study. Overall, informal carers generally appreciated assistive technology and their experience of use varied.

Carers face mounting fatigue, depression, stress, health problems and loss of social occupations (Cheung and Tseng 2008), which in turn impacts on quality of life and carer wellbeing. An informal carer can be defined as 'a person of any age who provides unpaid support to a relative, partner or friend who is ill, frail, has a disability or has mental health or substance misuse problems' (Carers Trust 2012). Evidence suggests Telecare reduces carer stress and depression compared with informal carers with no access to such technology (Bensink et al. 2016), however this phenomenon is not fully understood (Davies et al. 2013). Despite the lack of robust understanding of this proposed positive affect of Telecare on family carers, policy makers continue to argue the benefits of mainstreaming the service stating the beneficial impacts of reducing anxiety, improving the carer's sleeping pattern, improving relationships with the care recipient and allowing them to remain in paid employment for longer (Jarrold and Yeandle 2009).

It is argued that Telecare should be implemented and established as a nursing intervention to minimise family member carer burden by providing cost effective, supportive intervention and the provision of required knowledge in an appropriate time frame to support the caring role (Kim et al. 2011). The study completed by Kim et al. (2011) concluded that home based telecare was more effective in reducing carer burden on the family of stroke patients than a face-to face hospital based carer group, thus suggesting that technology has a role to play in the alleviation of the negative impacts of caring for a loved one. This may be due to the flexible and dynamic relationships formed between the informal carer and health care professional as supportive contact may be obtained at an appropriate time for the carer, when and as felt necessary. Soli et al. (2015) found the carers frequency in use of technology in gaining support shaped the relationship in terms of attitudes and needs with the formal carers. The study also reported the attitudes about technology adopted by the family regulated how the nurses supported them, concluding a positive attitude and frequent contact meant increased support and decreased carer burden. Mellors (2009) investigated the psychological outcomes of telecare on informal carers and found no significant change in carer burden or quality-of-life. Despite these findings, telecare was perceived positively in this study with informal carers reporting the service assists with caring duties.

A study conducted by Steils et al. (2021) indicated 84% of Telecare managers believe that Telecare reduces carer stress by providing reassurance and increased independence and quality of life for informal carers. It has been reported however, that discord exists between the perceptions of informal carers and healthcare providers that prescribe Telecare services. Whilst some Telecare providers believe informal carer’s needs were identified and taken into consideration before installation, the associated carer did not feel they had been consulted in the process or their needs assessed (Steils et al. 2021).

Monitored Telecare devices enable informal carers to remain in employment which is a particular benefit as there has been a significant increase in numbers of working age carers. Telecare call centres have been described as a ‘buffer’ allowing informal carers to manage other roles in their life (Steils et al. 2021). However, ineffective system procedures can impact on the intended outcome. Some informal carers report they are contacted to respond to inappropriately triaged Telecare alerts which should have been managed by formal health or social care staff (Steils et al. 2021), resulting in added stress and anxiety. It is therefore imperative that Telecare providers develop and adhere to robust protocols to provide seamless care.

Formal carers; Registered Nurses and Healthcare Assistants

A substantial body of work has argued that Telecare is effective in the care and treatment of people with long-term conditions (Phanarath 2014), however, the impact of technology on healthcare professionals should also be considered when collating evidence to explore it’s use and implementation. Technology is not only designed to improve healthcare provision for the service user, it also aims to optimise the use of health and social care workers time (Magnusson, Hanson and Borg 2004). In recent years, the UK government has rallied to shape resources to support and enable individuals with long term conditions to self-manage their condition in a primary care setting, and emphasised self-care and patient expertise (Department of Health 2001). This shift towards a patient-centred approach has meant the NHS has increased the role nurses play with people with long term conditions in order to manage the increasing demand of this growing population (Public Health Resource Unit 2009). The notion of health care professionals supporting individuals to self-manage their condition aims to reduce utilisation of care services and improve quality of life (Pearson et al. 2007), however, health system structures have been reported to impede the ability of professionals to provide effective support due to time constraints, complexity of care, restraints on resources, poor continuity of care and poor communication between disciplines (Ashworth and Thompson 2011). Existing research has explored if technology, such as Telecare, can aid nurses in their role of supporting self-management to address the afore mentioned challenges. In 2014, Taylor et al. presented a qualitative study examining the experience of older people and nurses using Telehealth for long-term condition management. Whist nurse participants raised concern that Telehealth can create dependence as opposed to self-care, this perspective was not shared with the patient participants who reported that Telehealth led to better management of their condition and the increased confidence in ability to manage symptoms meant the technology was welcomed. Results of a metareview of 53 systematic reviews, comprising 232 randomised control trails (RCT), concluded Telehealth self-management was not consistently superior to 'care as usual' however, none of the evidence reported any negative side effects, suggesting that it is a safe option for the delivery of self-management care despite the concerns raised from existing qualitative evidence (Hanlon et al. 2017).

Integration of Telecare into traditional healthcare settings can be compromised by the perceptions of its risks and safety (Guise 2014). Healthcare professionals have raised concern about providing remote care and the potential negative impact on care procedures and outcomes (Mair et al. 2007). Lack of personal non- 'face to face' care is thought by some to hinder rigorous clinical assessment (Mair et al. 2008) and impede traditional clinical relationships (Hopp et al. 2010). Staff-patient interactions and good communication has said to be adversely affected by the use of technology, in turn impacting on clinical relationships resulting in some healthcare professionals viewing Telecare to be less safe than standard care (Guise 2014). In contrast, the use of technology has been found to enable a more equal relationship to develop between healthcare workers and older people with this increased connectedness to staff leading to prompt assessment and treatment (Magnusson, Hanson and Borg 2004).

In 2010, Pol conducted an empirical study that explored the impact Telecare had on what Registered Nurses considered to be 'good' and 'usual' care in clinical practice. This ethnographic research interviewed 9 Registered Nurses and 33 patients with heart failure to understand their 'daily doings' and the impact Telecare had on these. The study spanned five different Telecare projects, seven hospital departments, one rehabilitation clinic and a regional network of General Practitioners. Overall, the results demonstrated that the notion of Telecare taking away the 'heart' of nursing care was a misconception, and in fact the technology lead to more frequent and specialised contacts between nurses and patients.

A potential barrier recognised within the research completed by Pol (2010) was the generic and prescriptive nature of home technology that could compromise the 'sixth sense' of the practitioner. It was reported that this meant additional work for the healthcare professional as they received alerts from the monitoring technology to signal activity outside of the recognised norms of the device but were actually within normal parameters for the individual service user. This meant the alarms were not interpreted at face value but were considered and interpreted against the background of the individual which took additional time and resources to correct the problems the devices introduced. In contrast to this, the patients in the study found this to be comforting as they felt they had increased interaction with the nurses and was perceived positively.

Perceptions of tele-homecare efficacy by clinical staff were debated in research conducted by Radhakrishnan et al. (2016) of which a main concern was the technology's ability to identify and alert disease exacerbation. The study concluded that the technology was not suitable for all service-users and the service needs to be contextualised for people in receipt of tele-homecare to ensure individual needs are tailored to. In the infancy of telecare services, several studies emphasised the importance of careful assessment in the implementation and continued use of the service (Woolham 2005).

There are concerns that the framing of telecare is driven by a technology and economical 'push' rather than an individualised 'pull' which has led to insufficient understanding of user needs (Milligan et al. 2011). It is argued that stakeholders can hold different values and ethical stance which affect successful assessment, implementation and review of telecare by health care professionals.

The operational focus of safety and risk management to prevent or delay move into long term residential facilities and the use of telecare to support this align with the national strategic aims of reducing the need for care and to enhance quality of life and well-being (Wollham et al. 2019).

It is often difficult for assessors to match the individuals needs to the technology due to structures and processes over which staff have limited control or influence. Greenhalgh et al. (2016) reports service providers, such as social workers, care managers and other health care professionals, recognise the need for personalised solutions without having the means to deliver them. Varying levels of knowledge could affect the quality of assessment for telecare. Sugarhood et al. (2014) argued that varied knowledge can give rise to telecare service provision that is built around the background of the prescriber, rather than the needs of the individual. Training for telecare is often 'product based' and focuses on the functionality of devices, which may be viewed as a marketing opportunity for technology firms.

Healthcare workers have reported they feel threatened and anxious about how the implementation of technology will change traditional roles and fear added work that may possibly be generated (Kim et al. 2019).

Technology

The potential for innovative technology to enable preventative, predictive and personalised care is enormous. A radical new approach in technology use is needed for the 1.4 million NHS staff, 1.5 million social care employees and the patient end user (Department of Health 2018). Many challenges present as obstacles which need to be overcome to achieve this vision, some of which include:

- Existing complex organisational and delivery structures.
- A risk averse culture.
- Limited resources to invest.
- A critical need to build and maintain public interest.

(Collins 2018)

In 2019 the NHS introduced the concept of ‘Personalised Care’ in the NHS Long Term Plan and intends for this to become ‘business as usual’ by 2024 (NHS England 2019). A main aim of this initiative is for people with long term conditions to receive support in the self-management of chronic conditions with one means of doing this is through technological assistance. Digital approaches need to meet the users specialised needs with digital services, platforms, infrastructure, and standards in place that will facilitate interoperability across health and social care (NHS England 2020). It is purposed that digital solutions may significantly enrich service user experience in accessing care as well as improve health outcomes and decreasing pressure on healthcare resources.

Telecare services can empower people living with chronic conditions to make informed decisions about their disease management and can delay the progression into costly residential care settings (Radhakrishnan et al. 2016). As defined by the Department of Health (DOH), Telecare is a service that uses ‘a combination of alarms, sensors and other equipment that help people live independently and aims to promote safety in the home environment. This is done by monitoring activity changes over time and will raise a call for help in emergency situations, such as a fall, fire or flood’ (DOH 2009). Telehealth is defined as a service that uses equipment to monitor a person’s health that would usually be measured by a health care professional, in their own home for example, vital signs such as blood oxygen saturation, blood pressure or blood glucose (Davies and Newman 2011). Telemedicine signifies the application of Information Communication Technology (ICT) to increase access to medical care and intervention with the aim to improve patient outcomes

(World Health Organisation (WHO) 2010). It has been purposed that Telemedicine has the potential to improve global clinical management and healthcare delivery by enhancing access, quality, efficiency and cost-effectiveness (Haleem et al. 2021).

Significant interest has been demonstrated in the potential use of technology to reduce the utilisation of public health services for people with long term conditions to improve quality and cost effectiveness of care (Newman et al. 2018). In response to this, the UK government funded a large scale, multi-site randomised control study (RCT). The Whole System Demonstrator (WSD) aimed to study the implementation, impact and acceptability of telehealth and telecare (Newman et al. 2018). This cluster RCT evaluated the effectiveness and cost-effectiveness of telehealth in the management of long-term health needs and telecare in the management of social care needs, both in comparison to care received as usual. Although headline findings released in 2011 appeared promising, further detailed reporting suggest possible methodological flaws and questionable results. Initial findings boasted that telehealth can deliver a 15% reduction in A&E attendance, 20% reduction in emergency hospital admissions, 14% decrease in elective hospital admissions, 14% reduction in hospital bed days and more strikingly, a 45% reduction in mortality rates (Newman et al. 2011). However, as reported in 2018, although telehealth had a statistically significant reduction in hospital admissions and mortality rate, baseline demographics that were not fully analysed may have influenced these results. The intervention group cost of hospital care was less than the control group however this was not statistically significant and the overall total cost to health and social care services were higher in the intervention group. Standardised outcome measures were used to measure any change in quality-of-life outcomes and psychological wellbeing (anxiety and depression) but did not measure any significant changes in the intervention group, moreover, the trial group did not even reach the trial defined clinical effect. Telehealth and telecare did not have an effect on generalised self-care self-efficacy or self-care behaviours, and although telecare reduced hospital emergency admission it did not lead to a decrease in service-use overall. Interestingly, 13% of participants withdrew due to active rejection of telehealth and this is recognised as a barrier to the widespread deployment of the service which is a supporting factor into further research into this area. The inconclusive findings and questions surrounding methodological integrity necessitate further research to explore this area.

COVID-19 has been a significant global health crisis since December 2019 and the absence of a pharmaceutical treatment, non-pharmacological public health strategies have been implemented in affected countries (Chen et al. 2020). Such strategies include social distancing, isolation, quarantine and community containment (Lenward 2020). It is believed that these preventative strategies disproportionately affect the elderly population resulting in social isolation and loneliness (Gale et al. 2018) which in turn exacerbates frailty and disability (Mehrabi and Beland 2020). Information and communication technology use is a potential way to mitigate these risk factors by providing a means of social connectedness (Chen and Shulz 2016).

Digital technology is already embedded in the delivery of health and social care, however it’s application and use has become vital during the COVID-19 pandemic (Keesara et al 2020). Tools such as Microsoft Teams, Zoom and Google Hangouts have become more accepted during the pandemic, and have enabled remote health consultations and connected social communities during lockdown (Manjunath 2020).

In summary, technology is an emerging intervention being implemented into health and social care however the evidence base surrounding this phenomenon is inconclusive. This doctoral research will add to the existing body of knowledge by exploring the perspectives and experience of service users and care providers with particular focus on night time technology. Its findings will inform services when implementing technology into care provision.

Doctoral research aim:

To explore experiences and perspectives of community dwelling older adults and their carers on assistive technology for night time use.

Research objectives:

1. Explore existing evidence on the experience of people with long term conditions and their carers on the use of home assistive technology.

2. Investigate the experiences and perceptions of technology from community carers from a non-technology using organisation, and the experiences of telecare call responders using night-time technology in supporting older adults living in the community.

3. Examine the experiences and perspectives of community dwelling older adults with social care needs who use night-time technology and their call responders.

Chapter 2: Methodology

Introduction

Social research is crucial in the exploration and understanding of natural phenomenon. Researchers aim to produce implementable solutions and suggestions to address critical issues by exploring their causes, explanations and applications (Rajaseker et al. 2013). Research methodology is the systematic process applied to conduct a study and outlines the strategy and procedure of research (Norrie et al. 2013), and is vital to establish reliability, validity and trustworthiness.

In this chapter the research methodology utilised in the research project will be detailed and explored. Methodological considerations and choices will be justified to enable the reader to make judgement on the robustness and quality of the research. This chapter will critically analyse and discuss the research context, paradigm, approach, data collection, data analysis, validity and reliability, and ethical considerations pertinent to the study.

Research paradigm and domain

A sequential design, which is an iterative process whereby the data collected in one phase informs the data collection of the next, will allow the findings to be generalised by verifying and augmenting study results from members of the defined population (Creswell and Plano 2007). The research was qualitatively led which has been argued to have enormous potential for generating new ways of analysing and understanding the complexities of social experience and enhances capacity for generalisation (Mason 2006).

Ontology in research is the philosophical beginning to enquiry to find explanations of phenomena that can be understood to be true. The concept of truth is widely debated by philosophers with views from truth being something that is fact and can be described objectively, to truth being a construct of an individuals' mind that is influenced by values, beliefs and personal experiences (Bleiker et al. 2019).

A critical realist philosophical approach was applied to this research. Critical realism has become an increasingly popular philosophical framework that encapsulates elements from both positivist and constructivist stances (Denzin and Lincoln 2011). Positivism accepts there is a single, 'one truth' reality that can be objectively known, which is in contrast to constructivism which believes that reality is the subjective construct of an individual's mind (Mitchell 2013). Critical realist philosophers assume the existence of an objective truth but recognise the subjective nature of knowledge and its constantly changing social constructs (Vincent and O'Mahoney 2016). It is believed that critical realism aids the researcher to explore and explain social phenomena, and also go on to make practical recommendations for social practice (Fletcher 2017) which is what this study aims to do. Critical realism has become a current trend among sociologists as it is believed to provide a valid critique of contemporary study and negotiate the challenges of philosophy in social science (Zhang 2022). Researchers hold certain beliefs that are not reducible to empirical data when constructing theories which goes against a positivist viewpoint (Archer et al. 2016). Critical realism acknowledges the existence of both intransitive and transitive dimensions in knowledge as it moves from a positivist to interpretevist stance (Bhasker 2010). Whilst critical realism has benefits by using this ontological approach to view research, it has been argued it is not superior to other alternatives and does not warrant a hegemonic status, and it is suggested that its philosophical soundness needs to be developed (Zhang 2020).

Epistemologically, critical realism looks to describe the real world through the experiences of participants to obtain an understanding of issues and make recommendations to address social challenges (Fletcher 2017). A constructivist epistemology was applied to this research which views participants in research not as objects to be experimented on but as 'models' who construct knowledge and reality (Bleiker et al. 2019). Whilst both constructivism and constructionism regard knowledge as being constructed, constructivism places higher importance to the person in the construct of knowledge. It has been proposed that this approach can result in strategic recommendations as a research output, however viewing reality through a critical realist lens is a subjective process and therefore difficult to ascertain the correctness of the representation (Lawani 2021).

Interpretive-constructivism is rooted in a deep philosophical history. The interpretation of collected data constructs a picture of the phenomena being studied and allows conclusions to be formed (Van der Walt 2020). Interpretation gives the opportunity to find the deeper meaning hidden in data (Barrett 2009) and a demonstratable process of how conclusions were made (Aldridge 2018). The author is aware that interpretation is influenced by their own attitudes, values and beliefs, which is the same as the experiences voiced by participants and also the reader of the research- to this means, there in no object reality, rather unique interpretations by all involved (Barrett 2009). Subjective constructs are never absolute reality but opinions formed based on the individual's circumstances which is the beauty of qualitative enquiry.

Positivist-empiricist research is criticised for its focus on ethnocentrism and ignorance of subjective, cultural and social nuances (Patino-Torres and Goulart 2019). Taking a constructive-interpretive approach to knowledge generation allows the researcher to place subjectivity at the centre and explore social and individual constructs with the acknowledgement of their own social, cultural and ethical lens (Patino-Torres and Goulart 2019). Within qualitative enquiry, analysis of data and results are not the objective sum of information collected or observable actions, rather a 'complex and dynamic intellectual construction' performed by the researcher (Gorlzalez and Martinez 2019). The constructive-interpretive nature of qualitative enquiry allows the researcher to construct knowledge that is reasonably understandable in the exploration of the studied phenomena by the speculations, interpretations and stringent discussion during the research process (Teo 2008). In this regard, formed concepts are not considered to be equal to reality but subjective points of consideration that can be further developed and understood with future research (Patino-Torres and Goulart 2019). During the research process the author engaged in regular supervision during all three included studies to discuss knowledge construction. A constructive-interpretive approach to qualitative enquiry considers the nuanced creative nature of humans and the emotional constructs that shape an individual's perception of reality.

Research design

All 3 studies in this research are qualitative in approach and aim to explore phenomenon to answer the research question. Whilst quantification offers valid and reliable measurements it does not support, as well as qualitative methods, the exploration of nuanced, complex, dynamic and multifaceted 'wholes' (Patton 2008). This research aims to generate and refine theory, not test or measure, therefore using a qualitative approach and qualitative methods will provide an appurtenant perspective to achieve the research aims which would not be accomplished with a quantitative methodology.

A co-creative approach was originally considered for this research however, after critical consideration was decided against. Co-creation is an act of collective creativity, with stakeholders working in equal partnership to achieve a shared goal (Sanders and Strappers 2008). Notably, this approach moves away from the traditional 'knowledge translation' paradigm where knowledge is created by academics and processed to be accessible to non-academics, towards 'knowledge production' where knowledge is generated in the context of its application with the exploitation of multiple perspectives to achieve an evolving collective view (Gibbons et al. 1994). Co-creation has been widely utilised in industrial services but the application in healthcare services remains in the theoretical and experimental phase (Zhang et al. 2015). The World Health Organisation (WHO) program 'Health 2020' (WHO 2012) puts patient empowerment as the main goal for achieving optimised healthcare results including cost reduction, improved health outcomes, increased prevention, improved service quality and user satisfaction (Russo et al. 2019). The importance of the service user's active role as an essential contributor for a sustainable health and social care system has been recognised and has replaced the traditional focus of effectiveness and efficiency in organisational improvement (Arah et al. 2003); co-creation is one way to achieve this.

Co-creation demands the equity of legitimacy and value of inputs from all stakeholders, however, this may be difficult to achieve (Farr 2008). Multi-stakeholder partnerships as characterised by structural complexity and competing interests with conflict and power balance being identified negative themes, especially when commercial stakeholders are in participation (Greenhalgh et al. 2016). The transformation of typical power relationships between the traditional roles of provider and recipient need to be challenged in order to enable generation of collective ownership which is central to co-creation (Bratteteig and Wagner 2012). Critical engagement in appraisal of power relationship issues is notably sparse in co-creation literature (Donetto et al 2015), as is the guidance of how to practically apply co-creative research with literature tending to focus on projects that have been completed rather than observing the process through a theoretical or empirical lens (Greenhalgh et al.2016).

In the initial stages of this research, the Evidence-Based-Co-Design (EBDC) toolkit (Kingsfund 2023) was considered as an approach. The EBDC toolkit is a co-creative framework to engage all stakeholders to develop and improve services and sets out methods to achieve this. Whilst this was critically investigated, the toolkit was deemed to be too restrictive in approach and not appropriate for the purpose and scope of this project. Whilst a co-creative lens was applied to study 2 and 3, no standardised methods were employed.This research consists of 3 individual studies to meet each of the three research objectives, 1) a qualitative evidence synthesis exploring the experience of home technology with people with long-term conditions and carers, 2) an exploration of the perceptions of technology from community carers from a non-technology using organisation, and the experiences of telecare call responders using night time technology in supporting older adults in the community, and 3) an exploration of community dwelling older adults with social care needs who use night time technology and their call responders. The findings from each of the individual studies were then pooled to generate discussions, creating new insights, and going some way to answer the overarching research question.

Methods

Various methods were utilised in the 3 studies to answer the research question. Study 1 is a qualitative evidence synthesis which aimed to bring together and go beyond the original findings of empirical research to generate new and enhanced understandings of the phenomenon in question. This approach enables original findings to be systematically considered and interpreted by making judgement to identify an integrated meaning of the collected work. Whilst methods for qualitative evidence synthesis are less developed than quantitative systematic reviews, the synthesis of qualitative research offers complex and detailed exploratory findings whose potential to inform practice and policy has been recognised (Thomas and Harden 2008). Study 2 utilises virtual focus groups, and study 3 uses semi-structured interviews and virtual focus groups to collect qualitative data that is analysed via thematic synthesis. Detailed research methods and rational for them can be found in the ‘method’ section of each study.

Data analysis

Study 1

The trustworthiness of synthesising qualitative data has been contested due to the albescence of rigorous methods and few completed reviews to learn from. It is argued that the deconstruction and then reconstruction of qualitative evidence in a synthesis de-contextualises original findings and therefore possibly render them meaningless (Campbell et al. 2003). Despite this school of thought it is believed the synthesis of qualitative evidence has potential to guide policy and practice (Roen et al. 2006), as long as the original complexity and nuances are preserved (Thomas and Harden 2008). Acclaimed for its ability to be implemented with all qualitative research, Thomas and Harden’s (2008) 3 stage thematic synthesis was utilised in study 1. The three stages consist of 1) line-by-line coding of the original text, 2) developing descriptive themes and, 3) generation of analytical themes. Whilst descriptive themes remain close to the original study, analytical themes ‘go beyond’ what is already known and create new insights and constructs. Further detailed information on the process of the thematic synthesis can be found in study 1 (chapter 3).

Study 2 and 3

Audio recordings of the virtual focus group and semi-structured interviews in studies 2 and 3 were transcribed verbatim and data was analysed using thematic analysis. There are several methods to analyse data generated from qualitative research and the chosen method should be appropriate to the ontological and epistemological approach of the question being addressed. Thematic analysis is a method for systematically organising, identifying and analysing themes across a data set and is becoming increasingly popular in the analysis of qualitative data (Braun and Clarke 2019). A recognised strength of thematic analysis is its flexibility as it is not tied to a particular epistemological or ontological perspective, however this does not mean it is ‘atheoretical’ and can be applied across a range of approaches (Braun and Clarke 2006). As thematic analysis is not associated or guided by an existing theoretical framework, it is harmonious with the critical realist research paradigm which guides this research and utilises a researcher driven analytical approach (Fletcher 2017).

Thematic analysis provides the framework for robust analysis of data which can be presented in a way that is accessible outside of academic communities (Braun and Clarke 2014), and therefore is an appropriate method to employ with this industry funded research for involved agencies. A disadvantage of thematic analysis is the lack of substantial literature compared to grounded theory, ethnography and phenomenology (Newell et al. 2017). Grounded theory is widely applied in research and has evolved to take different forms since it's conception by Glaser and Strauss (1967), resulting in the application of it being challenging. The techniques used in grounded theory have been criticised, being viewed as time-consuming, involving rules that are obtuse (Timonen et al. 2018). The lack of clear processes or practical guidance can make grounded theory a less favourable option compared to the clear instruction given with Braun and Clarke's thematic analysis approach (Braun and Clarke 2006), especially for the novice researcher. Interpretive Phenomenological Approach (IPA) is a frequently used framework in qualitative research and is concerned with how people make meaning of their experiences (Pietkiewicz and Smith 2014). An IPA approach is essentially 'participant-centred' and enables a person to explore their lived experience as they wish without interruption or distortion (Alase 2017), and in this regard was not viewed as the best approach for this research which aimed to explore the experiences and perspectives of assistive technology to make practical recommendations for clinical practice.

When analysing the data, the researcher is the catalyst of analysis, making judgements about coding, theming, decontextualizing and recontextualising the data (Starks and Trinidad 2007). It is therefore the responsibility of the researcher to provide enough evidence to demonstrate a systematised process which enables the reader to judge credibility (Ryan et al. 2007). Braun and Clarke's six phase approach to thematic analysis was followed to analyse qualitative data to ensure a systematised and auditable approach was undertaken (Braun and Clarke 2014). The six stages of thematic analysis will now be discussed.

Thematic analysis six phase approach

Phase 1: Familiarising yourself with the data

Transcripts of the virtual focus groups and semi-structured interviews were read and re-read to enable immersion in the data. Notes were made to identify potential areas of interest that may answer the research question and obtain a superficial understanding of the meaning in the data set. This phase was discussed with the researcher's supervisory team to discuss reflexivity.

Phase 2: Generating initial codes

Once the researcher was familiar with the data, the entire data set was coded line-by-line to create initial semantic codes. As the research is of an inductive approach, transcripts of the virtual focus group and interviews were coded line-by-line in their entirety to generate data driven codes. Due to the researcher's experience and the specific knowledge required to effectively utilise specialised coding software, the data was coded manually by hand. Data extracts for specific codes were collated together at this stage.

Phase 3: Searching for themes

Initial codes were grouped together by content and meaning. Commonalities and differences were identified through the analysis of codes which were then combined to generate an overarching theme.

Phase 4: Reviewing potential themes

Themes were reviewed and data re-coded as necessary to ensure the identified themes are an accurate representation of the data. This stage was repeated until the researcher believed saturation had been achieved.

Phase 5: Defining and naming themes

Once themes were identified and formalised, they were given a name to capture the essence of the content.

Phase 6: Producing the report

Data analysis were reported in the 'Results' section of each study.

All six phases of data analysis were critically discussed with the researcher's supervisory team as they occurred and was supported by a reflexive diary.

Increasing the rigor of qualitative research

Trustworthiness

Many critics are cautious to except trustworthiness in qualitative research however the construct of a trustworthiness framework by Guba and Lincoln (1989) has structured a way of analysing validity and rigor in qualitative inquiries (Shenton 2004). Trustworthiness of this research will now be discussed using Guba and Lincoln's framework focussing on transferability, credibility, dependability, and confirmability.

Transferability

Transferability in qualitative research in concerned with how the study findings can be transferred to other populations and is established by providing the reader with evidence to make their own judgement to what extent the results could be applied to their context, time, situation and population (Statistics Solutions 2019). It has been argued that the notion of producing truly transferable results from a single research study is not an achievable aim and the multiple realities of different contexts means the understanding of a phenomenon is gained gradually rather than through one study (Shenton 2003). It is intended that the outcome of this research will be compared with other studies to deepen understanding of the phenomena and enable the reader to assess transferability. Transferability in this research was established by; 1) a detailed methodology that systematically explains and justifies reasoning of methods, and 2) thick description of the data. Providing a vivid picture of the data and justified methodological decisions will enable the reader to make an informed decision to whether the research can be transferred and applied to their own setting.

Credibility

In qualitative research, credibility is the equivalent of internal validity in quantitative studies (Korstjens and Moserl 2017) and therefore is involved with establishing if the results are credible and believable. The use of Braun and Clarke's thematic analysis theoretical framework will provide an auditable structure that will demonstrate the analytical process, enabling the reader to make judgement on credibility. Iterative questioning will be utilised in the semi-structured interviews to ensure a systematic, repeatable, and recursive process which will contribute to credible findings. Member checking which would have increased credibility by participant feedback for validation was considered by the researcher however, after discussion with the supervisory team this was decided against due to the impractical implications this may have given the scope and time frame of this research. The ability to conduct member checking was also impeded at the time of data collection due to the impact of COVID-19 restrictions which meant limited access to study participants . In order to achieve a level of informant feedback, the researcher utilised 'on the spot' member checking whereby responses in the virtual focus group and interviews were paraphrased back to participants to ensure the essence of what was intended was captured, and a summary of main points was discussed at the end of the focus group and interviews with opportunity for participants to clarify points made if required. A reflexive diary was be kept throughout the data collection and analysis process which involved reflecting on the way in which the research is conducted and understanding the impact of the researchers' own values and beliefs and how these shape the outcome (Hardy et al. 2001). Qualitative research is open to multiple factors that influence interpretations that are generated and therefore, a reflexive approach is required to understand these influences and the impact they have had on data collection, interpretation and analysis (Nadin and Cassell 2006). Reflexive accounts were scrutinised at frequent de-briefing sessions with the researcher's supervisory team. It is hoped that the research design provided data that portrays a thick description of the phenomena, enabling detailed analysis that can be compared with the findings of similar research, thus increasing research credibility.

Dependability

Dependability in qualitative research is concerned with the repeatability of the study and is the evaluation of the quality of the research process. It has been argued that a study cannot be truly replicable due to the nature of qualitative methods where results are tied to an ethnographic present, however the systematic process should be repeatable even if different results are achieved (Shenton 2003). This quality indicator was sought by transparently describing and recording research steps. An audit trail of methodological decisions and justification for them was be kept by the researcher and regularly discussed with their supervisory team.

Confirmability

Qualitative research assumes the researcher brings their own unique perspective to the research which is dependent on their values, beliefs and philosophical stance. Confirmability is the degree to which results can be confirmed and corroborated by others (Baxter and Eyles 1997), and ensures that findings are driven by the data, not just the researcher's opinion (Anney 2015). Bowen (2009) suggests confirmability is achieved by an audit trail, reflexive journal and triangulation of data. The researcher kept a reflexive diary and trackable audit trail which was discussed with the supervisory team throughout the research process. Multiple methods of data collection via systematised qualitative synthesis of empirical research, individual interviews and focus groups, meant that methodological triangulation was achieved. Investigator triangulation was employed by the researcher involving the supervisory team in coding, analysis and interpretation of data. Credibility could have been further enhanced by data triangulation whereby data is collected from multiple stakeholders, for example multiple housing with care facilities or technology prescribers, however this was not feasible due to the scope and nature of this research project.

Ethics

Ethical approval for the research study has been gained from the Coventry University Ethics board (Appendix 1: Ethics certificate). After liaison with Coventry University Ethics team, it was determined that external ethics review was not required for this research. Following the methods described in this chapter ensured trustworthiness and enhanced the quality and integrity of the study.

Participants provided written informed consent and were made aware participation is voluntary before the research commenced. The risk to human subjects associated in this study is minimal however contact details for the researcher and research supervisor were provided to participants if support is required during or after the research process. All participants were over 18 years of age and had mental capacity to engage in the research. Confidentiality and anonymity of participant information is a key principle of research ethics and therefore all data files were encrypted and stored on Microsoft OneNote Drive on a password protected personal computer (PC) at the researcher's home. Access was granted to the researcher's supervisory team as required. All physical documents were stored in a locked cabinet at the researcher's home due to the mandated requirement to work from home during pandemic lockdowns. The planned disposal date of data collected, and personal information is June 2022 in accordance with Coventry University's Principles and Standards of Conduct on the Governance of Research.

The General Data Protection Regulation (GDPR) became law binding in 2018 with the purpose of aligning data protection regulation in the European Union (Vlahou et al. 2021). This research is deemed as 'scientific' by its nature of aiming to generate new knowledge (Ducato 2020), and therefore the legal basis of GDPR is represented by gaining consent (Quinn 2018). Article 7(2) (GDPR) outlines that participants have the right to withdraw consent at any time and researchers must then stop processing their data immediately. Participants in study 2 (chapter 4) and 3 (chapter 5) were made aware of this right by the provision and explanation of a participant information sheet (appendix 4), however no participant withdrew consent during the research.

Participants in study 2 (chapter 4) and 3 (chapter 5) were anonymised to protect identity in keeping with the Data Protection Act (2018). All identifiable information was anonymised to mitigate the risk of identification, including indirect identifiers such as initials, physical or visual descriptors of a person, specific job titles, geo-spatial information and places of work (CQC 2020).

Honesty, transparency and objectivity have been described as key principles of research integrity (Shaw and Satalkar 2018), which is an emerging issue in research which looks to mitigate misconduct, plagiarism and falsification by researchers (Retraction Watch 2017). The question of transparency and objectivity in qualitative research is open to debate due to the subjective nature of this methodological approach. Strategies were employed during the three studies of this research and these will now be discussed based on the guidance proposed by Nobel and Smith (2015);

1) Accounting for personal biases that may have influenced findings

The researcher completed written reflections throughout the research and can be identified by italic font. The purpose of these reflective accounts was to attend to any potential biases and the impact they may have had on the research process and findings.

2) Meticulous record keeping, demonstrating a decision trail and ensuring interpretations of data are consistent and transparent

A reflexive account was kept by the researcher for the duration of this research to evidence thinking and decision making. The researcher has an email trail of all correspondence with gatekeepers which impacted on the direction of the research. All supervisory sessions were evidenced and documented. Data coding is presented in appendix 6 and 9, and demonstrate the interpretation of data.

3) Seeking out similarities and differences across accounts to ensure different perspectives are represented

This study has a strong alignment with a collaborative approach whereby experiences and perspectives from different stakeholders are collectively considered to ensure the representation of the stakeholders involved. The themes generated in all included studies are supported by rich data and data for each study were analysed as a whole data set.

4) Including rich and thick verbatim descriptions of participant’s accounts to support findings

All data collected was transcribed verbatim and used for data analysis. Appendix 6 and 9 display how the data represents the themes, and rich and thick descriptions of the data are presented in the findings sections of study 2 and 3.

5) Demonstrating clarity of thought processes

Methodological choices for the research overall and each individual study were critically considered and justified. The researcher ensured to work inline with their proposed methodology and methods and reported where and why this was not possible when necessary. The reporting of the research processes will enable the reader to draw conclusions about the rigor and trustworthiness when they are considering the outcomes of the research.

6) Engaging with other researchers to reduce researcher bias

The researcher worked closely with their supervisory team during data collection, analysis and the formation of research recommendations. Whilst collective data scrutiny can not guarantee results will be free of bias, the involvement of the colleagues in analysing data and results, the inherent bias imposed by the lead researcher can be managed and reduced (Kleppner 2010). It is also important for the data users (people reading the research) to critically evaluate and draw their own conclusions on data integrity based on their perceived rigor of the research.

7) Respondent validation

For study 1 and 2, a summary of content was verbally provided to participants at the end of each data collection session to relay the overarching message and ensure that they key message was captured and not misunderstood. This gave opportunity for participants to amend or correct what was discussed. It is recognised that this is not a formal, and quite a subjective way to gain some degree of respondent validation which may be open to researcher bias, however due to the experience of the researcher and the limited time frame for the studies, member checking was discussed with the supervisory team and decided against.

8) Data triangulation

The iterative approach taken for study 2 and 3 and the multiple methods of data collection (i.e semi-structured interviews and focus groups) enabled a more comprehensive understanding of the phenomena. Researcher triangulation was achieved to some degree by the involvement of the supervisory team in data scrutiny.

Whilst the researcher is an integral part of qualitative research who adds value through the integration of their own attitudes, values and beliefs, researcher bias should be examined throughout the whole research process and the possible influence this has on methodological decisions (Galdas 2017). Despite the challenges that subjectivity presents to qualitative research, the interpretive nature of this approach is the very strength of this research approach (Thorne 2009).

An initial bias for this research may have been present due to the industry funded nature of the study. Sponsorship has been identified as a potential bias in research due to the influence the funder has on the initial stages of a project, namely the first step of identifying the research area and forming the research question (Fabbri et al. 2018). The risk that research findings are closely aligned with the agenda of the sponsor should be reflected on and taken into consideration when interpreting and implementing results. This research study was initially ultimately shaped by the PHC funder who dictated the phenomenon of the study would be assistive technology for people with long term conditions at night time. As the researcher was an ‘outsider’ to the PHC and also has never specifically worked as an occupational therapist for the provision of assistive technology, this was in favour of upholding a relatively neutral and impartial view of the phenomenon thus reducing the risk of this researcher bias. During the course of the research and as challenges arose (see preface chapter for an account of the research timeline), the focus moved away from the initial aim of exploring assistive technology at night time towards an interpretation of the actual data and the findings and output were a representation of overall experiences that were important to and reported by participants in study 2 and 3.

Reflective accounts further examining researcher impact and bias can be identified throughout the thesis in italic font.

Competing interests

The researcher declares no potential conflict of interest with the study. As the research is co-funded by Coventry University and a community healthcare provider, there may be a perceived funding bias as the researcher may subconsciously impose values and beliefs favourable to a positive research outcome. To minimise this potential bias, the researcher followed the proposed methodology and made formal amendments where necessary to provide an audit trail. Reflexivity was utilised to attend to the context of knowledge construction and the impact the researcher's personal stance has on this throughout the research process.

Conclusion

The main purpose of this research was to explore the experiences and perspectives of older adults and their carers regarding home technology at night time, and this methodology chapter has explored, defined and critically evaluated the methods that were implemented to achieve the research aim and objectives. In conclusion, the study followed a qualitative research approach with a critical realist philosophical stance. Data was collected via a qualitative systematic evidence synthesis, individual interviews with service users and focus groups with representative participants from service users, community carers and telecare call responder stakeholders. Findings from the 3 studies were then pooled to generate critical discussion to answer the overarching research question. Methodological measures were put in place to address matters of trustworthiness and enable to the reader to evaluate the research with view to decide if findings are transferable to their own context.

Chapter 3: Study 1

Home technology- the experience of people with long term conditions and their carers; a qualitative evidence synthesis.

Introduction

The need for care in the home environment is growing with the aging population and the functional and medical complexities they hold. 30% of the UK population over the age of 75 are living with one or more long term conditions (LTC) which equates to 15 million people (DOH 2015). This figure is set to increase over the next 10 years and currently accounts for 70% of money spent on health and social care (DOH 2015a). According to the Department of Health (DOH) a LTC is defined as a condition that cannot, at present be cured; but can be controlled by medication and other therapies (DOH 'n.d.'). The increasing burden of LTC's on health care resources and costs provide a powerful incentive to find more compelling ways to care for this growing population.

The Five Year Forward View (Gov.UK, 2014) outlined a vision for a sustainable NHS in England and aimed to reduce the current cost of providing health and social care to people with LTC's. The framework that was set out to transform experiences of service users through harnessing technology has been adopted as Government policy as it aims to deliver greater quality of care (Gov.uk 2023). It is estimated that the NHS will be lacking £30 billion over the next 5 years if spending at the current rate is continued (NHS England 2014). One objective of the FYFV plan is to support people with LTC's and their carers to live healthily and independently, maximise quality of care, reduce costs and provide better value for the taxpayer.

There are approximately 6.8 million unpaid carers in England saving the state £132 billion per year (Carers UK 2015). Caring for a loved one can impact on the carer's mental and physical health, relationships and finances. Without the right support, the carer could suffer from exhaustion, sustain physical injury or become overwhelmed by anxiety and low mood. This in turn could potentially lead to carer breakdown and crisis point (Carers UK 2014). It is therefore imperative that carers are supported in providing care.

A study conducted by de Peretti and Villars (2014), found that caring for someone with Alzheimer's Disease can see the caregiver succumbing to frailty and therefore potentially requiring care support themselves. The chronic stress of caring for a loved one can lead to the emotional and physical exhaustion that is beyond the carer's physiological reserves. Carer burden has been linked with institutionalisation and is a major cause of a person with a LTC to be placed in residential or nursing care (Toot et al 2016). It is vital that the informal carer is supported in the care they provide to ensure their physical and emotional well-being and enable the person being cared for to remain in the community.

Increasing workload demand means healthcare workers face a wide range of psychosocial stressors which puts them at risk of developing ‘burnout syndrome’ (Portogheses et al 2014). In turn, this may affect patient health outcomes as well as compromised quality and safety of provided care (DesCamo and Talarico 2016). With changes in healthcare set to continue at an accelerated pace, there is increasing need for innovation and collaboration to provide effective care (Follen et al 2007).

Technology is one potential solution to the challenges of caring for an aging population with an increasing prevalence of long term conditions. Digital, or electronic Assisted Living Technologies (eALT) is defined as “electronic technology that is developed to support the independence of community-dwelling older adults by alleviating or preventing functional or cognitive impairment, by limiting the impact of chronic disease, or by enabling social or physical activity” (Peek et al 2014). eALT includes digital devices that enable people to live independently (telecare), monitor health conditions (telehealth) or help support health and wellbeing through smart phone or tablet (mHealth) (Holliday et al 2017). Some evidence suggests technology has potential to save money and improve health outcomes (NHS England 2015).

The aim of this study is to explore and synthesise the experiences of people with long term health conditions and their carers when using home technology. The objectives were:

1. To undertake a systematic search of the literature and identify appropriate studies to analyse.
2. To systematically analyse and synthesise what is known from included studies.
3. To explore the implications of the review findings on implementation of technology in clinical practice.

Methodology

Synthesis of qualitative evidence is exploratory and seeks to expand the understanding of a phenomenon in a particular context. Thus, a qualitative approach is appropriate to explore the person with a long-term condition and their carer’s experience of using technology in the home environment. In contrast to the recognised methods of the synthesis of quantitative data in systematic reviews, the methods for synthesising qualitative data are still evolving (Ring et al 2011). Tong et al (2012) reported a paper to enhance the transparency in reporting the synthesis of qualitative research (ENTREQ). This review follows the ENTREQ statement with the aim to improve conduct and reporting which enables the reader to understand the process of qualitative synthesis.

It is often argued that qualitative research is not generalisable and synthesis de-contextualises the findings, thus wrongly assuming that results are commensurable (Cambell et al 2003). However, Sandelowski purposes that qualitative synthesis produces integrations that are more than the sum of its parts and interpretations are inferences derived from the sample as a whole (Sandelowski 2004). Thus, findings are brought together for a wider audience and the reader can make judgement on what is wanted to be known. Transferability of findings may be sought through the generation of higher level or more complex findings, not through precision of them.

Thematic synthesis was used to synthesise evidence in this review. Thematic synthesis is an inductive approach which aims to achieve abstraction at a higher level by rigorously examining overlap and common elements across studies (Morton et al 2010). The thematic synthesis methodology enables the identification and description of influencing components on decision making. This approach looks to answer questions about intervention need, appropriateness and acceptability, and factors influencing intervention implementation (Thomas and Harden 2008) which can be transferred to guide successful prescription and use of home technology.

The number of methods for qualitative review has grown in recent history since Noblit and Hare's description of meta-ethnography (Noblit and Hare 1988), however no particular method has been held as the 'gold standard' for synthesis of qualitative evidence (Dixon-Woods et el 2005). All methods share the aim to go beyond the primary study and synthesise a new account of findings. The integration of the context specific primary findings can be joined together to create broader, overarching and new meanings. Unlike meta-ethnography, which adopts an interpretative constructionist epistemology, thematic synthesis is not tied to a particular theoretical or epistemological position as described by Braun and Clarke (2006). However, this does not mean that thematic analysis is atheoretical. The flexibility it entails enables thematic synthesis to be applied across a range of theoretical and epistemological approaches. The author of this review adopts a critical realist perspective in attempt to answer the research question. This approach goes beyond the realistic perspective of giving a descriptive overview of data with the aim to give an accurate report of a phenomenon but does not analyse as subjectively as a constructionist standpoint which looks to observe how themes are constructed within accounts and how these accounts construct the world.

Discourse synthesis, which regards knowledge as building blocks that can be integrated together to form new logic, was deemed a less appropriate methodology for this synthesis due to its concern of how language is used to produce versions of reality. It may be considered that discourse synthesis is truly constructionist due to its nature to understand how people use language to create and understand a phenomenon. There is a potential risk that using this methodology of synthesis would not produce the desired finding of this study to make recommendations and guide future clinical practice.

Thematic synthesis combines and adopts approaches from both meta-ethnography and grounded theory. Analytical coding shares characteristics with third order interpretations and invokes reciprocal translation used in meta-ethnography. As with the inductive grounded theory approach, themes are developed using a constant comparison method.

Searching

A systematic search strategy was developed to locate potentially relevant articles. Key words related to the sample (long term condition, chronic condition, home care, home rehabilitation, informal carer, carer, caregiver, spouse, family, formal carer, health care professional, nurse and health care assistant), phenomenon (technology, Telehealth, Telecare, Telemedicine and telecommunication) and research type (qualitative and qualitative research) were input into AMED, Medline, Academic Search Complete, CINAHL and PsycInfo. Each keyword was then searched as a MeSH term, subject term, CINAHL heading, AMED subject and PsycINFO thesaurus term to ensure comprehensive results (Appendix 2: Electronic database search strategy example).

Study selection and quality appraisal

A purposive sampling approach for studies was adopted as the purpose of this review is an interpretive explanation of the phenomenon, not a prediction of outcomes. 1859 articles were yielded from the search and were screened via study title and abstract. Initial screening and discarding of irrelevant articles identified 95 potentially appropriate studies. The remaining 95 articles were then screened by scanning full texts against the following inclusion and exclusion criteria.

Inclusion and exclusion criteria

Research type

Studies were only included if they followed a qualitative methodology as the purpose of this review is to explore the experience of technology. Quantitative and mixed-method studies were excluded as the large volume of data produced via this method can create challenges when analysing and disseminating the data (Halcomb 2018). The purpose of this study is to explore the phenomenon which is in keeping with a qualitative approach. To allow an interpretative method to be applied from first-hand data, only primary studies were included in the review. Secondary studies were excluded to reduce interpretative bias from previous authors.

Sample

All long-term conditions were included with exception of functional mental health conditions. A broad sample of health conditions would enable variability and designs the set of included studies to be heterogeneous thus, achieving a higher level of abstraction. For the purpose of this study, a carer was defined as someone related or unrelated to, in a paid or unpaid role of supporting a person with a long-term health condition.

Phenomenon

As this study is not concerned with a particular technology, all technologies (assistive and remote monitoring which included telecare, telehealth, telemedicine and telemonitoring) were included for consideration. Again, this produces a heterogeneous sample of studies and will enhance transferability of findings that can be applied across different contexts. Telerehabilitation specific studies were excluded from the review as the rehabilitation is not a focus of this research. Studies with a main focus of cost, adoption, satisfaction or technology proposal from an organisational level were excluded as they are not concerned with the lived human experience.

Setting

For the study to be included, the participants had to be in receipt of technology in the home environment. Technology provided in a nursing, residential, prison or in-patient setting were excluded.

Time frame and geography

To capture all relevant research, no time frame restrictions were put on studies to be included. Studies were included despite geographical location; however, non-English language articles were excluded to prevent linguistical bias from the translation process.

Application of the inclusion and exclusion criteria identified 8 appropriate studies to be synthesised in this review.

Due to its difference in nature from quantitative data, there is much debate as to whether qualitative research should be assessed for quality to avoid unreliable conclusions. As there is no accepted or empirically tested method for excluding qualitative studies (Thomas and Harden 2008), all eight studies were included in review regardless of quality. Evidence was not prioritised by research design but by ability to answer the review question. This is, however, a factor to be considered when appraising the review. To appraise rigour, credibility and relevance, the Critical Appraisal Skills Programme Qualitative Checklist (CASP 2018) was utilised.

Data extraction

Originally it was planned to extract the data relating to the experience of people with a long-term condition and their carers with technology, however not all studies focused on this in isolation. To prevent producing an empty synthesis and imposing the a priori framework implied by the review question, all data within the results/finding sections were coded. In doing so, the wider experience of technology could be explored and synthesised.

Detailed methods for thematic synthesis

The synthesis was formed by conducting three stages which overlapped to some degree: the free line-by-line coding of the primary findings, the organisation of ‘free codes’ into related areas to form ‘descriptive’ themes and finally the construction of ‘analytical’ themes.

Stages one and two: coding text and developing descriptive themes

Due to the experience of the author and time resources required to effectively utilise a specialised coding software, the decision was made to code the results section of the eight studies manually by hand. The first stage involved immersion of the data. Repeated and active reading of the primary studies enabled early recognition of meanings and patterns before the formal coding process began and ensures coding is developed and defined throughout the analytical process. Each of the results/findings section of the primary research was given a line-by-line free code according to meaning and context. The use of line-by-line coding enabled translation of concepts from one study to another which has been described as a key component in the synthesis of qualitative research (Fisher et al 2006). These data driven codes identified key features of the data, and a latent rather than semantic approach was adopted. Full and equal attention was given to all primary studies to identify repeated patterns including inconsistencies and contradictory data to prevent potential bias.

Stage two of the thematic synthesis re-focussed the analysis providing broader themes by grouping related free codes together. A theme captures an important aspect about the data in relation to the research question and represents some level of patterned response or meaning across the results/findings of the primary studies (Braun and Clarke 2006). Descriptive themes were not formed on the basis of prevalence within the studies, but ability to answer the research question of the experience of technology for people with a long-term condition and their carers. The generated free codes were organised into potential themes and coded extracts were collated with a view to identify overarching themes (Appendix 3: Example coding).

Initial descriptive themes were reviewed by the author and Director of Studies during supervisory meetings before being defined, refined and named.

Stage three: generating analytical themes

Completing stage one and two of the thematic synthesis created analysis that was very close to the original findings of the primary studies. In order to go beyond initial findings and generate additional concepts, understandings and hypotheses, analytical themes were sought from the data. The notion of ‘going beyond’ the primary data is a defining characteristic of the synthetic product and enables findings of heterogeneous data to be synthesised to inform of clinical practice. Reflexivity was greatly considered during this stage of synthesis due to the interpretive process required by the author. To avoid author bias, this stage was discussed at supervisory meetings with the Director of Studies. Descriptive themes were studied to explore potential inferred meanings from data, and from this, abstract and analytical themes emerged.

Results

Initial searches yield 1859 potentially relevant records of which 1764 were discarded after the screening of titles and abstracts. 95 full text articles were screened based on the inclusion and exclusion criteria of this study and a further 87 articles were excluded. The final 8 articles were critically appraised using the CASP qualitative critical appraisal tool (CASP 2018) and were included in this qualitative evidence synthesis (see figure 3 for CASP checklist results). See figure 1 for PRISMA flow diagram.

Figure 1: *PRISMA flow diagram*

PRISMA 2009 Flow Diagram

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From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *Preferred Reporting Items for Systematic Reviews and Meta-Analyses*: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit www.prisma-statement.org.

Description of studies

Eight qualitative studies (see table 2) met the inclusion criteria and were included in this qualitative evidence synthesis (Lindqvist and Borell 2012, Trief et al. 2007, Pol et al 2014, Vatnoy et al 2015, Chiang and Wang 2016, Sevean et al 2008, Fairbrother et al. 2012, Lu et al 2012). These studies were published between 2007 and 2016 and were all published in English. Seven of the studies used semi-structured interviews (Lindqvist and Borell 2012, Trief et al. 2007, Pol et al 2014, Vatnoy et al 2015, Chiang and Wang 2016, Sevean et al 2008, Fairbrother et al. 2012) and one study used both semi-structured interviews and a focus group (Lu et al 2012) to collect data. All studies analysed data using various qualitative content analysis methods. Five of the included studies explored the use of technology from the service user's perspective (Lindqvist and Borell 2012, Trief et al 2007, Pol et al 2014, Vatnoy et al 2015, Lu et al 2012), one study explored the use of technology with the service user and family carer (Sevean et al 2008), one study explored the use of technology from a health care provider's perspective (Chiang and Wang 2016) and one study from the perspective of the service user and health care provider (Fairbrother et al 2012). Telehealth technology was the focus of two studies (Lu et al 2012, Sevean et al 2008), telemedicine was the focus of three studies (Fairbrother et al 2012, Vatnoy et al 2015, Trief et al 2007), one study explored smart mobile devices (Chiang and Wang 2016), one study focussed on sensory monitoring (Pol et al 2014), and one explores computer based assistive technology (Lindqvist and Borell 2012). All eight studies were set in high-income countries; four in Europe (Scotland, Norway, Holland and Sweden) (Fairbrother et al 2012, Vatnoy et al 2015, Pol et al 2014, Lindqvist and Borell 2012), one is Asia (Chiang and Wang 2016), one in America (Trief et al 2007) and one in Canada (Sevean et al 2008). See table 1 for characteristics of included studies.

Methodological limitations of included studies

All of the included studies provided a description of context, participants, sampling, methods and analysis. There was a clear statement of the aims of the research and the research methods were in line with the aims in all of the included studies. Data in the studies was collected via either semi-structured interviews or a focus group which is in keeping with the qualitative approach. All included studies considered ethical concerns and had obtained ethical approval from an appropriate body. A clear statement of findings was presented in each included study. Three included studies were unclear as to whether the recruitment strategies were appropriate to the aims of the research (Pol et al 2014, Sevean et al 2008, Chiang and Wang 2016). Only two studies had made their relationship with participants clear and reported on this (Lindqvist and Borell 2012, Vatnoy et al 2015). As stated in the method section, studies were not excluded based on assessment of quality therefore no scoring system was used to analyse or rank the studies. See table 3 for CASP qualitative quality assessment.

Table 2: Characteristics of included studies

Author/Date	**Title**	**Context**	**Study design**	**Findings**
Lu et al (2012).	Advocacy of home telehealth care among consumers with chronic conditions.	Community based. Purposive sample of 12 participants.	Qualitative content analysis. Focus group. Semi-structured interviews.	1) Perceived support and security. 2) Enhanced disease management. 3) Concern with using the devices. 4) Worry about the cost.
Fairbrother et al (2012).	Telemonitoring for chronic heart failure: the views of patients and healthcare professionals- a qualitative study.	Community based. Purposive sample of 22 participants.	Qualitative framework approach. Semi-structured interviews.	1) Information, support and reassurance. 2) Compliance and dependence. 3) Changes and challenges. 4) Determining the criteria for patient applicability. 5) Continuity of care.
Sevean et al (2008).	Patients and family's experiences with video telehealth in rural/remote communities in North Canada.	Community based. Purposive sample of 14 participants.	Qualitative thematic analysis. Semi-structured interviews.	1) Lessening the burden of cost and time. 2) Maximising supports-access to family, friends and local care providers. 3) Tailoring specific e-health systems to enhance patient and family needs.

Chiang and Wang (2016).	Nurses’ experience of using a smart mobile devise application to assist home care for patients with chronic disease: a qualitative study.	Community based. Purposive sample of 17 participants.	Qualitative content analysis. Interviews.	Positive: 1) Reduction in medical service consumption and cost. 2) Reduction in workload stress. 3) Facilitating improvement in quality of care. 4) Promotion of nurse-patient relationship. Negative: 1) Perceived risk. 2) Lack of organisational incentives and operational procedures. 3) Disturbance in personal life.
Vatnoy et al (2015).	Telemedicine to support coping resources in home-living patients diagnosed with chronic obstructive pulmonary disease: Patient’s experiences.	Community based. Convenience sample of 10 participants.	Qualitative latent content analysis. Interviews.	1) Telemonitoring solution is experienced as comprehensible and manageable and provides meaning to daily life. 2) Telemonitoring solution contributes to stress reduction caused by illness burden and facilitates living as normal as possible.
Pol et al (2014).	Older people’s perspectives regarding the use of sensor monitoring in their home.	Community based. Purposive sample of 23 participants.	Qualitative interpretative phenomenological analysis. Semi-structured interviews.	1) Sense of safety and living independently at home.

				2) The sensors keep an eye on me and that comforts me. 3) Sense of safety is more important than privacy. 4) Sensory monitoring: a support for or a limitation of independence?
Trief et al (2007).	Diabetes management assisted by telemedicine: patient perspectives.	Community based. Purposive sample of 33 participants.	Qualitative grounded theory approach. Semi-structured interviews.	1) Interest and obstacles. 2) Changes in physical health. 3) Emotional health and family relationships. 4) Monitoring and support from staff.
Lindqvist and Borell (2012).	Computer-based assistive technology and changes in daily living after stroke.	Community based. Purposive sample of 4 participants.	Qualitative grounded theory approach. Semi-structured interviews.	1) Increased security and control during the performance of an activity. 2) Increased control of time and recreated daily structure. 3) Alleviated responsibilities for spouse and regained responsibilities for the participant.

Table 3: CASP qualitative quality assessment of included studies

Study ID	Was there a clear statement of the aims of the research?	Is a qualitative method appropriate?	Was the research design appropriate to address the aims of the research?	Was the recruitment strategy appropriate to the aims of the research?	Was the data collected in a way that addressed the research issue?	Has the relationship between the researcher and participants been adequately considered?	Have ethical issues been taken into consideration?	Was the data analysis sufficiently rigorous?	Is there a clear statement of findings?
Lu et al (2012)	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes
Vatnoy et al (2015)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pol et al (2014)	Yes	Yes	Yes	Unclear	Yes	Unclear	Yes	Unclear	Yes
Trief et al (2007)	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes
Lindqvist and Borell (2012)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sevean et al (2008)	Yes	Yes	Yes	Unclear	Yes	Unclear	Yes	Yes	Yes
Chiang and Wang (2016)	Yes	Yes	Yes	Unclear	Yes	Unclear	Yes	Yes	Yes
Fairbrother et al (2012)	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes

Review findings

Descriptive themes

8 descriptive themes were generated from the results/findings of the original studies:

1. Technology and disease management.
2. Usability and compliance.
3. Cost of technology.
4. Technology and collaborative communication.
5. Safety and security at home.
6. Technology and the traditional roles of healthcare professionals and services.
7. Technology impact on informal carers.
8. Impact of technology implementation.

1) Technology and disease management

All included studies identified that using technology in the home environment promotes effective disease self- management. Three studies (paper 8, 10, 11) found that people with long term conditions want to self-manage their disease to maximise independent living in the community with technology emerging as an enabling facilitator to achieve this. The flexibility that technology offers permits confident and effective management of medical regimes, minimising disruption to daily routines of the care recipient. Sevean et al (2008) report the positive effects of holistic self-management encourage positive lifestyle change, reduction of anxiety and an increase in quality of life although not measured on a quantifiable scale.

Autonomy and personal responsibility is encouraged through the use of technology and is found to enhance the collaborative working relationship between the care recipients and healthcare professional. Better health monitoring and medical adherence as a result of technology implementation has a positive impact on the early identification of health deterioration and intervention, moreover, reducing emergency admissions and hospitalisation into healthcare services.

Although the predominant theme that technology impacts positively on disease self-management, barriers were identified within most studies. Routine health monitoring caused anxiety for some technology users and as a result not always accepted. Compliance of participants was sometimes variable thus impacting on the outcome of technology use. The notion of dependency emerged from the study completed by Pol et al (2014), which was perceived as a negative outcome especially for people with stable or well managed health conditions. Individual tailoring of technology prescription and education on use and benefits were recommended to overcome these barriers.

2) Usability and compliance

Synthesis of findings from the included studies found that the usability of the technology had a direct impact on compliance. Results across the studies were mixed with both barriers and facilitators discovered. The main cause of concern from technology users, which in turn influenced compliance, was equipment malfunction. Many of the studies report initial ‘teething’ problems after implementation causing apprehension and anxiety from the care recipient. Concern caused by this, and also the perceived fear of incorrectly using complicated technological equipment, resulted in the discontinued use of the technology. Participants felt that they needed ‘expert support’ to effectively use the devices, with the older adult population requiring greater and more sustained input on implementation. In contrast to this, two of the included studies found that technology was experienced positively stating that it is convenient, easily used and is not dependent on existing technical skills. Technology was also found to be aesthetically pleasing which increased compliance. These studies found that technical issues were experienced as in the afore mentioned research however dysfunction was easily resolved in a timely manner and was not a barrier to compliance.

3) Cost of technology

Cost was a theme identified in many of the included studies, including impact on the care recipient and from an organisational level. Price of equipment and subsequent services to the individual was described as an influencing factor and more important than the potential benefits of technology, with Lu et al (2012) arguing participants in their research were more likely to pay for services if the benefits were explicitly explained and known. Participants were keen to know if technology was a cost-effective option or if other methods and services would achieve the same outcome. It is recognised people with a long-term health condition experience an increased financial cost of living however technology has the potential to alleviate these costs through decreasing travel costs and time and loss of earnings to attend appointments. Savings through time and money at an organisational level are also emerging themes in the study completed by Chiang and Wang (2016). This study concluded that technology use reduces medical cost and service consumption through a decrease in required home visits by healthcare professionals.

4) Technology and collaborative communication

Technology was perceived to enhance effective collaborative communication between the care recipient, informal caregiver and the healthcare professional in all included studies. Care recipient participants expressed that knowing they could illicit an immediate response from a healthcare professional when required increased confidence in community living. The positive therapeutic relationship enabled from this form of communication had a positive impact on wellbeing and quality of life.

Healthcare professionals also recognised the influence of enhanced communication when using technology. Communication via technology was thought to decrease repetition of information, help with communication on difficult or sensitive subjects and can overcome communication barriers. The gathering of more than one healthcare professional at the same time via technological means was also a considered benefit of providing effective service delivery. In contrast, communication through technology was perceived as time consuming by the healthcare professional with some care recipients inappropriately or over communicating via this method.

5) Safety and security at home

All synthesised studies report technology increased the sense of safety and security in the home environment, especially when living alone. There were consensus people wanted to feel safe in the home environment and the constant surveillance of technology helped achieve this. Only one study found that technology can be perceived as intrusive which led to feeling insecure in the home environment. Healthcare professionals viewed technology to be safety promoting in relation to medication adherence, which in turn, promotes better disease self-management and health outcomes.

6) Technology and the traditional roles of healthcare professionals and services

The use of technology within the studies was widely acknowledged to identify and manage interventions at early stages of deterioration, moreover, reducing emergency hospitalisation. Contrasting experiences from healthcare professionals suggest the infrastructure of existing traditional roles and services may not be suitable for the evolving technology enabled service framework. Participants expressed work generated from technology was often in addition to existing practices and found technology to be disruptive and difficult to manage.

7) Technology impact on informal carers

Studies that included informal carers found technology to be favourable in aiding support provided to the care recipient. Carer burden was decreased, and responsibilities were alleviated as an outcome of reassurance they perceived technology to provide. Overall, the use of technology was reported to have a positive impact on the informal carer, however, concerns we raised regarding the process of data collection and management. Pol et al (2014) discovered privacy in relation to sensory monitoring was not an issue for the care recipient, however was at times opposed by family members. Children of two participants were concerned that authorities would know more than was needed about their parent and perceived this as an invasion of privacy. Care recipients were not deterred from technology use despite objection from family members, demonstrating safety is considered more important than privacy.

8) Impact of technology implementation

The process of initial technology implementation was found to directly influence acceptance and compliance with users. Apprehension and decreased confidence were often expressed by participants in early stages of use, which led to non-acceptance of technology services if not managed appropriately. Technology was found to be easily accepted and natural if the implementation was meaningful to the individual. User education on devices, functions and technology services promoted a positive attitude and increased self-confidence of care recipients, informal carers and healthcare professionals.

Analytical themes

The descriptive themes were analysed further to construct analytical themes, which attempt to go beyond the findings originally reported in studies (Thomas and Haden 2008) and deliver insights in the experiences of a phenomena that transcend the findings of primary research (Rathbone et al 2017). Four analytical themes emerged from the studies of technology experience in the community:

1. Safety and security are more important than privacy.
2. Education is essential for successful implementation.
3. Concern for the implications of technology on traditional healthcare roles and resources.
4. Successful implementation is paramount in effective disease self-management.

1) Safety and security are more important than privacy

Technology may be seen as an example of an increasingly common tension: between respecting privacy and not interfering with liberty, and on the other hand, protection from harm, reduction of risk and maximising safety (Sethi et al 2012). Telecare in particular raises issues around competing liberties and compromise of autonomy. Participants in the included studies regularly expressed privacy, although important, was less so than safety, suggesting although the ethical imperative of respecting autonomy may not be met in full, it may be traded for the pursuit of overall safety.

Care recipients found contact with healthcare services when required, enabled by technology, increased reassurance when living in the community:

Feelings of trust and confidence was related to the capability to contact healthcare services when needed. Monitoring, feedback and advice were considered a reassurance and provided a feeling of safety; 'When I replied to the questions and she saw I had deteriorated, she called me up at once, gave advice, and called a doctor; it makes me feel safe' (E). P6

Being watched in the home environment was perceived positively by one participant:

'*Look at my sensors, they are my watchdogs and they look after me' Mr. A.*

Mr. A outlined the advantages of technology monitoring in the slow health decline experienced which he would not have recognised or reported himself, and the importance of continual surveillance of a healthcare professional. The negative connotations surrounding the potential deprivation of liberty linked with constant monitoring were outweighed by the positive benefits of feeling safe in the home environment.

Safety was also expressed in relation to the 'joined up', seamless care that technology services enable. Quick and appropriate responses to medical decisions facilitated by technology were regarded as a safety measure that improve the user's experience along medical pathways; *'they make everything go faster, help get an appointment at the doctor and then they try to get me into hospital quickly; it's really such a safety' (E). P6*, thus, demonstrating effective use of technology impacts on more than just the immediate response of care at home but also infiltrates decisions at all levels of care.

It was widely acknowledged within the studies a sense of safety contributes to the acceptance of technology, whereby, technology was utilised effectively with higher rates of compliance when safety was viewed a direct outcome. Informal carers and family members support of technology use was increased with the perception that technology provides a level of security when they were not present with the care recipient. This, in turn, impacts positively on the uptake, compliance and use when users were supported by loved ones.

2) Education is essential for successful implementation

Many subjects mentioned that technology could help them improve adherence to their medication and facilitate their understanding of their health condition through regular management, however, this can only be achieved with education of technological devices and of their long term condition. Studies on web-based interventions aimed to improve medical conditions showed no significant improvement in measured parameters when the technology was used without prior training (Grant et al 2008). However, when education was an equal element to the use of technology in the study design, the use of technologies led to quantifiable, significant changes.

If sufficient education is not provided, the misinterpretation of information obtained from digital health resources can lead to medical decisions that do not involve healthcare professionals and may endanger the lives of the service user (Fahy et al 2014). This concern was inferred by participants within the synthesised studies who believed; *an expert should sit down and guide them through the operating process step by step because they believed the device was complicated. (P1),* to reduce the risk of error when using technology. A lack of formalised education to support self-management was an emerging theme suggesting a common missing element with technology implementation which, in turn, impacts on its success.

The development of health status resulting from technology use is dependent on the level of health literacy; those with low health literacy levels are generally in a worse state of health, visit the doctor more often, implement fewer preventative techniques and are more costly to healthcare systems (European Health Literacy Project 2012). Education of the older-adult population and those with cognitive impairment impose a challenge to healthcare and technology providers. Participants within included studies expressed the need for individual, tailored training programmes to enable them to access and utilise technology at home:

It is not appropriate to assume that older people can keep all of this information in their head after just one demonstration. P1

Health literacy of individual users should be assessed, and methods of education adapted to meet the needs of each care recipient to maximise the effectiveness of technology services.

3) Concern for the implications of technology on traditional healthcare roles and resources

Technological advances have become inseparable from healthcare in recent years, and as healthcare systems worldwide are becoming financially unsustainable, a paradigm shift is imminent (Mesko et al 2017). In a traditional setting, the service user is not involved with decision making about disease management. Historically, the patient was dependent on the infrastructure, information and decisions made by the healthcare system, however, by sharing responsibilities, healthcare workers could also share the burden of treatment decisions. There is potential to eliminate repetitive parts of their role, enabling them to spend more face-to-face time with service users. Effective time nurses spend with patients is associated with improved patient outcomes, reduced errors, and patient and nurse satisfaction (Westbrook et al 2011). Utilisation of technology to reduce repetitive elements and free time for more meaningful patient contact may have the potential to elicit these benefits. For some participant within the studies, these benefits were not recognised and the push for technology implementation were regarded as a decision made by 'high up' non-clinical management whose priorities and motives may differ from those of 'front-line' staff:

I think certain people at health board level think this is going to be great at reducing home visits and your going to be able to just sit in your office and look at everybody, but these patients still need to be seen…..to put everybody in the same box because they've got a long term condition and think you're going to reduce admissions…it's not necessarily going to be able to do that. (Professional #2) P2

This view was expressed by many of the healthcare professionals who feared technology was a means of replacing direct patient contact and was considered an ethical dilemma. Integration of telemetric provision at a local level rather than a centralised 'call centre', which emphasises the value of relationship-based continuity of care over cost benefits associated with centralisation, may be a solution to this perceived problem:

'telehealth works better when you know the patient because you can look at the information, you'd know roughly what's been happening with that patient over the past week. If you don't know this it can lead to decisions being made that perhaps are not the best decisions. (Professional #3) P2

Care recipients also shared the view continuity of contact was related to the trust of individual follow up and the confidence of being known by the healthcare worker:

'the Telenurse tells me I am looking better today' (D); 'when nurses at central are strangers, you have to get to know them; then if feels safer' (I); and 'you don't have to repeat yourself' (F). P6

Lack of interoperability between the telemonitoring patient information system and existing patient information systems used in primary and secondary care was a frustration and challenge to existing working practice; *'the perceived lack of systems interoperability was considered to prevent information sharing with colleagues, and this was felt to be a barrier to care provision' P2,* leading to resistance to technological service advancement.

Despite the concern and reservation, healthcare professionals perceived telemonitoring facilitated 'closer monitoring' of patients. Telemonitoring data were attributed as providing a more detailed picture of patient health than usual care, enabling the practitioner to take pro-active approaches to clinical management. One study found that technology simplified operating procedures, reduced staff workload and replaced unnecessary control visits by healthcare professionals (P5).

These conflicting views from healthcare workers suggest technology use and benefits are not widely known and may impact on motivation to work with services providers to transform current service infrastructures to implement technology.

4) Successful implementation is paramount in effective disease self-management

Numerous studies have reported the relationship between self-management for health conditions, change in behaviour and subsequent improvement in health and wellbeing and reduction in health resource consumption (Barlow and Hendy 2009). Technology is a potential method to encourage self-disease management. The frequent contact with the healthcare provider enabled by technology may positively affect a person's adherence to self-manage, enhance autonomy and help the care recipient and healthcare provider manage treatment plans (Hunkler 2000). Care recipients using home technology expressed many benefits of the service:

Participants who received homecare services experienced that real-time video contact provided them with more flexibility and self-determination: 'Previously I had to wait all day for them to come; now it's up to me. I send my health data and they respond. I have more control myself' (I)

The control function of sensory monitoring as a stimulating factor for performing exercises-personal responsibility 'there is a sensor hanging above my sideboard. So when I come downstairs I'm doing my exercises in front of it and I start swinging my legs for 20 minutes' Mr. I. P8

Improved behavioural self-control and positive perceptions of health outcomes enabled by technology also impacted on changes in emotional health:

'Well, by affecting my physical health, that affected my emotional health, you know. When you feel better you are not as down in the dumps' P11

These benefits were only achieved through the successful implementation, and therefore compliance, of technology. Professionals emphasised the importance of selecting suitable patients for telemonitoring and questioned the utility of monitoring stable patients. Although the possibility of self-initiated daily contact was appreciated, those with well managed or stable health conditions felt the daily reporting via technology to be a burden. This poses the question of who needs to receive technology and the purpose of such services in relation to the individual.

Another emerging theme regarding successful implementation of technology was that of device use and management. Participants often experienced technological dysfunction and how this was managed had direct impact on its continued effective use:

So sometimes I know how to deal with the equipment if it malfunctions. However, if the equipment is broken, I might choose to turn it off. Frequent malfunctioning of the device may make users lose confidence in using it (Case 1) P1

Discussion

The analytical theme of safety and privacy identified ethical issues surrounding technology use, in particular that of informed consent and ascent. Consent is the legal counterpart of the ethical concept of autonomy. For consent to be valid, it must be given freely, by a compliant person based on sufficient information. Information regarding ethical implications of technology should be provided so the user can make an informed decision. The degree to which privacy will be invaded must be explained. Questions over informed consent arise in relation to people who have reduced or lack capacity. The Mental Capacity Act (2005) is a legislative framework to manage consent for those who lack mental capacity. The act outlines capacity should be assumed in the absence of evidence to the contrary and practicable steps should be taken to help make a decision (Sethi et al 2012). As potential users are likely to be unfamiliar with technology, information needs to be conveyed in creative ways to maximise comprehension and retention (Perry et al 2010). The studies included in the review made lack of capacity an excluding criterion to the primary research, therefore the perceptions of this population were not explored. Future research should focus on capturing perceptions for the seldom heard voices of people who lack capacity or have a cognitive impairment in order for decision makers to include these perspectives in service delivery.

The main goal for any successful patient management approach is to improve health outcomes and quality of life. Although inferred improvement in quality of life emerged from the synthesis of study findings, it is difficult to conclude technology has a positive impact on this without quantifiable evidence. Future studies into technology and quality of life should include standardised outcome measures to determine impact as recommended by the systematic review by Pare et al (2007) which viewed this as important as clinical health outcomes.

Systematic evaluation of the structural effects of technology has not been sufficient to support its diffusion. This study found that healthcare professionals harbour concern on the impact technology will have on traditional roles and service frameworks. Future research to investigate the impact on the utilisation of healthcare services (Emergency department attendance, hospitalisation and hospital length of stay) may go some way to provide evidence to address these concerns and give insight to the bigger picture of healthcare delivery.

Study limitations

Studies included in this synthesis were quality assessed with regards to their ability to answer the research question and not the methodological quality of the primary study. In essence, studies were not prioritised by research design but the degree to which they emphasised the experience of technology use and studies were not excluded from the review due to poor methodological quality. This may be deemed as a study limitation and a result of researcher bias, however there is no accepted or empirically tested method for excluding qualitative studies from synthesis based on their quality (Daly et al 2007).

Exclusion of studies using a mixed-method design may have led to insightful data being missed. The decision not to include these studies was made due to limited time resources, the challenges analysing and presenting data using both approaches, and the fact this review is not exhaustive. Future detailed and larger studies in relation to the experience of technology at home should consider the inclusion of mixed-method research.

A limit on time and available resources restricted the scope of this review. The inclusion of eight primary studies is a relatively sparse number to include in an evidence synthesis. To broaden the scope of future studies, specific long-term conditions, including paediatrics, should be searched to yield more articles at the searching stage.

Finally, it is recognised that this review is limited by having one author with limited experience in conducting evidence syntheses. The author was supported by a supervisory team throughout the process.

Conclusion

The aim of this study was to explore and synthesise the experiences of people with long term health conditions and their carers when using home technology. Based on this review, technology to support people with long term conditions and their carers in the home environment is overall experienced positively and seems to be a promising management approach. Nevertheless, more studies are still required in this area to build an in-depth body of knowledge related to clinical effects, cost effectiveness, impact on services and acceptance by users. Areas such as behavioural affects from different socioeconomic status, educational background, age and culture should also by explored to gain an inclusive understanding of the phenomena.

The experience of technology at night time has been identified as a dearth in available literature. The author of this review is conducting a PhD with the aim to co-create a technology enabled night time home care service for people with a long-term condition and their carers, therefore the phenomenon of technology use at night is of particular interest. Night time home care possesses a unique set of challenges including limited access to staff, services and an increased risk of injuries due to falls. Technology may be a means to alleviate some of these pressures and enhance existing services. Preliminary searches for evidence regarding the experience of technology at night were unsuccessful and research regarding this could not be identified. Examination of the eight studies included in this review highlighted no mention of the experience of technology overnight. Future research into technology and night time use would contribute to existing knowledge and guide clinical practice to enable people to live longer in their home environment.

Chapter 4: Study 2

An exploration of the perceptions and experiences of technology from community carers from a non-technology using organisation, and the experiences of telecare call responders using night time technology in supporting older adults in the community.

Preface

This study explores the perceptions of community carers who currently do not use technology and then explores these perceptions in relation to the experiences of a technology using telecare service. ‘Telecare’ was the main mode of technology provision focussed on in this study. The aim of the study was to explore how consistent perceptions of technology are with the experiences of technology users with the intention to explore the differences between perception and experience. Data was collected in 2 phases, 1) a focus group with non-technology community carers and 2) a focus group with technology using telecare call responders. Narrative themes were generated from the first focus group with the non-technology using community carers which were then explored with the telecare call responders in the second focus group. Thematic analysis was used to analyse the data as a whole and produced 4 themes and 13 sub-themes. Results from the study show there is congruence between the perception and experience of technology but also highlighted areas of disparity. Study findings are considered alongside study 1 (chapter 3) and study 3 (chapter 5) in the discussion and conclusion (chapter 6) of this thesis to explore the overarching aim of this research, exploring the values and perspectives of home assisstive technology at night time for community dwelling older adults and their carers.

Introduction

Telecare has become an integral part of adult social care offered by English local council authorities (Steils et al. 2019), and usually refers to technological devices in the user’s home environment that relays information to a remote, third-party monitoring centre (Curry et al. 2002). There are approximately 1.7 million telecare users in the UK (Gibson et al. 2016). Telecare has been regarded as a cost-effective way to enable a person to ‘age in place’ in the community and prevent transfer to residential settings and reduce acute hospital attendance (Botsis and Hartvigsen 2008). Whilst telecare has been integrated into government policy since the National Strategy for Carers (DoH 1999) and interest in the use and application of it increasing in the past two decades (Miles and Doughty 2011), studies into the benefits of the service are conflicting and confusing (Madara Marasinghe 2016). The Whole System Demonstrator Project (Steventon et al. 2012) was an extensive randomised clinical trial funded by the Department of Health to study the effect of telecare on hospital admissions and mortality rates. Initial findings were promising as telecare was reported to decrease mortality and hospital admission rates, however later studies have questioned the rigor of the clinical trial with the overarching understanding being telecare does not deliver better outcomes than 'care as usual' (Woolham et al. 2019). Investment into the technology service has continued despite the reduction of adult care resources over the past decade, undeterred by the inconclusive evidence base (Innes and Tetlow 2015). The ambiguity in research outcomes for telecare necessitates further investigation into this phenomenon to shape and influence future practice.

The seemingly positive widespread experience of telecare services showcased through demonstration and pilot projects is in contrast to the problematic reality of introducing the service to the health and social care forum (Hanson et al. 2011). The failure of telecare to become a mainstream intervention is not purely technological as research suggests equipment is 'tried and tested, inexpensive and easy to install' (Sixsmith and Sixsmith 2011), and it has been proposed that the barrier to successful implementation is the unacceptability of service users and care providers (Hanson et al. 2011). The disparity between the postulated and empirically evidenced benefits of telecare demonstrates the need for further research into this phenomenon.

Research question:

What are the perceptions of technology from non-technology using community carers and the experiences of technology using telecare call responders on the use of technology to support people living in the community at night?

Research aims:

1) Explore the perceptions of care providers who do not currently use telecare on the use of technology to support service users at night.
2) Explore the experiences of telecare providers on the use of technology to support service users at night.
3) Explore how consistent the perceptions of non-technology using community carers and the experiences of technology telecare call responders are.

Methods

Design

This study adopts a qualitative approach to answer the research question to explore the experiences and perceptions of care providers on the use of technology to support older adults at night time.

Qualitative approaches are regarded as exploratory in nature and aim to examine phenomenon from the participant's understanding of the world around them and assumes there is no single truth (Allen 2020). Refer to Chapter 2 Methodology for discussions around epistemology and ontology for this research.

Two focus groups were conducted for this study, one with community carers who do not currently utilise telecare technology and the second with telecare call responders. The first focus group aimed to explore the perceptions of community carers who do not use technology in their service which identified broad themes that were then explored in the second focus group with the technology using telecare call responders. The aim of this method was to explore how consistent the perceptions of non-technology using service providers are with the experience of service providers who use technology. Whilst broad themes were identified from the first focus group, data from both focus groups was analysed as one body of data in keeping with the approach of this research.

This study follows the consolidated criteria for reporting qualitative research (COREQ) checklist (Tong, Sainsbury, & Craig, 2007).

Participants

The sample for this study consists of carers working in a community health care setting who do not currently utilise telecare services, and telecare call centre responders. Two participants represented the community carer population, one male and one female, and 4 telecare call responders participated in the second focus group, one female and three males. The intentional selection of these two varying demographics was applied to enable an iterative approach whereby the outcome of the community carer focus group guided the content of discussion with the telecare call responder focus group. Obtaining the perceptions of technology from a service that does not use technology and the experience of a telecare service meant that inferences about perception and experience could be identified. The following inclusion criteria was applied to participants:

Community health care carer: 1) <18 years old, 2) work in the community with experience of night shifts and 3) speak English.

Telecare call responders: 1) <18 years old, 2) work as a telecare call responder with experience of night shifts and 3) speak English.

Purposive sampling, also known as judgemental and nonprobability sampling, was used to recruit participants to produce a sample that can logically be assumed to be representative of the population under study (Lavrakas 2008). Purposefully chosen participants aim to generate dense, focussed, and rich data that will enable the researcher to propose a convincing account of the phenomenon (Curtis et al. 2000). This sampling method aims to select participants with particular characteristics who will be equipped to answer the research question, which is in contrast to randomised sampling which deliberately recruits for diversity in participants (Etikan et al. 2016). Community health care carers and telecare call staff were recruited from the same organisation by email advertisement and care branch manager recommendation. Potential participants who expressed an interest to participate in the research were contacted via telephone by the researcher to give further information and were provided with a participant information sheet (Appendix 4: Participant information sheet). Written consent was obtained from all participants (Appendix 5: Participant consent form). No other contact was made with participants before commencement of data collection and no relationship was established between the researcher and participants prior to the study. All approached potential participants consented to participate in the research and none withdrew consent during the study. This sampling method may be criticised as being contrived due to the potential of staff being favoured for desirable characteristics determined by branch manager perceptions. Sampling bias may mean the sample does not accurately reflect the study population (Lavrakos 2008), and therefore affect the transferability of findings. It is recognised that this is a limitation of the study and will be reflected on in relation to results, however sampling via this method was deemed to be the only viable option given the scope of this research and the researchers limited access to the desired population.

Data collection

It has been argued that no amount of analysis can compensate for improperly collected data, therefore it is imperious that selecting an appropriate data collection method is based on sound judgement and reasoning (Tongco 2007). The sample for this research is heterogeneous to achieve maximum level of variation in the purposive sample and create a perspective that represents the population (Ayres 2019).

This study consisted of two on-line virtual focus groups, the first being with 2 community health care carers to explore their perceptions of technology to support their service at night time, and the second with telecare call centre staff to explore their experiences of technology at night. It had been initially proposed that qualitative data would be collected by a traditional focus group design however, this approach was challenged by the community health care service who voiced that this method would be inappropriate and difficult to achieve given the geographical location and shift patterns of staff. The service from which the community health care carers were recruited from have branches across England, Wales and Scotland and care for 2900 people, have 1500 care staff and provided 620,000 care visits in 2018 (Interserve Healthcare 2019), but despite the large number of care staff, it would be difficult to recruit the required participants to attend a focus group in one geographical area. The initial response of the researcher was hesitance as it was feared the interactive group dynamic generated by a face-to-face focus group may be lost in an on-line forum and may influence participant responses and therefore results. After initial unease of the researcher, the possibility of a virtual on-line focus group was explored and accepted as a viable method for data collection. The emergence of the internet has provided unique innovative potential that has resulted in different approaches to collaborate with stakeholders in the process of co-creation (Kohler et al. 2011).

Social researchers have recently begun to recognise the unique and inventive opportunities the Internet holds to support qualitative research (Turney and Pocknee 2005) and the advancements in communication technology has resulted in the emergence of on-line focus groups (Stancanelli 2010). Notable benefits include the ability to recruit participants from a nationwide sample, the method is convenient for the researcher and participants as they do not have to travel to attend a group and the lack of travel costs and room hire associated with traditional focus groups means the virtual design is cost effective (InterQ Research 2019). A study conducted by Kenny (2005) explored whether active engagement and group interaction could be captured via an online forum. The research identified the virtual focus group to be a positive experience that enabled collection of rich data and recognised potential to capitalise on technology in reducing cost and aiding convenience for the researcher and participants.

Synchronous focus groups (where data is collected in ‘real time’ and therefore requiring participants to be available at the same time) and asynchronous data collection (which is akin to a discussion forum where participants can log in at their convenience and respond to pre-determined written questions) were considered as data collection methods. After consideration it was decided to proceed with a synchronous data collection design due to the multiple benefits it holds. A study completed by Oringderf (2004) found that participants are more likely to participate on-line as it is more convenient to fit in with work schedules. Oringderf also proposes that a virtual group offers social equalisation which goes some way to addressing issues of power balance often associated with collaborative methods, as individual socio-economic status, ethnicity and nationality may not be disclosed by participants.

It has been argued that traditional face-to-face focus groups facilitate reciprocation, exploration and elaboration of ideas generated from the interaction between participants (Bender and Ewbank 1994) which may be compromised in an on-line forum. A study conducted by Murgardo-Armeteros et al. (2012) observed a lower degree of interaction between participants and the need for constant interjection from the moderator and recognised this as a limitation of on-line focus groups. Newbie and Watson (2015) identified that some participants prefer to communicate face-to-face and the missing camaraderie in an on-line forum can affect the group dynamics and impact on data generated which in turn will affect credibility of findings.

On balance, evidence suggests there are advantages and disadvantages to using a virtual on-line focus group and critical appraisal of this method once utilised may contribute to existing knowledge and guide future application of this technique.

The first virtual focus group was conducted via the BlueJeans Teleconference web application and provided audio and visual communications. Microsoft Teams was used to host the second on-line focus group with the telecare call responders. Each focus group lasted approximately 60 minutes and was audio and visual recorded to be later transcribed verbatim.

Virtual on-line group schedule

The virtual on-line focus group for community carer participants followed the format below. The questions/discussion topics have been generated in an attempt to provide data that will answer the research question. It is recognised that focus groups are dynamic and fluid, therefore the researcher guided the session to accommodate any emerging topics during the group.

Interview and online focus group schedule

1. Open and introduction; the researcher introduced themselves to the participants and gave a brief explanation of the research. The researcher initiated discussion around technology at home, briefly outlining types of technology available and what it might be used for.

2. What is your experience of technology?; participants had the opportunity to explore and discuss any previous knowledge or application of home technology. This question was designed to get participants thinking about technology, its uses and any impact it may have on community living by drawing on previous knowledge or experiences.

3. What are your experiences of night time home care? What are your night time needs?; this question aimed to achieve an understanding of care experiences at night time and get the participant to think about potential problems that may potentially be addressed with technology.

4. How do you think technology could help you at night time?; participants were given the opportunity to consider how technology may be of benefit or constraint if utilised to support night time care in the community.

5. 'What's in the box?' activity; this activity was designed to enable participants to envisage a piece of technology that would potentially solve their identified challenges and problems at night time.

Questions such as ‘What would the technology do? What would it look like? How much would it cost? What problem may this help with?’ were asked to prompt thinking.

6. Conclusion and close of interview; the researcher briefly recapped on the main points discussed and gave participants the opportunity to correct any misinterpretations that may have been made.

The researcher identified four broad narrative themes from the first focus group with the community carers by immersion in the data, 1) safety of the service user, 2) documentation, 3) reliability of technology and 4) fear of change to a technology service. These themes were introduced to the telecare call responder participants in the second focus group and were discussed in relation to their experience of providing a technology enabled service.

Data analysis

Braun and Clark’s 6 stage thematic analysis was used to analyse data from the focus groups to provide a rich description of the data and identify themes relevant to the research question (Braun and Clark 2012). To distinguish explicit meanings of the data, themes were generated at a semantic level as overarching meanings and implications could then be considered. Data from both focus groups were coded as one data set in order to create integrated findings in keeping with the co-creative approach of this research. Data was coded by the researcher with regular input from the supervisory team to oversee the coding, analysis and theme development process. A reflexive diary was kept to record and analyse the researcher’s impact on interpretation. Data coding was completed using Microsoft Word and ‘pen and paper’ method. Data management software tools were considered to assist with the data analysis process but decided against due to time and resource constraints, and the preferred methods of the researcher.

Ethical considerations

This study was approved by Coventry University Ethics board in January 2020 (Appendix 1: Ethics certificate). All of the participants were given written and verbal information about the study. Participants were guaranteed anonymity and confidentiality and given the opportunity to withdraw from the study.

Results

Six participants participated in the study with representation from a non-technology using and a technology using organisation. Table 4 outlines the characteristics of participants.

Table 4: *Characteristics of participants*

Characteristic		Number	Percentage%
Gender	Male	4	67
	Female	2	33
	Other	0	0
Age	18-25	0	0
	26-35	1	17
	36-45	3	50
	46-55	2	33
	55+	0	0
Ethnic origin	White British	6	100
	Other	0	0
Role	Community carer	2	67
	Telecare call responder	4	33
Experience of night shift	Yes	6	100
	No	0	0

Four themes were identified from the data gathered at the focus groups: 1) Face-to-face vs. technological care services, 2) Fear of change and repercussions, 3) Going digital and, 4) Is technology reliable? Table 5 depicts the themes and sub-themes emerging from the data. Appendix 6 displays the coding process for this study.

Table 5*: Themes and sub-themes*

Theme	Sub theme
Face-to-face versus technological care services	Current health and social care landscape
	Face-to-face and technological care: the best fit
	Service user needs and preferences
	Service provider views and opinions
Fear of change and repercussions	Perceived risks of using technology
	Concern of the service user's perception of technology
	The older adult population and technology
	Are we ready?
Going digital	Current practices: written documentation
	The potential of digital notes

	The possible challenges of digital notes
Is technology reliable?	The perceptions from a non-technology service
	The experiences of a telecare service

Face-to-face vs. technological care services

The theme 'face-to-face vs. technological care services' was broadly categorised into four sub-themes: 1) current health and social care landscape, 2) face-to-face and technological care: the best fit, 3) service user needs and preferences and, 4) service provider views and opinions.

Current health and social care landscape

Recognition was given to the implementation and use of technology in the current health and social care landscape from both community carer and telecare call responder participants. One participant felt that there has '*likely been an increase in the use of on-line services by elderly people during the pandemic as this was the only way they could engage in social interaction'*. It was felt the notion that the older population are inadequate at 'using technology' was likely 'to be a myth' with a telecare call responder saying:

'I think the next generation behind them (the elderly population now), *which is sadly me, people in their 50's and 60's now it* (technology) *won't be a problem. This is a problem that will eventually go away because, you know, I can use a phone'*

The belief that older people '*will not take technology on board for their social care'* was challenged by a participant as they believe elderly people are becoming increasingly competent and confident with technological devices, '*they have phones, tablets, laptops-everything really'*.

A '*lack of employed care staff'* providing face-to-face care in the community was felt to impact the '*recent push and interest of technology services'*. A telecare call responder participant estimated that '*50% of the people have a care package alongside the telecare service'* which provide support during the day. Whist some service users did receive a 'live-in' carer at night, this service was '*far and few between'*.

Face-to-face and technological care: the best fit

A combination of telecare and physical carer support was considered by both telecare and community carer participants to be the '*golden standard'*. One telecare call responder voiced that the notion of all telecare service users having access to a carer would be 'utopian' and contemplated the logistical difficulties this would present in their service:

'*Some of our big sites have got over 1000 flats. I mean that would be over 1000 carers. Could you imagine it every night as they pulled up to work, you would need a car park as big as a runway just to park their cars*.'

The participant stated, '*this would be the best care home ever'*, however the concept of all elderly people having carers is '*unrealistic*' and '*not actually needed'*. With acknowledgement that face-to-face care is preferable from all participants, there was suggestion that '*a combination of telecare and social care would be optimal*'.

Participants in the community carer focus group compared the response of a telecare alarm and an actual carer being present in an emergency situation with one participant saying:

'*There is no doubt that the people that we care for need someone to be there with them in case of an emergency. If it was the case they had to rely on an alarm or pressing a button well I don't think that would work for them'*.

Telecare call responder participants also considered the possible differing impact of a technological or human response in an emergency and questioned the actual benefit of a carer being there over a telecare service. It was felt by one participant that the outcome of a technology or a carer response would '*ultimately be the same'.* Contemplating when service users do require an ambulance, the participant said:

'*The actual time waiting for help would be exactly the same because obviously the carer would call for an ambulance and the ambulance would respond which is exactly what we would do from the call centre*.'

It was felt by one community carer participant that having a carer present may reduce inappropriate use of the ambulance service and this was echoed by the view of a telecare call responder when discussing the benefits of a carer being present:

'*It means that you know there is no waste of ambulance service time, because if we have frequent occurrences where service users press the alarm accidently and they don't hear us, an ambulance is called. If a carer is there they can just go in and check up on the person, and if it is a mistake then there's no waste of ambulance'*

In this regard, it was deemed that '*having the best of both worlds where we had a living scheme with people living with telecare and also access to carers who are there 24/7*' would be '*the best fit'*. Benefits of having a carer as a first responder were outlined by a participant, *'if they (service user)* *fall a carer can put them in a more comfortable position or stem any blood flow, so it's a lovely scenario to have a live-in carer at all of our properties'*.

Individual assessment for technology was considered *'vitally important'* by a participant who felt that '*if technology was to stand in place of a carer, we need to make sure that the technology meets the individual needs of the service user'* so the combination of care was '*effective and not to the detriment of the service user'*.

Service user needs and preferences

The needs and preferences of the service user were themes emerging in the views of both the community carer and telecare call responder participants. It was felt particularly by community carers that technological solutions are '*not appropriate'* for all service users, especially those who *'have complex health or social needs'*. A community carer participant detailed their experience of the community of people they care for and how they often need '*in-person supervision'*:

'*These people are seriously ill. They have extremely complex health needs that require me as a person to be there to be able to respond quickly if needed. I worry about the response if we are relying on technology. I would just worry*.'

The participant went on to say, *'there is one service user that you have to be in the same room as and watch him whilst he is sleeping because if his alarm goes off it means he has stopped breathing'*. Location and ability of the carer to respond to specific needs was described to be '*potentially problematic*' if the carer was '*not in the same room'*.

This participant also questioned how technology would 'fit in' to the current care they provide as often they are assigned 'live-in' care whereby they are present with the service user at all times, *'I can't see how these telecare services would be of benefit if we are there with the service user anyway?*'.

Participants in the community carer group queried the reliability of service users to activate an alarm through telecare when needed and voiced fear this may have a consequence on receiving an appropriate response:

'*If someone was having a stroke or a heart attack, would they have it in mind to press an alarm? In a panic situation would they think 'ooh I have to press the alarm'? You don't think of that when you are in a state of panic do you?*'

Technology design was thought to be crucial in the effective use of technology services and in meeting the specific needs of the service user. There was congruence of belief between the two participant groups that, '*technology is suitable for the person that is going to be using it'*. The importance of ‘technology companies making sure that equipment is directly designed for the service user in mind’ was stressed by one participant who further said:

‘*There is no point in giving somebody a super fancy iPad who only want a red and green button. The pendants have a big red button for a reason because it’s very clear what you should be pressing there*.’

Education in the use of the technology equipment was also contemplated to be paramount in the service meeting service user individual needs. Whilst it was recognised by participants that the older adult population ‘*can and do use technology’*, it was expressed:

‘*I think it’s having clear instructions, clear support and a bit of a confidence boost just so they know it is accessible and can be used, and it is there to help them*.’

The functionality of technological equipment was considered to be of potential assistance within the care role and enhance current processes:

‘Your ability to take photographs, you know, if you are doing medication changes, you can send them back to the office, pieces of equipment carers are looking at, service numbers and the rest of it, doing all of the equipment checks. You can share pictures, you can write notes, you have access to the professionals you need.’

Service provider views and opinions

There was recognition that technology has a purpose and can potentially support care delivery with one participant stating when discussing ‘*the increased use of technology and technology services’*, *‘I think it is the way everything is going now, you know, in terms of life as a whole’*. Contemplating the service users currently accessing the telecare service, the participant informed, *’we have a little over 3000,000 service users, just imagine how many carers we would need to service that amount of people*’. In this regard, the participant believed, ‘*technology can be a support in the absence of a carer’*. On the topic of ‘live-in’ carers at night, a telecare responder participant said, ‘*I guess not many people have an overnight carer, I mean that would be great but it’s not something we come across often, they are very few and far between*’ and ‘*not all service users have the luxury of a live-in carer’*.

Social needs were believed by one telecare responder participant to be ‘*easier to support with telecare services than possibly people with complex health needs’*. Individual assessment of the individual was deemed to be ‘vitally important’ to ascertain the service user’s needs and ‘*provide the right technology for them’*. A community carer participant suggested that remote monitoring via a telecare type service would not be ‘*appropriate for the type of complex clients I care for’* which require a carer to be ‘nearby’:

‘*He (service user) suffers from sleep apnoea and you have to be there, you have to get to him fast and you can’t do that if you are not in the same room as him. There are some clients I think these things could work for, but when we are talking about complex care, if the carers are on ‘waking nights’, they are very close by*.’

Another carer participant voiced that technology services would be *‘better suited to those people who you are not needed to be as attentive with and as close to all of the time’*. In this respect the participant felt that ‘no equipment could replace’ the face-to-face care required by complex service users.

Telecare call responder participants discussed the possibility that direct care that is supported with technology services could be ‘*of benefit to the carer’*:

‘*It kind of takes the pressure off. Maybe that then not to replace them, but to take some of the pressure off. The technology could be an emergency backup*.’

Social interaction was described as ‘*something a lot of our service users enjoy’* by a telecare responder. Whilst it was voiced by a participant, ‘o*bviously face-to-face care is always going to be the ideal scenario’* it was said *‘some people might go quite well not having their care about having someone calling in on them three times a day to see how they are doing’*. A telecare responder participant stated, ‘*we do have social interactions but over the intercom systems’*.

When contemplating what the ‘*ideal service’* would be, one participant concluded with:

‘*And even though the answer appears on the surface relatively simple, which is a mixture of both care and technology, is your ideal scenario possible because you can’t have 100,000 carers for 100,000 service users. I dint know how that business model would look, the CEO would probably faint*.’

Fear of change and repercussions

Four sub-themes were identified in the theme ‘fear of change and repercussions’: 1) perceived risks of using technology, 2) concern of the service user’s perception of technology, 3) the older adult population and technology and, 4) technology: are we ready?

Perceived risks of using technology

Community carers expressed a fear of adverse outcomes to the service user and their professional identity if the technology service provided fails or is inadequate to meet the desired needs. Concern was raised by one carer participant retelling an experience of a service user who had fallen out of bed and the falls sensor did not detect the fall:

'If the lady next door hadn't heard her fall, we would have lost her. She was pouring blood from her forehead cut before the paramedics got there, if the lady next door had not heard her fall, we would have lost her. She would have been there all night in the cold'

This view was echoed by another carer participant who voiced apprehension about a care *'not being physically present'* in the case of an emergency, stating '*technology will always be second best to a person being at hand'.* Malfunction of technical equipment was considered by a community carer *'to be a risk'* who expressed a *'lack of faith'* that technology could be relied upon when providing care for people living in the community. When discussed with the telecare call responders there was acknowledgement that '*technology can go wrong'* however procedures are in place to ensure the resolvement of issues in a timely manner. Telecare call responders felt that although equipment malfunction may be a risk, this risk could be mitigated. One call responder participant expressed they have not had experience of detrimental impact due to equipment issues:

'Yes, it does happen (equipment malfunction), but it is not something I have come across where it has impacted the service user negatively in terms of safety, however this does not mean it doesn't happen'.

Another telecare call responder reflected that whilst technology may have nuanced risks this is also the case for 'face-to-face' care which presents its own challenges such as '*a carer may be running late or miss a visit'.*

Carer competence in the safe and effective use of prescribed technology was considered a potential risk to the service and service user. *'Carer confidence and ability in using technology'* was expressed by a carer participant to be a risk as incorrect or incompetent use could '*be to the detriment of the people they care for'.* A carer participant voiced:

'It's going to come down to some people are extremely good with technology and I am one of them, but you will have some that will maybe need a little more planning and practice'.

With the opinion that some people *'are naturally very good with technology'* it was felt by one participant it is the responsibility of the individual and the employer to ensure competence to the required level is achieved and maintained '*to provide a safe and effective technology service'*.

Concern of the service user's perception of technology

The notion of substituting face-to-face care with technology was discussed amongst carer participants and views of concern emerged about the perception of services users of a technology-based service. One carer participant expressed the *'fear of receiving a complaint'* from a service user who may perceive the use of technology as '*replacing the person with a gadget'*

Experience of a complaint was detailed by a carer participant where a service-user's parent was dissatisfied with the amount of time the carer spent updating care notes on a laptop:

'*In a service I used to work for we had laptops that we would take out, until the parents complained the carers spent more time on their laptops than actually looking after their child which actually wasn't true.*'

The carer voiced upset of being accused of '*playing on devices rather than looking after the child, reading to the child or doing something for the child'*. This perceived misunderstanding of service-users not '*understanding the role of technology in their care'* was supported with the experience of another carer participant who went on to say they felt this was '*common*' of the older adult population:

'*The elderly people we are looking after, it's their husband saying you should be spending more time doing things with my wife, she needs this and this is why you are here to give her your attention*.'

Both community carers and telecare call responder participant groups expressed the opinion that reducing or replacing the '*care element'* of a service with a technology service may be perceived by the service user that '*an aspect of social support is being taken away'*. This was also reflected by the personal opinion of a telecare call responder:

'I think if I was now the person and I was told no, the carer I had been coming to see me for the last five years was no longer coming to see me and I was presented with a pendant alarm to press if I needed help I think as a person, I think I'd be rather concerned and upset that my needs were no longer being considered and that I would miss the carer who I built a rapport with'

Acceptance of a technology service and devices, particularly at night time was thought to be challenging by the community carer participants as '*if you have a tablet or something, they complain about the light from the tablet as everything is pitch black, so it will wake them up and irritate them'.*

The older adult population and technology

Community carer participants discussed the opinion that elderly service users may not understand the potential benefits and use of technology in supporting their needs in the community. A carer participant expressed the view that they personally '*sometimes struggle with gadgets and devices'* and said, *'if that is the case for me, what is it like for the elderly people we care for?*'. Whilst the benefits of using technology were recognised by community carers, apprehension was expressed by one participant saying:

'*Old school people, older than me school, may not understand the technology and how fast it makes note taking for us and how fast the information can get back to the office. That is my love of it and at the end of the day its for the benefit of them, but they don't always see that'*.

Availability of necessary resources required for a technological service was considered in relation to the older adult population. A community carer participant voiced, '*you may have people who do not have broadband, elderly people, the older generation are scared of it I think as they do not understand it'.* This participant saw this as a potential barrier and questioned what would be done in this circumstance saying, *'we cannot force them* (to purchase broadband)'.

This view was not shared by one telecare call responder participant who felt that the elderly population are '*changing*' in terms of '*confidence and ability'* to successfully use and engage with technological services. Recognition was given that whilst some elderly service users '*struggle with the concept of these devices in their homes'*, many welcome technology and are happy to utilise technology services:

'People tend to assume that anyone elderly aren't capable of operating this equipment and they're not capable of thinking for themselves. When people move into sheltered housing or they require some sort of care line system to help them, it doesn't mean that they are completely helpless in all areas of their life'.

Technology: are we ready?

Participants in the community carer focus group shared experience of difficulties when using on-line technology services and questioned if the current infrastructure would be sufficient in the delivery of an effective telecare service:

'*Depending on where you are, some of the locations we go to, it's making sure the connections and WiFi so the devices actually work for us. That was one of the issues I have found, we have been in a couple of areas where the laptop did not work, or the mobile reception wasn't great'*.

One participant voiced it was *'imperative*' they are '*given the best broadband and all the rest of it'* to enable the technology service to be successful. A particular area of concern in this regard was the service provision to users in rural and remote areas because of *'the limited coverage* (of broadband and mobile services)'.

Going digital

The theme 'going digital' has been categorised into three sub-themes: 1) current practices: written documentation, 2) the potential of digital notes and 3) the possible challenges of digital notes.

Current practices: written documentation

Participants in the community carer focus group currently use written documentation and discussed their experiences of this within the focus group. There was perception that documentation is an important aspect of their role, '*as for notes, we are regulated by the CQC., we have certain standards to keep us and our service users safe*'. Time taken to complete written notes to the required standard was identified as a barrier to the caring role, with one carer participant stating:

'The time you need to write notes can be more than the time before she (service user) needs more attention, and you come back (to writing the notes) and think-right what did she do then?'

This participant also described the impact the time written notes has on their working shift saying, *'I can be there 15-20 minutes after my shift has finished just to make sure my notes are complete but I will do it as I know the office needs to know'*. Recognition was given to notes being time consuming due to the amount of information carers have to document:

'*Doing the notes is the hard part. I don't do things briefly, it's probably like reading a book when you read my notes but it's important-I don't want to miss anything out*.'

It was voiced by another carer participant that there are times that required information is not documented as a result of time constraints, *'they do a fantastic job and the quality of logs we have back in is brilliant but there are gaps sometimes as they literally do not have time to put it down*.'

Written documentation was thought by one carer participant to impact on the time they were able to provide for *'hands-on'* care with service users. Furthermore, this participant went on to say*, 'I would prefer to spend my time, or at least as much as possible, looking after the people I care for and I feel writing notes takes this time away'.*

As notes are currently handwritten it means carers have to physically take the documents back to the appropriate care branch office which is considered to be *'inconvenient and time consuming':*

'The extra running around that we do to take notes to branch, we don't really need it when we already do so many miles of travelling to people's houses, that could be taken away if we had digital notes on a tablet.'

Written document at night time was described to be '*challenging'* due to the conditions that are specific to night, particularly the darkness and lack of light:

'*The package I am on at present, to sleep they have to have pitch black, you don't have any lighting devices with you apart from your mobile phone to write the notes at all. It is very difficult to write in the darkness.*'

Other tasks such as '*checking the emergency box, the ventilators, and machines'* which are all tasks *'vital to service user safety'* need to be completed '*in pitch black as the client is asleep'*. The carer participant described *'completing these tasks along with writing notes in the dark can be very difficult and time consuming'*.

The potential of digital notes

A sub-theme of the potential of digital notes emerged from the data with both community carer and telecare call responder participants outlining the potential benefits to the service and service user. A '*growing awareness*' of the current health and social care context '*are working towards a technological future to support non-clinical practices'* has made one participant contemplate that '*technology could be a solution for documentation challenges'* particularly the impact written documentation has on time:

'*I think it would give us more time with the service users, it would cut down the admin time and give us more caring time, and that would be for all of us really*.'

This view was reiterated by a second participant who shared, '*if it is done quick on a computer (documentation) we have more time to spend with the service user, rather than sitting there for hours on end writing notes'*. Having a device such as a '*computer, tablet or laptop'* was thought to '*speed up the process as it is far more simple than writing notes'*.

Digital documentation was also regarded by participants to positively impact on service processes which may benefit the care being provided to the service user:

'*Plus, it gets to the office quicker (digital notes). We collect written notes at the end of the month, they don't know what has happened until the end of the month. If it is anything urgent, we obviously contact the branch by phone, but if it's digital notes they can have an overall look at the decline of someone's health as it happens. They can see it quicker if it is sent through'*

This was described as being particularly advantageous for '*complex service users'* when '*information getting back to base faster'* meant they could be *'tracked in real time'*.

Digital documentation was thought to possibly have a beneficial impact to care staff personally and support their caring role. One participant anticipated the potential advantage of digital notes of time saving may be valuable to care staff:

‘*If there was something where she (carer) could get home earlier and out her head down and not worry about stuff. We are very lucky that we work with people who have, what I call, a professional conscience, and if they have an intense night, I know they can’t rest until they have off loaded that, so having something like on-line notes would help the process I think.’*

Telecare call responder participants also discussed the potential benefits of digital notes meaning they could possibly have access to ‘*real time information’*. One call responder participant shared their view of:

‘If a carer visited someone today and they made a comment that the person wasn’t particularly well that day or something along those lines, if we then got a call on the alarm later that night, we would then have a bit more information about them, what was happening currently with that service user.'

Making documentation accessible to multiple services via the use of digital notes was viewed positively by both groups of participants as ‘*it may improve inter-agency communication’*, with one participant believing that ‘*improved communication equals improved service provision’*.

When considering documentation standards, a community carer participant expressed that keeping digital notes may enable carers to document to the required standard:

‘Sometimes with written notes things get missed out, having a structure digitally would provide a standardised way which would help us record everything that we need.’

Community carer participants also suggested digital notes would ‘*make the home environment less clinical*’. Current written documentation results ‘*in papers and folders all over the place*’ giving recognition that ‘*we are there and care for people however we are in their homes’*. Another carer participant stated, ‘*you’ve not got big books of paperwork cluttering the house which is a good thing for the service user and family*’.

The possible challenges of digital notes

‘*Getting all agencies on board’* was a recognised challenge by one participant when considering the implementation of digital notes with it being described as ‘*a huge task’*. The desired system of digital notes would be ‘*a universal system which could be accessed by multiple services’* would ‘*cut down on information duplication and allow easy access to information about the service user’*. Possible data protection issues and GDPR standards were expressed by a telecare responder participant who felt *‘it would be very difficult to manage a system properly in terms of data protection with so many people accessing it’*. It was acknowledged that ‘*data protection needs to be considered and adhered to if this (multi-agency digital notes) was going to happen’*. The participant stated, ‘*we would need some kind of contract that service users signed to say they are happy for their information to be* *shared, and they would also need to know which organisations would have access to it*'. Additionally, it was thought that some data is sensitive in nature which may not be appropriate to share:

'You are looking at some potentially extremely sensitive information, especially people who are feeling particularly suicidal. You know, that being held in some sort of location, it would be very difficult to share that sort of information.'

Historical and current documentation practices were thought to be a possible barrier to the implementation of digital note taking. A community carer participant shared:

'*I can really see the benefits of notes being made digital, I would be happy to move forward with the times, but I think some people, some carers may have a difficult time with that and want to continue in the good old-fashioned way*.'

This participant expressed '*some people do not like change, so it may be difficult to get everyone on board with this (digital notes)*'.

Is technology reliable?

Two sub-themes have been identified in the theme of 'is technology reliable?': 1) the perceptions from a non-technology service and, 2) the experiences of a telecare service.

The perceptions from a non-technology service

The community carer participants do not currently utilise technology services in their service delivery and mainly discussed the reliability of technology in terms of '*associated risk and response times*'. One participant described an experience in a previous employment where a service user had a falls alarm beside the bed but failed to detect a fall:

'*She missed the falls mat completely, we were on our way to the next call and we had to try and get back to her and call an ambulance, if it wasn't for her neighbour hearing a thud we may have lost her*'.

This carer questioned the reliability of the technological equipment asking, '*can it be trusted to do what it is meant to do?*'. The participant went on to say, '*if the alarm goes off has the person fell out of bed or just got out of bed?*' stating '*if they have hit their head on something you've got to be there fast if they have had a head injury*'. To this regard, the carer participant felt that a technological response is not as reliable as a human response and may lead to undesired outcomes for the service user. Another area of concern expressed by community carers was the service user's ability or reliability to activate an alarm response when needed in an emergency situation stating, '*it doesn't come to your mind instantly to go and press a button*'.

Reflecting on how a telecare style service may fit into the current service provided by community carers, participants considered the logistics and needs of their specific service user demographic:

'If I were going to be in the house then it would probably work. If I was going to be situated somewhere different it would have to be someone (who would respond to an alarm) living on the same street to be able to get there fast'.

The location of a designated responder was regarded an important factor in the provision of a '*safe and effective*' technology service. Discussing location sensor equipment, one participant voiced:

'*They do work quite well but at the same time, it's how fast does this person get to the front door before you can get to them and stop them wondering down the street?*'.

The experiences of a telecare service

Telecare call responders discussed and shared experiences of when technology has malfunctioned, acknowledging things '*sometimes go wrong'*:

'I'm not going to say things don't ever go wrong with equipment, because it does, but on top of that I guess you know, things go wrong with care if they run late and there are issues there, I am sure, but yes things go wrong with equipment'.

In response to the risk of equipment malfunction, there are *'very strict protocols making sure if there is a problem it is dealt with quickly and service is restored as soon as possible'*. The '*clear procedures to get things sorted*' results in '*99% of any faults are repaired within 24 hours'*. Current telecare services used by the participants are run using analogue communication with an intent to '*transfer services to IP by 2025*' which would '*improve communication and make problems more easily resolvable'*.

Telecare services was regarded as '*beneficial'* by call responders by they way in which it could potentially identify unmet care needs and therefore '*set the wheels in motion to adapt care provision'*. One participant voiced:

'*If we come across service users who don't seem to be getting the right care they need, or they are regularly pressing their alarms, then there is a process that we go to where we will follow that up with their family or a different department, and yes we would raise concerns'*.

It was also identified by one participant that telecare services can '*play a role'* in identifying and escalating *'safeguarding concerns'* of service users.

Conclusion

Discussion

Findings from this study indicate that service providers believe that telecare technology is optimal when utilised alongside the traditional means of social care provision by face-to-face care from a carer. Recognition was given to the strengths and limitations of telecare and in-person care with the belief that one's advantages go some way in mitigating the barriers of the other. The notion that care is optimised when integrated with technology is reflected in the existing body of knowledge in this area. Karlsen et al. (2019) conducted a qualitative hermeneutic study to explore the experiences of telecare among older adults and their family carers and found that telecare in combination with home care does improve the care provided. This, however, was not always perceived to be the case and the research recommends that individual needs should be assessed to tailor the technology service to work in harmony with face-to-face care.

Acknowledgement was given to an increase in the application and use of telecare services as a consequence of a reduction in health and social carers available to support people living in the community. Research conducted by Cook et el. (2017) highlights telecare technology is viewed as an evolving and innovative means to support the growing elderly population in a climate of reduced social care funding for in-person care support. Despite this trend and promotion of telecare to support community dwelling people, the evidence of success and effectiveness is inconclusive which poses the question if telecare should be used seemingly as a 'band aid' to provide some support in absence of what may actually be required.

Participants in this study challenged the view that older adults are somewhat incompetent in the successful use of modern-day technology and perceive the elderly population to be active members of on-line communities. Telecare call responders and community carers alike spoke of how their service users possess and use technology devices, such as tablets and laptops, as part of their daily life and more so to keep connected with family and friends, particularly during the covid-19 pandemic. It was proposed that the challenge of engaging older adults in new technology is progressively dissolving as technology adept generations enter and progress through later life. A systematic review which explored innovation and technology for older adults found that elderly people will and do use technology if it is affordable, accessible and useable, but also recognises unique nuanced challenges faced by elderly people as a result of physical and cognitive decline associated with aging (Mostaghel 2016). In this respect the review concludes that elderly people represent a diverse population with a diverse range of needs which need to be considered when implementing technology into care services.

Telecare solutions may not be appropriate for all service users, as recognised by community carer participants who felt that some people in their care have complex health care needs which could not be met by telecare in isolation. The integration of telehealth and telecare services has been considered for service users who require both health and social care, but research has evidenced relatively few people would fit the criteria for this integrated approach, with discussion also around risk management of this unique population (Goodwin 2010). Further research is required into this area to explore the phenomenon of assistive technology for people with complex health needs.

Community care participants in this study voiced that digital documentation of service user notes would be advantageous with the belief that time saved from handwritten documentation could be used for hands-on care. There was a shared belief that time spent caring for a service user is more valuable than time spent on documentation and could be used for direct hands-on care. Advances in technology have seen the rise of practitioners and services adopting digital note taking, with evidence suggesting this method is advantageous for service users and providers (Wroten et al. 2020). Evidence suggests digital documentation is more time efficient than handwritten notes and also improves inter-disciplinary communication by making notes standardised and accessible (Jamieson et al. 2016).

Telecare call responders spoke of the service's intention to migrate from analogue to digital communication and it was felt this would bring positive changes and improve telecare digital services. Digital connectivity was viewed to speed up processes and enable connection to more devices which was thought to be a step in the right direction as telecare aligns with technology advancement. All analogue telephone services are planned to be discontinued in 2025 and telecare is presented with the challenge of moving to digital connectivity without putting vulnerable service users at risk in the transition period (Taylor et al. 2021). The change presents a unique opportunity to review the way in which telecare delivers care and challenge traditional practices utilising the assets of digital connection. Future research into this area would be advantageous to inform and shape telecare services in the dawn of moving to digital connectivity.

The recognition of the changing landscape of health and social care and the emerging drive to incorporate digital solutions is met with reservations about preparedness and readiness of existing services and infrastructures. Evidence suggests this concern is not unfounded as limited inoperability and choice local authorities face mean service users may not have access to the technology they actually need (Taylor et al. 2021). Procter et al (2018) propose the move to digital from analogue communication presents opportunity to develop bespoke services for individual needs due to the benefits digitisation holds.

Community carer participants in this study expressed worry about the reliability of telecare and voiced concern over safety risks, fearing potential negative outcomes as a result of using the service over traditional face-to-face care. The concept of reliability and risk of telecare services is widely debated in the existing body of knowledge with no conclusive conclusion. It is believed that telecare can protect older adults against harm and increase security, but also the service possesses challenges and limitations that could lead to harm in this population (Johannessen et al. 2018). Protecting the elderly population against injury is an area of concern globally (WHO 2017) and promoting safety is an important objective in delivering telecare services (Ministry of Health and Care Services 2013). It is imperative that services and governing bodies are informed by the evidence base when planning and implementing telecare, ensuring the technology has the potential to meet the needs of the population.

Solutions and possibilities for the future

This study has highlighted interesting considerations which may be used to inform future practice and service development. With the area of technology services being of wide debate yet inconclusive outcomes, it is imperative to review the evidence and implement its findings to progress and maximise any potential benefits. Findings from this study suggest that the optimal solution would be the intertwined provision of face to face and technology services to scaffold the care needs of older adults living in the community, however there are circumstances where one mode of support would be more suitable than receiving both. There were 1.7 million telecare users in the UK in 2016 (Steils et al. 2019) and there are 818,000 service users accessing long term care with 2 million new service requests in 2021-22 costing local authorities £16.6 billion (NHS Digital 2023). Providing a dual approach of direct and technological care would be strategically and financially challenging. One solution proposed in a study by Steils et al. (2019) was to have a ‘mobile response service’ attached to telecare, where a designated carer would complete a welfare check on a person who has raised a telecare alarm. Whilst it is acknowledged that this is not the same as receiving a regular package of care, it would offer some compromise for people using telecare in the community to receive direct access to a carer when needed.

Education for service providers regarding the implementation of telecare services and user risk and safety, may be one way to mitigate the fear of change and repercussions of technology that emerged as a theme in this study. Competence and knowledge in the prescription and use of telecare is fundamental to ensure safe and ethical use of the service (Guise et al. 2014). It is suggested that a standardised telecare curriculum should be implemented in the training of health care professionals to ensure proper usage and application (Chike-Harris 2021). The concern regarding the service user’s perception of technology and their ability to successfully use it, which was another theme which emerged from the study relating to ‘fear’, is not necessarily supported by existing literature or the findings of study 3 in this research (see chapter 4). This view that was held by some participants may be a subjective opinion and not based on evidence which education may address or at least enable service providers to make an informed decision when considering the application of telecare with older adults.

Digital note taking was discussed favourably by participants in the study. Health and social care are undergoing digital transformation, which has been accelerated by the pandemic, and professionals must be active participants on this journey whilst holding on to their professional values (Butcher and Hussain 2022). Whilst digital note taking was positively perceived in this study, studies have shown that employees are not always accepting, and organisations are employing strategies to manage change to successfully implement the technology (Brooks and Grotz 2010). It is suggested that successful implementation of digital records requires managers, clinical leads, IT services and project management stakeholders address key issues to support and increase the compliance of users (Scott et al. 2018). Organisations are encouraged to devise a roll out plan, consider the technological aspects of implementation (systems and hardware) and training (user training, contingency planning and staff support) (Scott et al. 2018).

The reliability of telecare was a concern and emergent theme from this study. Participants expressed apprehension about the technology and the subsequent risk this might impose on the service user. Again, whilst education, as aforementioned, may go some way to give health and social care workers an informed and evidence-based understanding, working closely organisation managers, having clear reporting systems and a protocol for when technology dysfunction occurs may address and reduce this anxiety. Technological limitations and the difficulties understanding and using telecare is an area of discussion in the field and it is recommended that reliable technology is developed which is matched to the user’s knowledge, skills and ability (Johannessen et al. 2019).

It is vitally important that an evidence-informed approach is taken when services look to implement technology into their provision. This study offers an insight into the experiences and perceptions of health and social care employees from which recommendations have been made. Further research of the recommendations, if implemented, would be beneficial to draw conclusions and further suggest potential developments to enhance practice.

Strengths and limitations

Qualitative research aims to produce data that is representative of the human experience, however this methodology may be viewed as problematic in regard to establishing trustworthiness as this quality assurance indicator has been described to be far from an exact procedure (Stahl and King

2020). The constructivist-interpretive nature of qualitative enquiry as discussed in the methodology chapter (chapter 3), which is influenced by the interpretation of the researcher, their life experiences, culture and personal standpoint, means these factors are bound to shape data interpretation and research outcome (Shufutinsky 2020). Therefore, despite the thick description and unique perspectives qualitative research provides, this methodology has been critiqued as invalid as it lacks 'analytical description and scholarly rigor' (Giola et al, 2012). Trustworthiness of this study will now be considered and recommendations for future similar studies will be made.

Implementation of Braun and Clarke's six stage thematic analysis provided a highly flexible approach which enabled a rich, detailed and complex account of the data collected through its theoretical freedom (Brauna and Clarke 2006). Means of establishing trustworthiness were considered at each stage of the thematic analysis so the reader can make informed judgement on the quality of this study:

Phase 1: familiarising yourself with the data: Prolonged engagement and repeated reading of the data allowed data immersion, and patterns and meanings were actively sought to understand the breadth and content of the data corpus. Data across the data sets were triangulated, and theoretical and reflective thoughts were documented. Initial thoughts about potential codes and themes were identified and a reflexive journal was kept.

Phase 2: generating initial codes: Specific characteristics were identified by initial coding which enabled the data to be simplified. Full and equal attention was given to each data item by working through the data systematically to identify pertinent phenomena of interest. Credibility was enhanced by research supervisor and peer debriefing as it enabled the research to examine their own thoughts and ideas, and how these may influence coding.

Phase 3: searching for themes: Detailed notes were kept on the development and hierarchies of concepts and themes and researcher triangulation was achieved by regular supervisor supervision. To demonstrate that themes were rooted in the data, a consistent approach was taken with all data sets in terms of data collection, coding, organising and analysis.

Phase 4: reviewing themes: Themes were discussed with the supervisory team at this phase to establish if a coherent pattern was present. During this stage it was evident that some themes did not have adequate data to support, and therefore the raw data was revisited to reconstruct the theme.

Phase 5: defining and naming themes: Sufficient time was invested in defining and naming themes which increases the probability of developing credible findings (Lincoln and Guba 1985). As suggested by King (2004), data was read through twice whilst scrutinising coding to consider the themes complete. Discussions with the supervisory team prompted themes to be re-named to better reflect the data.

Phase 6: producing the report: The aim when writing the report for this study was to be concise, coherent and logical, and provide an interesting account of the data within and across themes (Braun and Clarke 2006). The researcher endeavoured to communicate the process of analysis in a way that rendered findings credible and believable to the critical reader (Nowell et al. 2017). Short data extracts were included to demonstrate specific points and larger, more extensive extracts were used to give readers an insight into the original text.

A reflexive diary was kept throughout the research process and the researcher met regularly with their supervisory team to address matters of objectivity. Critical discussions with peers helped to ensure as far possible that findings were a result of the experiences of the participants rather than the preferences and characteristics of the researcher. The researchers ontological and epistemological beliefs are outlined and discussed in Chapter 2 (Methodology).

It is recommended further studies of this nature consider the co-creative approach further by integrating the views and perspectives of community carers and telecare call responders. Time constraints and limited resources meant that only two online focus groups were conducted, one with each sub-group of participants, however it is felt by the researcher that an additional focus group combining participants from both sub-groups and taking an iterative approach would generate integrated and in-depth insights. This would also enhance credibility by the triangulation of data collection methods. Transferability of findings would also be aided by the random recruitment of participants working in different caring and telecare organisations.

Only having participants from two organisations may be regarded as a limitation to the study and the lack of diversity in regards to age and ethnicity of participants may also impact of transferability of findings. A larger study including more organisations and a diverse participant population is recommended to explore this phenomenon in greater depth.

Conclusion

This study aimed to explore the experiences and perceptions of care providers on the use of technology to support people living in the community overnight. A qualitative methodology was applied using online focus groups to establish the views of community carers and telecare call responders. Four main themes emerged from the data using Braun and Clarke’s six stage thematic analysis; 1) face-to-face versus technological care services, 2) fear of change and repercussions, 3) going digital and, 4) is technology reliable? Results show some consistency between perception of technology from the non-technology using participants and the experience of the technology using telecare participants, however this study has highlighted some disparity between perceptions and experiences.

Study 2; a reflexive account using Kolb's reflective cycle of experiential learning (Kolb 1984)

Concrete experience

Ethical approval for this study was originally gained in 2018 as part of a doctoral study looking to explore the use of assistive technology at night time for people with long term conditions and their carers. The original proposal was for this to be the first phase of a three phase co-creative mixed method study conducted with a PHC. Communication with the PHC was challenging after the replacement of the original gatekeeper in 2019 and recruitment of participants was difficult resulting in only 2 participants recruited to the first focus group held in March 2020.

In March 2020 in unprecedented events, the world was significantly impacted by the onset of the covid-19 pandemic. The first UK lockdown commenced on the 23rd March with social distancing orders meaning contact with people outside of your household was prohibited. Communication with the PHC became even more challenging as their service priority moved to their response to the pandemic. The next data collection phase of this research was originally proposed to be face-to-face dyadic semi-structured interviews with service users of the PHC which given the pandemic restrictions was no longer possible. Fieldwork and data collection was essentially put on hold between March and August due to the uncertainty of the pandemic response, and in August 2020 the PHC went into administration and officially withdrew support for the research. It was also at this time that the director of studies left the university and replaced with another supervisor.

With the support of the supervisory team and university, a new organisation was approached and agreed to participate in this research in January 2021. The new company was a telecare provider and therefore had a different focus from the PHC in regard to assistive technology. A new research proposal was completed as the original proposal was not inline with the new telecare company, and a new focus was needed to maximise the research output. Ethical approval was gained in February 2021 for a new qualitative research study exploring the perceptions of home assistive technology at night time for community dwelling older adults and their carers. Data collection for this study continued in May 2021 with a focus group using telecare call responders at the new organisation.

After much consideration, it was decided with the supervisory team that the data collected from the initial focus group using PHC participants would still be used in the thematic analysis as it produced *rich and useful data. The purpose of this study was to explore the perceptions of technology from community carers from a non-technology using organisation (the PHC), and the experiences of telecare call responders (telecare provider) using night time technology in supporting older adults in the community. Data analysis using Braun and Clark's 6 stage thematic analysis was completed on the data generated from the two focus groups as a whole to produce themes. Data analysis was completed between January and May 2022.*

Reflective observation

There are three main areas of reflection that impacted on the process and outcome of this study, 1) change of organisation participating in the research, 2) the impact of the covid-19 pandemic and, 3) change of director of studies. These will now be reflected on in turn.

1) *Change of organisation participating in the study*

The change from the PHC to the telecare service participating in the study had the greatest impact on the process and outcome of the research. It was a frustrating experience to have designed the research project as a whole around the needs of the PHC funding the study for the organisation to be no longer involved. Whilst the PHC had not overtly influenced the research protocol or aims and objectives, on reflection there is a degree of researcher bias even though this was consciously sought to be avoided. A reflexive journal was kept, and regular supervisory meetings were held to attend to researcher assumptions and the impact this may have on the study. As a novice researcher completing research part-funded by the PHC, I felt that whilst planning the research was always collaborative, I was forming the methodology to be inline with what the PHC wanted, thus creating bias. There was certainly a perceived restriction in the line of enquiry as to where this research could go and what it could explore.

When the PHC finally withdrew all support, it was a very uncertain time in the PhD journey, and it was unclear if the project would progress any further. With only one data set and heading into the final year of the research studentship the prospect of ceasing the study was very real. I was conscious of the time already asserted thus far and aware of the need for this research to contribute to the existing knowledge base, so made the decision to proceed with the PhD. Support from the university enabled me to make contact with a new organisation to work alongside to complete the research. Whilst recruiting a new organisation essentially meant going back and amending the original research proposal impacting on the already delayed timeframe, it also presented new and exciting opportunities to drive the research forward. My personal experience of occupational therapy was far more akin to the ethos of the telecare provider in terms of interest and research involvement and allowed more freedom in approach than the PHC.

Recruitment to the second focus group in study 2 was a positive experience as was the running of the group itself. Overall, whilst the change of organisation of the study posed challenges and presented barriers, the result of this enhanced the research process and outcome. Involvement of the telecare organisation brought new perceptions and produced valuable data contributing to the research outcome.

2) *The impact of the covid-19 pandemic*

Covid-19 brought about many personal and academic challenges to this research since it's onset in March 2020. Firstly, acknowledgement needs to be given to the uncertainty and unpredictability the pandemic presented to the world. On reflection, this was an unprecedented time where governing bodies, organisations and the general public were responding to the unknown resulting in major changes to the way communities lived their lives. A significant personal challenge I faced in terms of ability to dedicate time to the research was homeschooling my 2 young children during the national lockdowns where I had no option but to try and balance the researcher role and carer duties. The impact of this was the slowing down of the research process, which as discussed before was already impacted by the challenges faced with communication with the PHC and recruiting a new organisation.

During the first lockdown in March 2020, the PHC was still involved with the research. Engagement in evidence-based practice was an organisational aim and was the reason for part-funding the research, this however changed with their response to the pandemic as service user and staff care was prioritised. This only created further barriers to communication that were already being faced ultimately meaning recruitment of participants was near impossible at this time. In May 2021 when the second focus group was held covid-19 restrictions had been lifted from the afore mentioned national lockdowns however some restrictions and guidance remained in place. Face-to-face interactions had to be socially distanced and there was still particular concern around vulnerable population groups, such as my participant demographic, and the disease. With on-line communication now being an accepted form of communication since the start of the pandemic and also a review of the literature surrounding virtual data collection it was decided to complete further data collection on-line via virtual focus groups. This was a time effective and convenient way to collect data which had a positive impact on the progression and time frame of the research.

3) *Change of director of studies*

In August 2020, my director of studies who had supervised me from the start of the research left their role at the university and was replaced by another member of staff. I had an extremely good working *relationship with the director of studies who had been pivotal in the development of my research and they understood the nuances and intricate details of the project to that point. This event coincided with the private health company withdrawing their support and it was a very uncertain time with regards to progression and completion of the PhD. Once again, I was supported by the university and was quickly allocated a new director of studies who fortunately I had worked with previously meaning they had a broad understanding of my research and journey. Working alongside the new director of studies opened up new lines of thinking in relation to the research area and methodology, and I believe that this was beneficial to the process and had a positive impact on the research output.*

Abstract conceptualisation

As this research was originally part industry funded, it presented nuanced challenges which impacted on the process and outcome. It may be considered that this type of research is advantageous by way of providing outcomes that are embedded in 'real world' practice, as academics are often criticised for producing work that is not dir4ectly transferable to the industry landscape (Rahman 2023). A study conducted by Bernhard and Olsson (2020) proposed that industry funded research has the potential to expose novel insights, but challenges do exist and need to be considered to strengthen university-industry collaborations. For this research in particular, there was a perception of limited academic freedom as the topic of assistive technology at night time was stipulated by the PHC. Whilst networking opportunities may be a benefit of working alongside industry, this was a challenge with the PHC due to the lack of their committed participation.

The forced decision to move all data collection online was a task faced by many researchers, and whilst this presented challenges it also presented opportunities. It has been reported that 80% of universities research activities were impacted by imposed restrictions during the pandemic (Marioni et al. 2020) with healthcare research being particularly affected due to the enormous strain covid placed on these services (Evans 2022). The decision to pause, adapt methods and resume participant recruitment at a time that was deemed more appropriate is supported by Evans (2022) who reported that it would be morally and ethically wrong to ask people to participate in research at a time when all activity unrelated to covid had been paused. Moving data collection on-line meant easier and more convenient access for participants which is beneficial for them to participate in the virtual focus groups within their daily schedule. This was also the case for myself as it meant I did not have to factor in travel time and booking facilities to conduct face-to-face data collection.

Supervisor supportiveness, in terms of academic qualities and pastural support, is the greatest predictor of a positive student experience (Dericks et al. 2019). It has been argued that the supervisor has traditionally been considered to be the determinant of success as they are tasked with the responsibility of mentoring the whole PhD journey (Hmala 2022). Despite the temporary disruption *the change of director of studies had on my research, the experience was overall positive and did not impact negatively on the research process or output.*

Active experimentation

On reflection, the experience gained during study 2 had a direct impact on the planned process of study 3 (see chapter 5). Whilst the available evidence suggested that on-line data collection was not inferior to the traditional face-to-face data collection, I had now experienced this for myself with a positive outcome. From experience, in study 3, I was able to intentionally employ therapeutic interaction skills in virtual focus groups, for example I actively and consciously used the skill of paraphrasing what participants had said to ensure I had understood the message in case any nuances that can be found in in-person communication may have been missed. At this point, I had become far more skilled with on-line communication due to its required use since the start of the pandemic. It may also be argued that participants would have also become more confident with virtual communication, thus enhancing the richness of collected data. A positive relationship was formed with the new organisation as it became more invested in the research. This relationship was carried forward into study 3 where they continued to participate in data collection and undoubtably helped to steer the direction and outcome of the study.

Chapter 5: Study 3

An exploration of the experiences and perspectives of community dwelling older adults with social care needs who use night time technology and their call responders.

Preface

This study explores the experiences and perspectives of community dwelling older adults with social care needs and telecare call responders on night-time assistive technology services. The aim of the study was to gain the lived experience of telecare from a service user and service provider perspective to obtain a collective account from both populations. Data was collected in 3 phases, 1) semi-structured interviews with telecare service users, 2) a focus group with telecare call responders and finally 3) a focus group with both telecare call responders and users. Thematic analysis was used on the data set as a whole and generated 4 themes and 13 sub-themes which reflected their experiences. Study findings are considered alongside study 1 (chapter 3) and study 2 (chapter 4) in the discussion and conclusion (chapter 6) of this thesis to explore the overarching aim of this research, exploring the experiences and perspectives of home assisstive technology at night time for community dwelling older adults and their carers

Introduction

It is estimated that by the year 2050 one in five people with be 60 years of age or above, which totals 2 billion people globally (WHO 2017). Whilst this increasing longevity reflects the social and economical advancements of the modern world, it is forecast to challenge society and the economy and has been identified as a worldwide issue in terms of health and social care provision (WHO 2017). The increasing aging population demands analysis and re-development of the existing health and social care infrastructure with the WHO calling for research to create potential solutions to this challenge. A movement away from traditional residential care has fostered a growing number of models of sheltered housing for older adults (Finn et al 2021), which unlike residential care settings focus on the promotion of independent living, community integration, security and cost-effectiveness (Croucher et al 2006). One suitable solution which it well-recognised internationally is ‘housing with care’ which supports independent home and social care needs, where older adults live independently in a setting with communal facilities and is staffed 24/7 to assist with any basic social care needs the resident may have (Finn et al 2021). This care model is based on the social model of care and enables a ‘home-like’ environment and empowers autonomy and choice among residents (Carder 2002).

Assistive technology, also referred to as ‘telecare’, is an umbrella concept comprising of several communication technological solutions to promote safety and security at home (Barlow et al 2007). Telecare is utilised in housing with care facilities and is categorised into three categories: 1) first generation devices which include a user-triggered alarm button (active alarm), 2) second generation systems that detect hazards without the requirement to be triggered by the user and, 3) third generation telecare systems which are more complex and enables the remote lifestyle monitoring of the user (Stowe and Harding 2010).

Research question:

What are the lived experiences and perspectives of community dwelling older adults and assistive technology call responders of night time assistive technology services?

Research aims:

1. Explore the experiences and perspectives of the use of assistive technology at night time with people living in a ‘housing with care’ facility.
2. Explore the experiences and perspectives of the assistive technology service at night time with call responders.

Methods

Design

Qualitative research is an esteemed paradigm of inquiry which requires rigorous and methodological approaches to create meaningful and useful results due to its complex nature (Nowell et al 2017). It is imperative for researchers to outline analysis methods and philosophical assumptions to enable the reader to evaluate the study’s trustworthiness.

This study consists of three phases of data collection in order to answer the research question: 1) individual semi-structured interviews with assistive technology service users, 2) a focus group with assistive technology service providers (call responders) and 3) a focus group with both service users and providers. The purpose of the focus group with both service users and providers was to enable a collaborative forum when both voices could express and explore experiences and perspectives together.

This study follows the consolidated criteria for reporting qualitative research (COREQ) checklist (Tong, Sainsbury, & Craig, 2007).

Participants

The sample for this study consists of community dwelling older adults living is a ‘housing with care’ facility who use a technology care service and care line call responders in keeping with the co-creative approach, and the following inclusion criteria was applied to research participants;

Technology service user: 1) <18 years plus, 2) have a long-term condition, 3) have mental capacity, 4) able to engage in verbal communication, 4) living in the community housing with care facility with access to telecare technology and, 5) speak English.

Technology service provider: 1) <18 years plus, 2) work as a call responder at night time and, 3) speak English.

Participants must have mental capacity to be recruited to address issues of informed consent with this population. Researchers have an ethical and legal responsibility when obtaining informed consent to assess the capacity of potential participants (Hamilton et al. 2016). Valid informed consent ensures the research has been effectively communicated and understood, participants are aware that involvement is voluntary, and benefits of participation are weighed up against the risks (Health Research Authority 2017). The Mental Capacity Act (MCA) (2005) states it is the responsibility of the researcher to determine capacity to participate in research and a person must be assumed to have capacity unless established otherwise. Ensuring the attainment of valid informed consent of people without or fluctuating mental capacity is difficult to achieve and monitor, especially for a sole novice researcher. The MCA outlines that no group should be excluded from research participation, however the legislation aims to protect people without capacity to be free from unnecessary interference in the name of research. For the purpose and scope of all studies in this research, including participants without mental capacity would not add additional benefits or be less effective with participants that do have capacity to consent, therefore this group was excluded. In research, capacity is usually implied by the act of consenting to participate however, to ensure consent was not wrongly implied the researcher spoke with each participant to establish if they had read, understood and retained information about the research. As each participant only had one interaction with the researcher at the point of data collection, capacity after this was assumed and not re-tested. If mental capacity was questioned, a mental capacity assessment would be completed with the potential participant using a tool adapted from Coventry and Rugby CCG (2019) (Appendix 7: Mental capacity assessment form) however this was not required in either study. The researcher is an Occupational Therapist with 12 years clinical experience and is competent in formally assessing mental capacity.

It has been recognised the exclusion of non-English speaking participants can bias research and inappropriately exclude populations that could benefit from the research however, there are justifiable reasons for doing so (Russel-Einham and Torres 2017). Research has shown lower recruitment rates for non-English speaking participants due to perceived issues around communication and also a general reluctance to participate in research (Newington and Metcalf 2014) which may make recruitment of this demographic problematic. Non-English speakers are potentially vulnerable with regards to obtaining informed consent as the language barrier may prevent the full comprehension of potential risks and benefits of participation and therefore would be unethical (Institutional Review Board 2019). Interviews generate large volumes of rich data which if translated, would be at risk of translator bias which may limit the studies validity and trustworthiness. Although the decision was made to exclude non-English speaking participants from this study it will be considered a limitation to the findings and the impact on transferability will be critically appraised.

Purposive sampling was used to recruit participants to the study. This method of sampling is reliant on the researcher's knowledge and skill to select participants that are 'best fit' to answer the research question and will provide rich data to gain better insights and more precise results. Purposive sampling is consistent with the aims and assumptions of a qualitative research method approach (Palinkas et al. 2015) and intends to select participants that are knowledgeable or have experience of the phenomenon in question (Cresswell and Plano Clark 2011). An exponential non-discriminative snowballing sampling technique was utilised to recruit participants which enabled the recruitment of a previously hidden population (Dudovskiy 2021). This form of non-probability sampling has faced criticism and it is reported that this method will generate biased samples given that participants will potentially have similar characteristics and views and are therefore not representative of the wider population (Etikan et al 2015).

A specifically designed participant information sheet was created based on work completed by Paul McGee, Gillian Ward and Louise Moody (2017) (Appendix 8: Service user participant information sheet). Their study aimed to co-design a PIS with people with learning disabilities and made practical recommendations to empower meaningful collaboration and enable participation with this population. This PIS was given to the service user alongside the formal PIS that was provided to the service provider call responder to aid comprehension regarding study involvement.

Potential participants were contacted via telephone to provide information about the research study and to gain verbal consent. Once verbal consent was obtained, the participant information sheet (Appendix 4, 8) and consent form (Appendix 5) was emailed to participants to give written consent for engagement of the study. This was the only contact prior to the study and there was no relationship established between the researcher and participants prior to the study. All approached potential participants consented to participate in the study and none withdrew consent or dropped out during the research.

Data collection

Individual telephone interviews were conducted with 7 technology service users, each lasting approximately 45 minutes. Participants were in their own home at the time of the interview without the presence of non-participants. The sample consisted of 1 male, 5 females and 1 transgender female with an age range of 58-76. Data for the study was collected between May and July 2020. Six of the participants lived alone and one lived with their spouse in a housing with care facility, none of the participants received additional health or social care input. All of the participants lived in the same housing with care facility with access to a 24-hour telecare care line service provided by a private service provider. Technology equipment consists of a main communication device which is a wall mounted tablet and also a pendant alarm worn around the neck. The participants are required to ‘check in’ each morning with the on-site care warden via the tablet to indicate if they are ‘ok’ or ‘not ok’, other than this, the purpose of the technology in situ is to raise alarm in the case of an emergency such as a fall or acute medical episode.

An on-line focus group via Microsoft Teams was conducted with care line call centre responders and lasted approximately 60 minutes. The sample consisted of 3 males and 1 female, all of which had experience of service provision at night time.

A final on-line focus group was then conducted via Microsoft Teams with representatives from both service user and telecare call responder participants. The sample consisted of 2 female service users and, 1 female and 2 male call responders. All participants in this focus group had attended the previous interviews or focus group. The purpose of this focus group was in keeping with the co-creative and collaborative approach whereby the two stakeholders are enabled to discuss experiences and perspectives, and collaborate with each other.

All data collection sessions were either audio or visually recorded and transcribed verbatim in preparation for data analysis, and fieldnotes were taken at the time of data collection.

All interviews and the on-line focus group were semi-structured and followed the schedule below, with the purpose of collecting data that could be analysed and synthesised to capture the views of the service user and service provider to foster a co-creative dynamic.

Interview and online focus group schedule

1. Open and introduction; the researcher introduced themselves to the participants and gave a brief explanation of the research. The researcher initiated discussion around technology at home, briefly outlining types of technology available and what it might be used for.

2. What is your experience of technology?; participants had the opportunity to explore and discuss any previous knowledge or application of home technology. This question was designed to get participants thinking about technology, its uses and any impact it may have on community living by drawing on previous knowledge or experiences.

3. What are your experiences of night time home care? What are your night time needs?; this question aimed to achieve an understanding of care experiences at night time and get the participant to think about potential problems that may potentially be addressed with technology.

4. How do you think technology could help you at night time?; participants were given the opportunity to consider how technology may be of benefit or constraint if utilised to support night time care in the community.

5. 'What's in the box?' activity; this activity was designed to enable participants to envisage a piece of technology that would potentially solve their identified challenges and problems at night time. Questions such as 'What would the technology do? What would it look like? How much would it cost? What problem may this help with?' were asked to prompt thinking.

6. Conclusion and close of interview; the researcher briefly recapped on the main points discussed and gave participants the opportunity to correct any misinterpretations that may have been made

Data analysis

A rich description of the data set to identify themes relevant to the research question was achieved by utilising Braun and Clark's 6 stage thematic analysis (Braun and Clark 2012). This highly flexible approach provides a rich and detailed, yet complex account of the data (King 2004). As this research aims to identify and co-create practical recommendations that can be applied in practice, an inductive approach (Frith and Gleeson 2004) was used meaning themes are strongly linked to the data themselves (Patton 1990). Within this approach, data is not fit into pre-existing coding frameworks or the researcher's analytical preconceptions which ensures themes are data driven (Braun and Clark 2006). Themes were identified at a semantic level which means themes are distinguished within the explicit meaning of the data, allowing movement from description to interpretation where broader meanings and implications are theorised. Data was coded solely by the research but discussed regularly with the researcher's supervisory team and a reflexive diary was kept. Data coding was completed using Microsoft Word and 'pen and paper' methods. A data management tool software system such as NVivo was considered but decided against due to researcher experience and time constraints in having to learn how to use the software.

Ethical considerations

This study was approved by Coventry University Ethics board in January 2020 (Appendix 1). All of the participants were given written and verbal information about the study. Participants were guaranteed anonymity and confidentiality and given the opportunity to withdraw from the study at any time without implication to the social care service they receive.

Results

There were 12 participants included in this study with 5 representing the telecare call responder group and 7 representing the telecare service user group. Table 6 outlines the characteristics of participants.

Table 6: *Characteristics of participants*

Characteristic		Number	Percentage%
Gender	Male	5	42
	Female	6	50
	Other	1	8
Age	18-25	0	0
	26-35	1	8
	36-45	4	33
	46-55	0	0
	56-65	1	8
	66-75	5	42
	75+	1	8
Ethnic origin	White British	11	92
	Black British	1	8
	Other	0	0
Role	Telecare service user	7	58
	Telecare call responder	5	42

In relation to the semi-structured interviews and focus groups, data analysis using Braun and Clarke's 6 stage thematic analysis (Braun and Clarke 2006) revealed four main themes: 1) social isolation, 2) sense of community, 3) technology not tailored to individual need and, 4) technology not used as intended. Data analysis revealed the lived experience of telecare by the user and provider participants which is now explored in the results. Table 7 depicts the themes and sub-themes emerging from the data. Coding for this study can be found in appendix 9.

Table 7: *Themes and sub-themes*

Theme	Sub theme

Social isolation	Night time behaviours impact service use
	Service provider ethics, moral considerations, and judgement calls
	Social isolation and increased service use collide
	Minority groups, social isolation, and service use
Sense of community	The use of technology to form social connections
	Technology unites people in the same community
Technology and individual need	Blanket provision and lack of individual assessment for technology services
	Night time needs differ from day time needs
	Health inequalities
	Environmental and logistical considerations of technology
Technology not used as intended	Inappropriate use of technology service
	Education and training
	The impact of false alarms

Social isolation

Social isolation was broadly categorised into four groups: 1) night time behaviours and the impact on service use, 2) service provider ethics, moral considerations, and judgement calls, 3) corelation of social isolation and increased service use and, 4) minority groups, social isolation, and service use.

Night time behaviours impact service use

Telecare service providers reported that service user behaviour differs between day and night time and proposed that night time behaviours increase the demand and use of service at night. This was particularly identified in service users with dementia who may experience behavioural disruption and are often awake during the night:

'especially with regards to dementia patients is the people that are on the day and night reversals. So they don't quite understand that obviously when they're awake at two o'clock in the morning and there is nobody around.'

The increase in service use at night due to the impact of service user behaviour was also reported to correlate with inappropriate use and misuse of a service that should *‘be treated as the fourth emergency service’.* The impact of social isolation at night, particularly people living alone, can lead to engagement in behaviours that may require social interaction but not necessarily in the remit of what the telecare service aims to provide: ‘*there’s no denying we carry out huge amounts of welfare calls at night for people that are just lonely and doing crazy stuff that they shouldn’t be doing.’*

Service user values and beliefs about the telecare service can influence the use of the service. There did not appear to be correlation between the functional ability of the service user and increased use of telecare. One telecare call responder spoke of a service user who was 101 years old who had a fall during the night but ‘didn’t press her button as she did not want to bother us at night time’. This was described as a *‘prime example’* of a particular *‘service user behaviour’.* The participant went on to say, *‘other people that shall we say who are seemingly fitter and more able than her call quite regularly and I find that quite interesting’.* In this regard, it is felt that service use may be dictated by personal volition as opposed to need.

Night time is described as *‘isolating and lonely’* by service users which is further impacted by illness, *‘so at night when you’re not well or things, the weight of loneliness can be soul destroying*’. In addition to the feelings of isolation and loneliness, anxiety was reported to be experienced at night which led to seeking social contact via telecare as it *‘is something to calm the anxiety, to calm the feeling of total loneliness’.* In this regard, the use of telecare appears to alleviate the anxiety caused by isolation which prompts service use behaviour at night time.

Service provider ethics, moral considerations, and judgement calls: ‘eventually it gets them’

The potential consequences of inappropriate service use due to social isolation was reported to impact the personal wellbeing of the telecare call staff. One service provider participant gave an example of a female service user with early onset dementia who presses her call alarm nightly starting at 2am wanting *‘to have a chat’*:

‘she is not needing medical assistance, she wants to talk and to have contact with somebody that she knows and yes it’s quite upsetting actually as she can be quite teary…..it’s just doing our best to reassure her as much as we possibly can that it’s the middle of the night’.

Each telecare call responder receives *‘approximately 135-150 calls per night’* and the impact of this can be detrimental to their health and wellbeing. It was acknowledged that call responders *‘are sponges’* but *‘do not have limitless amounts of empathy and eventually it gets them’*. The service providers feel a sense of responsibility to respond to potentially inappropriate calls to address social and loneliness needs however are aware this use of time and resources may impact wider service provision:

'don't get me wrong, we fulfil that function every night, however with an emergency care line, we're also very conscious of people in the background waiting to be answered who perhaps have a more serious issue but we never detract or deter people from calling us'.

The notion of *'a boy who cried wolf'* scenario where the continued inappropriate use of the service may lead to a reduced response to particular service users is considered by service providers and something they actively avoid. Concerns of this were potentially overlooking the service user in the case of an emergency and also the impact this may have from a business perspective, '*because the time that happens, they'll leave us'.*

Service providers are conscious that decisions made in response to call button activation impacts other services that support the service user in the community and also their family. A reported awareness that other support services face the same challenging pressures at night influences their decision making, or more so that they are utilising services potentially inappropriately simply as there is no alternative. One particular example was given in relation to the use of the ambulance service to support service users experiencing mental health challenges at night not necessarily because emergency support was required, but because there are no appropriate alternative support services available at night:

'…at the moment we're calling ambulances which as you say (participant name) quite correctly is a complete waste of resource'.

Social isolation and increased service use collide

Social isolation was reported to be a prevalent issue in the community and the impact of this can be seen in the frequent inappropriate use of the telecare service and this is viewed as a misuse of time and resources:

'so it's definitely isolation in terms of people using their alarms when it's not the purpose it's there for certainly, to get someone to speak to because we will always answer'.

Service users voiced the feeling of reassurance that having access to the telecare service brings with one participant stating, *'you don't feel lonely on your own when you've got someone to talk to'*. The service was viewed as a lifeline which can activate access to help if needed, especially *'if I felt ill and I didn't want to go out and I needed something, I know there's people I can call there'.* Whilst telecare providers will always respond to all calls indifferent to its nature, it is recognised that some service users are ‘just wanting to chat and wanting to talk to a human being’ which can *‘tie one of you guys (call responder) up for hours on some occasions’.*

When discussing the possible solutions to the problem of loneliness and increased service use, one participant suggested the possibility of telecare call handlers having the ability to direct the calls to other, more appropriate mental health charities and services such as *‘the Samaritans or the Big White Wall to gain a little more friendship without it being personal’.* This recommendation was met with hesitance by the service provider, stating:

‘*But if there was a 24-hour line there for people that are generally lonely and need some social contact, we would be hitting that line, I would imagine, to the form of … I’m not exaggerating, 100 times a night maybe’*

There was indication that day time contact and services may not be adequate in meeting the social needs leading to increased service use at night:

‘And they may have a carer who is always running late who dashes in, come on then, let’s get you ready for bed and you know before they know it, they’ve gone from the sofa onto the bed, they’re in the pyjamas tucked in, night then, see you in the morning, you know, and so we are probably, for some of those people, especially the ones that call us a lot, we’re probably the only people they ever speak to’

A service user participant voiced the belief that people will continue to use the service for the purpose of loneliness alleviation stating*, ‘it’s like having a phone number that they remember, and they will use it and will just keep doing it I’m afraid, there is no stopping that’*.

The use of the telecare device was beneficial during the Covid-19 pandemic lockdowns as it enabled residents in the housing with care facility to communicate with each other via a video call application, *‘it helps with the lockdown and not being able to meet people…..I’ve made some good friends and I can talk to them on it’.* One resident reported they were very active on-line during lockdown as a way to combat loneliness, *‘I got very active in sending stuff round amongst us and keep friendships, contact, you know’.* The telecare device was also used a method of social connectedness overnight and enabled residents who experience insomnia to *‘alleviate the long hours of the night from being totally and utterly wasted’.*

Minority groups, social isolation, and service use

Online engagement for minority groups was reported by one participant to be problematic who spoke negatively about their experience. The nuanced challenges experienced by the transgender lady has led to a preference of face-to-face communication:

'I find because of my voice being more masculine than feminine, I find that when I talk to people online and things, I get oh my god you sound like a man and all this stuff, so I just basically, I gave up.'

The previous negative experience of online communication influenced future participation possibly leading to isolation from the virtual community and even 'in person' communities*, 'I don't go to support groups anymore, I don't contact anyone, I basically just stay at home on my own'.* The lack of social interaction, whether it be online or in person, led to the service user participant dealing *'with things on my own which is awkward and difficult',* and she found the absence of support networks to *'be quite irksome'.* In this respect, the disengagement of service use may be a contributing factor to social isolation.

Sense of community

'Sense of community' has been grouped into two broad sub-themes: 1) the use of technology to form social connections and 2) technology unites people in the same community.

The use of technology to form social connections

The function of the telecare service device that allows the residents to talk with each other via a video call application is used at the housing with care facility to form and maintain social connections. The technology offers a vehicle for social connectedness and unites people living in the same geographical community:

'I usually get at least half a dozen calls from other people in the block who I have become friendly with.'

Social connections offered by online communication with residents is neighbouring apartments was thought to reduce isolation and loneliness especially for people who live alone, with one service user participant stating, *'it alleviates the feeling of total isolation'* and in turn has a *'positive impact on wellbeing'.*

One participant spoke of how his wife used the technology to keep in contact with other residents and would quite often 'have a good old chinwag'. Another service user participant described how knowing they could talk to people in neighbouring apartments offered a 'sense of security' as the device was used 'to keep in touch with each other to make sure we're all ok'. The technology was described as a means to enable fulfilment of activities of daily living, such as shopping, as residents of the housing with care facility can communicate any needs they may have:

'If one of us is going out, if we want anything from the shop sort of thing, we can rely on each other.'

In this regard, the residents in the housing with care community use the video call application to *'keep in touch with each other and make sure we are all ok'.*

Whilst the telecare device was used for video calls between residents, one participant described the challenges she faced using the device which ultimately deterred her from using the service in this way:

'Just occasionally I've tried it. It's not exactly a comfortable thing to do because it all sounds very artificial.'

Technology unites people in the same community

The telecare service device was reported to connect the resident participants living in the housing with care facility and enabled communication between them. It also allowed direct communication with the on-site carer which was described by one service user participant as *'reassuring'.* Another service user participant spoke of how they used the device to keep in contact with others in the facility and *'could be chatting on it for an hour or two'.* Speaking more generally about technology, one service user participant expressed how they used mainstream social media and applications such as Zoom, to keep in contact with their family, *'we keep in touch with the kids with it'.*

The technology was used at night time by one service user participant to contact the on-site carer which then led to face-to-face contact which was reported to offer a feeling of '*security and reassurance':*

'So we have our on-site carer who is, if you press it in the middle of the night, she comes up and talks, so that also proves quite useful'

Technology not tailored to individual needs

Four sub-themes were identified in the theme 'technology not tailored to individual needs': 1) blanket provision and the lack of individual assessment for technology services, 2) night time needs differ from day time needs, 3) health inequalities and 4) environmental and logistical considerations of technology.

Blanket provision and lack of individual assessment for technology services

Service user participants in the study all received the telecare service when moving into the housing with care facility. One participant stated that the technology was a '*requirement of the tenancy'* and *'We have to have it, it's compulsory to pay for it.'.* It was expressed that the mandatory service was *'exceptionally expensive'* by a resident participant who also proceeded to voice dissatisfaction saying, *'I don't think we are getting enough'*. Financial implications of the requirement to pay for the service was considered by a service user participant:

‘So many people here are perfectly okay, so they’re just as normal and they begrudge paying it, it’s something they don’t need or use’.

Both service user and call responder participants shared the view that a ‘*blanket approach’* to the telecare provision meant that individual needs were *‘not being met’*. The perspective that being provided the service whilst not necessarily needing it offered ‘*reassurance*’ and *‘security’* if it ever was required, was expressed by a service user participant. Discussions from service user participants highlighted the desire for a more complex telecare service that ‘*offers more’* by the way of ‘*connecting to other services’* and not just the call centre was met with opposition from a call responder participant who expressed ‘*the beauty of pressing the big red button’.* The call responder voiced ‘*there is something about its simplicity’* which ‘*makes it work’*.

A service user participant who was opposed to paying for telecare stated*, ‘I think it’s all in the realms of fantasy for all this technology’*, whilst another resident participant said, *‘technology is now taking over and for the very elderly, I feel it’s moving too quickly but for someone like myself, I love technology’.*

Perceptions of elderly people and their ability to engage with and use the telecare equipment and a call responder participant expressed the view:

‘people tend to assume that anyone elderly aren’t capable of operating this equipment and they’re not capable of thinking for themselves and I think you guys have proved beyond any doubt that you know, when people move into sheltered housing or they require some sort of care line system to help them, it doesn’t mean that they are completely helpless in all areas of their life’

Night time needs differ from day time needs

The impact of sensory deficits, such as hearing impairment, was thought to impact of service use and provision as expressed by one call centre participant:

‘I would say that at night time, a lot of service users have hearing difficulties and at night they don’t wear hearing aids, so you can get false alarm calls or even genuine calls but it can be difficult to communicate with those service users. They don’t have their hearing aids in and you can struggle to work out exactly what has gone on and what the situation actually is.’

Cognitive impairment was also said to be a factor that contributes to the use of service at night time, with a call responder discoursing the perceived link of day time patterns of living and behaviour, and its possible influence on night time:

'I think one of the biggest challenges we face at night is that the service users seem to be well controlled during the day whether that be by care staff, housing staff, next of kin, family, they're kind of controlled but unfortunately or fortunately at night, they've napped all day and a great majority of them are wide awake and they're left to their own devices, so they are free, free as a bird, it's like a Disney movie out there and they are doing crazy stuff. They are cooking Sunday roast on a Wednesday at 4 in the morning.'

Telecare call responders discussed the notion that there are increased inappropriate calls at night compared to the day with one participant stating:

'we definitely receive calls at night from people who just want to talk, they live alone, they are in their flat and no one else is around. I guess in the day it is easier to reach out to other people'.

In response to this, a service user who self reportedly experiences '*insomnia, loneliness and isolation'* at night time said '*its tempting, you know if you press the button someone will be there to speak to you'*. This participant suggested a service development of adapting the service to enable users to contact charities and services directly from the telecare device.

From the perspective of the telecare call staff, access to service user information can be a challenge. Limited information is kept about the service users and the lack of services usually available during the day makes information gathering difficult:

'We have limited information with regards to maybe their major medical conditions, whether that's Alzheimer's or whatever it may be, so we have some. So it is pretty much, normally the kind of bare bones information on them'

Health inequalities

A service user participant who self reportedly *'loves technology'*, shared she has purchased technical devices to alleviate anxiety that she often experiences at night time:

‘I’ve got a little thing I bought which you set the timer on it and you can have different sounds through the night. So, for example, sometimes I need to hear white noise, sometimes you put on bird sounds and things like that’

Discussions around available technology led to call centre responders expressing the view that whilst technology exists, it is not always readily available or provided to meet the individual needs of the housing with care residents:

‘we are limited in what we can provide, there are things out there that would benefit our service users but we just can’t provide it for them’.

Referring to a particular service user who would often wander at night, a telecare responder spoke of a ‘*GPS based device that has an in zone and an out zone that when they trigger past certain points or certain GPS coordinates they then fire a signal through to us at the control room and then we can track them from there all the way up until we have someone directly with them’.* Whilst there was recognition that this ‘technology exists’ and ‘would benefit this woman tremendously’ it is ‘*not available for her to have’*.

The telecare service, which is compulsory for the service user participants, was viewed as ‘exceptionally expensive’ with one participant sharing that she, *‘had to reduce my broadband and mobile phone package to reduce costs’*. This participant voiced she found it *‘silly’* that all residents had to pay for the service as, ‘*many of us are fine and we don’t need it’*. A resident participant who lives with his wife voiced he ‘did not need’ the service, *‘because there’s two of us here, one always looks after the other*’. This participant expressed he felt he had ‘*enough technology’* as, ‘*We’ve got two laptops, two Amazon Fire Tablets, two smart phones, our Wi-Fi printer and a smart TV*’. Whilst this participant was ‘comfortable’ with the telecare technology that was provided, another voiced, ‘*there are a lot of people who are technophobes and the mere fact that there’s a tablet on the wall freaks them out’*.

Cost of the telecare service was also considered by the call responders as one participant discussed how the level of service impacted on service provision for residents paying for an increased level of service:

‘*some pay for a higher service than others and we need to protect that because obviously there would be fines or there would be dissatisfaction there*.’

Environmental and logistical considerations of technology

Service user participants explored the impact of telecare devices and the physical environment. The telecare device is a tablet which if fixed to the wall in the hallway and one participant described the difficulties they faced when using the device:

'*Well I'm disabled so I can't stand for more than a few seconds, I have to sit down and if the tablet goes off - I never know what to call it - it's too high, nobody can see me when I'm sitting down so I'm forced to stand up'*

A '*portable device'* was one suggestion made by a service user to overcome this environmental challenge so *'you could have it in your lap or something if you're in the lounge, so you can talk to people.'.* A call responder participant believed this may also be beneficial for service users who fall in their property at a distance from the wall mounted device and communication is difficult:

'so yes if they fall in the bedroom and the main equipment is in the living room, you can sometimes hear quite a blurry noise in the background, I've fallen and yes it can be difficult.'

Technology not used as intended.

The theme 'technology not used as intended' has three subsequent sub-themes: 1) inappropriate use of technology service, 2) education and training and 4) the impact of false alarms.

Inappropriate use of technology service

Reports of the telecare service call handlers responding to *'lot of calls there that aren't emergencies'* was linked to the inappropriate use and misuse of their resources. The lack of a triage system means that all calls are taken 'one by one' as the service user activates the alarm which one call responder participant reported poses an ethical dilemma for call centre staff:

'one of those is a heart attack, one of those is somebody who can't breathe and we're talking to Doris who hasn't had her cocoa and you know, their levels of responsibility are just massive to make that judgement call'.

The participant went on to say the above scenario '*is a tough call but one they make every night*'. Whilst the call responders feel a sense of responsibility to service users who access the telecare service for reasons that are not necessarily appropriate (as discussed in the theme 'Service provider ethics, moral considerations, and judgement calls'), there was consideration of the impact these calls may have at a business level:

'we are a business, so therefore the quicker we can answer calls and the quicker we can clear the line, the quicker we can get to the next call and so on and we can provide those service levels for our

customers and so sometimes it has to be said, we have to say to service users, there is nothing more we can do to help you…'

The potential consequence of having to tell service users they are unable to provide further assistance in a matter that does not warrant the telecare service was discussed by participants who voiced concern, *'because one day, that lady that calls a thousand times for relatively menial things is actually going to press a button because she really needs us.'.*

Inappropriate use of the service, moreover the fear of using it inappropriately, was reported to influence service user behaviour when using the device, *'She's frightened of calling them in an emergency when it isn't an emergency.'.*

Education and training

It was felt by both the housing with care residents and call responder participants there is an absence of formal or standardised education and training on the use of the telecare technology on provision. There was an expectation from a call responder participant that service users should be given guidance of the use of the service:

'I mean they should be telling them that it's there for emergencies, if they're unwell, if they need an ambulance, they need a doctor, they need a family. I don't know if that's always the case'

Frustration was voiced by a service user who discussed the negative impact the lack of training had on hers and others experience:

'Would it not be a lot simpler if whenever people are accepted and they do all the procedures, whether they're not just taught how to use the blooming thing and taught not to be afraid of it and that they can't break it, and to learn what it can do and what it does do and what it doesn't do'

This participant felt *'discouraged'* from using the telecare service as she did not *'fully understand'* its use and purpose. The housing with care resident recalls, *'I was the very first person to move into this block and she said then, I'll come up and show you and she never did'*. Further communication difficulties were experienced when she requested the on-site carer to demonstrate the use of the technological equipment, 'I said (name of carer) just come in and show me this and she went through it but because she's deaf, it was very difficult to communicate…looking at the screen on the wall because she can't lip read and at the end, when she left I was no better off than before she came in'.

The impact of false alarms

Telecare service providers considered the impact of false alarms and the consequences of them on the service. False alarms were described to be occasions where the emergency call button was activated in error by the service user. When discussing false alarms at night time, one call responder said:

'sometimes service users may activate their alarm or whatever in their sleep or by accident when they get up to go to the loo or whatever which obviously makes it more difficult for us to be able to contact them to check they're okay and potentially raising alarms unnecessarily.'

When the call button is activated, telecare staff attempt to contact the service user directly via the wall mounted device. If successful contact is not established the call responder will then contact the designated next of kin to decide on further action, for example the next of kin attending the service user's property. When this occurs in response to a false activation of the alarm, participants viewed this as 'a waste of time' for all parties. Furthermore, when a service user does not have a designated next of kin, call responders 'would be calling emergency services to check on them and in some cases, this is a waste of service use'.

Conclusion

Discussion

Service user participants in this study viewed telecare positively however research suggests many older adults are reluctant to adopt this service and some do not use telecare are intended (Hamblin 2016, Yusif et al. 2016). The notion of telecare not being utilised as intended was reflected in the findings of this study with both service users and provider participants acknowledging telecare is used as a conduit for connectedness to address social isolation. Whilst telecare call responders recognise this is a potential misuse of resources, they feel a moral obligation to respond to these calls which inevitably impacts on case load management. Research on the impact of social isolation and telecare and development of services that incorporate social needs into telecare packages is needed to provide a holistic service that caters to the nuanced needs of the older adult population.

False alarms was an area of discussion with participants expressing the negative impact on the limited resources available and also the potential for non-adoption of telecare as service users fear disturbing call operators when inappropriate. The phenomenon of false calls has been studied since the infancy of telecare services which may indicate solutions to address this challenge have yet to be found (Taylor 2018). Existing literature recognises false alarms are a common occurrence which have cost and resource implications. In a study exploring telecare use conducted by Taylor et al. (2018) up to 80% of calls generated by pendant trigger, 87% for falls alarm and 73% for the property exit sensor were false alarms. Technical design has also been found to be a cause for false alarms, for example the sensitivity of falls detectors means they are easily triggered highlighting the design opportunity to improve services and reduce false alarms (Horton 2008).

The use of telecare by participants in this study appeared to create a sense of community amongst the housing with care residents as the technology acted as a conduit to form and maintain social connections. Whilst the intent of telecare is to provide support remotely, it is argued that successful telecare relies on the presence of social networks and face-to-face care (Taylor et al. 2018). Yeandle (2014) suggests telecare promotes social networking, community cohesion, and strengthens relationships of the service users who utilise the service in this way. Development of enabling service users to communicate via telecare may alleviate the pressure put onto call operators who have to respond to social calls even though this is out of the intended remit of the service.

Individual assessment of service users to implement a telecare service which meets the unique needs of the person was deemed to be paramount by participants in this study. Studies have suggested that careful assessment is required to match the right technological solution to the individual (Marshall 2000, Wey 2004 and Woolham 2005) but also that the complex nature of assessing the needs of the needs is often overlooked (Woolham et al. 2021). The many stakeholders involved in the provision of telecare, for example assessors, manufacturers or installers, may have conflicting aims and values for the service which could affect telecare assessment and review (Greenhalgh et al. 2012). Interestingly, there is an absence of standardised guidance of telecare assessment in published guidelines, for example NICE (2015) outlays the primary role of the healthcare practitioner is to discuss and demonstrate use of telecare services, and neglects to consider their potential role in the prescription of the service to meet individual need. Further development is needed in telecare solutions to move away from a technological ‘push’ to a demand ‘pull’ when providing the service.

Lack of education and training was identified as a barrier to telecare in this study. Multiple service-user participants reported a lack of information and training on the use of the service, which in some cases led to avoidance or misuse. It is suggested that a proper introduction, effective education and monitored guidance can enhance the acceptance of the telecare system (Lai and Huang 2019). Training needs also extend to carers and call operators with literature proposing an absence of comprehensive education to assist these workers to provide the service effectively. The UTOPIA project aimed to understand the perspectives of the role of telecare in supporting older adults, with one area of focus being telecare training (King’s College London 2022). Findings from this project highlighted that of the 100 participant telecare assessors, 45% received training from manufacturers with ‘on the job training’ and 37% from ‘peer-to-peer’ training. Only 4% of the participants received formal training through an educational establishment, with 3% leading to a formal qualification. The study concluded that sub-optimal outcomes of telecare may be attributed and influenced by inadequate staff training, and also the failure to consider it as a complex intervention (Fisk et al. 2020). Further research into staff education and training, and the impact of this on service use would be beneficial to guide future training programs for telecare and care staff.

Health inequalities are present in the developing technological landscape and research indicates digital technology can be perceived as a gauge of socio-economic status and enable better health outcomes for its users (McAuley 2014). With this comes questions of equity and the danger of widening the gap of health inequalities where some people are disadvantaged because of personal circumstance. Service user participants in this study voiced the negative implications of the cost of telecare and service provider participants expressing older adults are not able to access the technological services they require. There is potential for eHealth tools, such as telecare, to avoid the increasing trend of social health inequalities, however further investigation is needed with rigorous consideration of interventions (Latiulippe et al. 2017).

Strengths and limitations

The trustworthiness of qualitative research is often questioned by positivist researchers as naturalistic studies cannot be reviewed by the concepts of validity and reliability (Shenton 2004). This trustworthiness of this study will now be considered using Lincoln and Guba’s constructs, credibility, transferability, dependability, and confirmability.

Adoption of Braun and Clarkes six stage thematic analysis method, which has been utilised in other similar previous comparable research projects (name) goes some way to bolster the credibility of this study. The researcher developed an early understanding of the participating telecare organisational structure by meeting with the organisational management to gain an adequate understanding of the context and establish a relationship with the stakeholder. Whilst a purposive snowball sampling technique was used in the recruitment of participants, it has been said that random sampling methods provide the greatest assurance that those selected are representative of the larger group (Bouma and Atkinson 1995). In this respect, random sampling and site triangulation may have strengthened credibility. Semi-structured interviews and focus groups are said to harbour similar methodological restrictions, however using both methods help to triangulate data as their individual strengths compensates for their limitations (Brewer and Hunter 2006). The co-creative nature of this study which recruited service users and service providers offered a form of triangulation but could have been improved by involving other stakeholders, such as family carers and technology providers, to obtain a wider perspective of the telecare service at night time. A limited budget, time frame and researcher experience meant other credibility indicator methods were not implemented which should be a consideration of further studies of this nature.

As the findings of this study are representative of a small demographic group living in the same housing with care facility accessing the same telecare service, it is 'impossible to demonstrate the findings and conclusions are applicable to other situations and populations' (Shenton 2004). Transferability, however, should not be disregarded as although each case is unique, it is also an example of a wider population where inferences can be made (Stake 1994). It has been proposed that the reader of the research has the responsibility to make judgement if whether or not the findings can be transferred to their own particular setting (Bassey 2000), therefore the researcher of this study endeavoured to provide rich contextual information to enable the decision of transferability to be made. Future research should consider multi-site service user participants and telecare services which would broaden findings and offer a wider population to gauge transferability.

Using semi-structured interviews and focus groups as data collection methods goes some way to indicate dependability, however it has been said that investigator's observations are 'static' and 'frozen in the ethnographic present' (Florio- Ruane 1991). This study strove to report the research process and practices to enable the reader to develop an understanding of the methods and their effectiveness. Achievement of this is demonstrated by detailing the research design and implementation, presenting the operational detail of data gathering and reflectively appraising the project.

A reflexive diary was kept throughout the research process and the researcher met regularly with their supervisory team to address matters of objectivity. Critical discussions with peers helped to ensure as far possible that findings were a result of the experiences of the participants rather than the preferences and characteristics of the researcher. The researchers ontological and epistemological beliefs are outlined and discussed in Chapter 2 (Methodology).

Conclusion

This study set out to explore the lived experience of community dwelling older adults with social care needs and telecare call responders on night time technology services. A qualitative approach was adopted, using semi-structured interviews and focus groups, to enable the views of seven residents at a housing with care facility and telecare call responders to be explored and discussed. Co-creative methods were utilised to merge service provider and service user opinions with the aim to focus on possible service developments with input from both stakeholders. Four main themes were identified in the data following Braun and Clarkes six stage thematic analysis; 1) social isolation, 2) sense of community, 3) technology and individual needs and 4) technology not used as intended.

Reflection

Description

This study which explored the experiences and perspectives of community dwelling older adults and their telecare call responders consisted of semi-structured interviews with service users, an on-line focus group with telecare call responders and a focus group with telecare call responders and service users. Data collected was analysed using Braun and Clarkes' thematic analysis and produced 4 overarching themes; 1) social isolation, 2) sense of community, 3) technology and individual need and, 4) technology not used as intended.

Feelings

It was a positive and enjoyable experience completing the data collection for this study. Participants, particularly the service user participants, represented a diverse community and each contributed valuable narrative to be analysed. I felt inspired listening to their experiences and felt honoured to have the opportunity to speak and collaborate with them. This was also the point where I could see the potential impact of my research and how it's findings may contribute to the existing body of knowledge and go some way to inform and improve practice and services. It also stirred the OT aligned attitudes, values and beliefs within me and I believe these shaped the findings and outcome of the research.

Evaluation and analysis

After the experience of study 2 in this research and overcoming the challenges it posed, this study was well planned, organised and executed. Recruitment of participants was completed in a timely manner and interviews and online focus groups were arranged efficiently. Participants engaged well during data collection and offered valuable insights into the phenomenon. On reflection, thematic analysis went well which was likely due to the rich data that was collected and also being the second time I have used this analysis approach and I therefore had experience.

Conclusion

This study collected rich data which contributes to the findings of the overall research. Taking a collaborative approach with service users and providers has meant that findings are a collective representation of these two stakeholders and are ingrained in both of their experiences and *perspectives. Going forward, the findings and recommendations of the overall study represent intertwined opinions and therefore it is hoped that recommendations will be implementable.*

Chapter 6: Discussion and Conclusion

This research aimed to explore the experiences and perspectives of assisstive technology at night time for people with long-term conditions and their carers with the following objectives:

1. Explore existing evidence on the experience of people with long term conditions and their carers on the use of home assistive technology.
2. Investigate the perceptions of technology from community carers from a non-technology using organisation, and the experiences of telecare call responders using night-time technology in supporting older adults living in the community.
3. Examine the experiences and perspectives of community dwelling older adults health and social care needs who use night-time technology and their call responders.

To answer the research question, three qualitative studies were conducted with data analysis via thematic synthesis and analysis. The themes generated from the three studies will now be discussed in relation to exisiting evidence with a view to draw conclusions, examine the limitiations of the study and suggest areas for future research. Table 8 dispays the themes from the studies.

Table 8: *Themes from studies 1, 2 and 3*

Study	Themes
Study 1 Home technology- the experience of people with long term conditions and their carers; a qualitative evidence synthesis.	Safety and security are more important than privacy
	Education is essential for successful implementation
	Concern for the implications of technology on traditional healthcare roles and resources
	Successful implementation is paramount in effective disease management
Study 2 An exploration of the perceptions of technology from community carers from a non-technology using organisation, and the experiences of	Face-to-face vs. technological care services
	Fear of change and repercussions
	Going digital
	Is technology reliable?

telecare call responders using night-time technology in supporting older adults living in the community.	
Study 3 An exploration of the experiences and perspectives of community dwelling older adults with social care needs who use night-time technology and their call responders.	Social isolation Sense of community Technology and individual need Technology not used as intended

On analysis of the themes from the three studies, six discussion areas were identified to overarch these themes; 1) security and safety, 2) education, 3) face-to-face versus technological care, 4) change, 5) social isolation and, 6) individual assessment for telecare solutions. Table 9 outlays which theme relates to each area of discussion.

***Table 9:** Overarching themes of studies 1, 2 and 3*

Discussion area	Theme/study
Safety and security	Study 1: • Safety and security are more important than privacy Study 2: • Is technology reliable? Study 3: • Technology and individual need
Education	Study 1: • Education is essential for successful implementation • Successful implementation is paramount in effective disease management Study 2: • Fear of change and repercussions Study 3: • Technology and individual need • Technology not used as intended
Face-to-face versus technological care	Study 2: • Face-to-face versus technological care services • Is technology reliable?

	Study 3: • Technology and individual need
Change	Study 1: • Concern for the implications of technology on traditional healthcare roles and resources Study 2: • Fear of change and repercussions • Going digital
Social isolation	Study 2: • Face-to-face vs. technological care services Study 3: • Social isolation • Sense of community
Individual assessment for telecare solutions	Study 1: • Successful implementation is paramount in effective disease management Study 2: • Is technology reliable? Study 3: • Technology and individual need • Technology not used as intended

Interestingly, whilst this study set out to explore the values and perspectives of community dwelling older adults and their carers of assistive technology at night time and the interview and focus group schedule directly prompted discussion around this, 'night time' was not a direct theme reflected in the data which may indicate that it is not deemed an important or influential aspect in the experience of receiving or providing technological services. This may also be a reason why there is a dearth in knowledge in this specific area, inferring that when considering experiences there are more pertinent issues other than technology provision at night.

Safety and security

The notion that safety is more important than privacy was reflected in the study 1 systematised qualitative review. Participants in included studies viewed technology surveillance to be a positive attribute and cancelled out potential concern about the technology being an invasion of privacy. This finding is mirrored by a study conducted by Melander-Wilkman et al. (2008) who found that safety experienced from the use of a mobility monitoring device was more important than privacy. The fact that service users could be located by a positioning technology was not thought to be a threat to privacy and allowed older adults to take risks as they felt level of protection with the device.

Whilst safety may be considered more salient than privacy, home monitoring technologies do raise privacy concerns and it is argued that private and sensitive data needs to be adequately protected. Robust ethical practices need to be positioned to gain the trust of the service user which may aid uptake and compliance (Gerke et al. 2020). Privacy and perceived obtrusiveness have been identified as factors which impede and reduce compliance with assistive technology (Chung et al. 2016).

Privacy and confidentiality have been said to be central issues to telecare due to the risk of possible data breaches and unjustified paternalism (Magnussan and Hanson 2003). Considering the data available from monitoring devices, professionals in a study conducted by Percival and Hanson (2006) recognised the benefits and felt the data enabled a detailed picture to be formed of the service user, however there was recognition that this data needs to be subject to strict guidelines of confidentiality. Service user participants in this study felt that surveillance is a growing culture and whilst there is a certain acceptance of this trajectory, the surveillance can feel intrusive, and this phenomenon is echoed in other research (Magnussen and Hansen 2003, Brownsell and Bradley 2003).

Telecare technologies hold the potential to enable older adults to ‘age in place’ and enhance quality of life, reduce hospital admissions and avoid placement into residential settings (Botsis et al. 2008). Advanced age and the growing population of older adults is associated with a greater risk of injury and harm (Johannessen et al. 2018). The safety of older adults is a growing concern with WHO (2018) stating this community is at an increased risk of a magnitude of health conditions, falls and medication errors. Therefore, ensuring the safety of older adults is priority for health and social care providers.

The notion that telecare services foster a sense of security for older adults was reflected in all three studies in this research (finding chapters 3, 4, 5), and this is supported with existing knowledge. A study conducted by Johannessen et al. (2018) aimed to explore care providers perspectives in relation to telecare used by older adults. Participants within the study perceived the use of telecare protected older adults against injury and insecurity, in particular the use of mobile safety alarms and video conversations. An increased feeling of safety was found to be a notable rationale for telecare uptake in the elderly population (Melander-Wikman et al. 2008). Melkas (2010) suggested that the perceived safety provided by telecare had a positive impact on overall wellbeing.

Telecare service users perceive an increased sense of security and reassurance due to the improved access to the call centre (Fairbrother et al. 2013). It has been reported the remote monitoring, surveillance and support telecare offers is beneficial, particularly as daily 'in-person' visits are not feasible, particularly in remote or rural areas (Radhakrishnan et al. 2016). Telecare call responders in study 2 and 3 spoke of face-to-face visits being the 'gold standard' but acknowledged the impossibility of all service users receiving this mode of care due to lack of resources and the prioritisation and distribution of resources available.

In contrast to these findings, previous research has suggested that telecare holds challenges that could lead to possible harm to older adults. It has been acknowledged that whilst telecare monitoring can reduce the severity of harm, it cannot fully prevent accidents (Saeed et al. 2020), which was a theme of concern from community carer participants in study 2.

Education

Numerous studies have outlined that usability challenges can deter people from using telecare monitoring services (Kao et al. 2018, Garcia et al. 2018, Grzybowski et al. 2017). Furthermore, if telecare devices are not user friendly there may be negative consequences for service users and carers who experience difficulties when operating the equipment (Saeed et al. 2020). In this regard, telecare services and equipment should be designed with accessibility in mind to encourage successful uptake and continued use of the service. Successful implementation of telecare has been linked to increased chances of acceptance by service users (Milligan et al. 2011). Despite this, telecare service providers report a lack of training on the use of systems which resulted in a lack of understanding how the service can be used to achieve intended outcomes for the service user (Radhakrishnan et al. 2012). There is evidence to support the implementation of assistive technology training and education to increase compliance with and use of technology systems. Blazun et al. (2012) concluded that older adult's social inclusion increased after participation in an assistive technology training course which in turn yielded positive psychosocial benefits and strengthened mental health. This argument is supported by Arthanat et al (2016) who found a significant increase in Information Communication Technology activities and reported positive perspectives six months post a home-based training program. Despite the nuanced challenges of the aging population and their ability to engage in learning activities, research into training older adults suggest if appropriate structures and techniques are put in place, skill acquisition can be achieved (Kachar et al. (2010).

It has been proposed that competent use of telecare is an essential element in the provision of safe and ethical care (Nagel et al. 2013). Training and education are important in mitigating safety risks associated with telecare services (Sheikh et al. 2011) and should be standardised to align working practices to promote safe use of the service (Darkins 2012). There remains to be a lack of competency-based training despite previous research suggesting this is necessary for telecare users and providers (Lamb and Shea 2006).

It is thought that adapting a transdisciplinary approach to tackle the nuanced challenged assistive technology can present is advantageous in creating solutions that are innovative, impactful and transformative (Boger et al. 2016). Adopting the principles of a transdisciplinary approach as put forward by Boger et al. (2016) to education and the continued evaluation of assistive technology services may provide a framework for providers to promote innovation and service improvement. The four principles which will now be explored are 1) complexity and holism, 2) relationships, 3) communication and 4) transformation. Complexity and holism addresses the particular intricacies of assistive technology and suggests these should be considered in a transdisciplinary way to share a common understanding of problems and harness the particular skill sets of each discipline. Creating shared goals will ensure priorities of all team members are being collaboratively considered when developing and providing services. To form and maintain positive transdisciplinary relationships it is suggested that all stakeholders work to create trust and respect and challenge the status quo to promote forward thinking and transformation. Study 2 (chapter 3) and study 3 (chapter 4) in this research went some way to capture the experiences and perceptions of different stakeholders to form collaborative recommendations, and it is proposed that this approach is carried forward in regard to the training and education of service providers in the use and application of technological services. Transparent communication between disciplines is key and should be employed in the education and continued development of services to foster a unified approach and avoid misunderstanding. To maximise impact, education and training should be transformative to achieve a deep level of understanding to form and implement new ways of working. Utilising these principles in education may enable multidisciplinary teams to work harmoniously, raising awareness to increase knowledge thus improving the service provided to assistive technology users.

Face-to face versus technological care

Apprehension about technology replacing face-to-face care is present in existing literature (Lolich et al. 2022). Watson et al. (2020) explored the experiences of housing with care residents who received a mixture of telecare and a rapid response care service and reported service users felt safer and more confident in the knowledge that a human response was available alongside the technology. Benefits extended to family carers who experienced reduced pressure as they no longer felt ‘on call’ 24/7. Finally, this study also found a reduction in ambulance requests due to falls as a result of the rapid response team. Overall, a combined telecare and rapid response team enabled older adults to remain independent in their own homes for longer and reduced pressure on family carers and other services.

A combined telecare and traditional home care service approach was advocated by Karlsen et al. (2018) who suggested telecare improved and enhanced the care received. Telecare in addition to a social care package was said to promote feelings of safety and security, and participants reported increased independence because of the functionality telecare offers. Cund (2018) states that telecare complements face-to-face care and can contribute to saving time and resources, however, recognises the technological needs of the elderly population are challenging.

The view that telecare is optimal when used in conjunction with face-to-face care is supported by existing literature. Percival and Hanson (2006) reported strong views from service user participants that telecare should be provided alongside a care package to accommodate older adult's need for social interaction and in recognition to the importance of human support. Replacing human contact with a technological solution may reduce a person's connectedness to the wider community. The research proposes that interaction with a carer is beneficial as it allows the carer to closely monitor and observe the service user directly, and also act as a conduit to the local community which could foster feelings of social connectedness for the housebound person (Percival and Hanson 2006).

A systematic review of the literature investigating videoconferencing interventions for people with long-term conditions concluded that videoconferencing is a feasible option to deliver treatment to this population (Steel et al. 2011). Interestingly, there was disparity between clinical staff and patients in regards to perceived satisfaction, with patients demonstrating high levels of satisfaction with the belief that building a good therapeutic rapport is possible and clinicians showing lower levels of satisfaction (Steel et al. 2011). This is an area which necessitates further exploration to establish the nuances around this concept.

Change

Study 2 highlighted the reluctance of the community carer participants in adopting telecare service due to the fear of its impact on their traditional roles and the perceived potential risks and harm. Acceptance and motivation of staff have been identified as imperative for the successful implementation of telecare (Kruse et al. 2018). Community carers are well placed to support community dwelling older adults in using telecare (Cund 2021), however literature suggests varying acceptance from carers (Brewster et al. 2014, Taylor et al. 2015).

Concern over the risks related to the use of telecare is a theme reflected in existing literature and is an existing area of research (Guise et al. 2014). Whilst telecare has the potential to improve and transform traditional health and social care delivery (Bates and Gawande 2014), it may also pose potential safety risks (Sheikh et al. 2011), which may undermine adoption into mainstream health and social care. Unsafe care provision and worry about providing remote care from a distance are common concerns raised by health and social care providers, alongside fear of poor service user outcomes (Mair et al. 2007). Research into the safety of telecare is inconclusive (Black et al. 2011), and the extent and consequence of risks are not fully known (Balka et al. 2007). A systematic review conducted by Guise et al. (2014) identified a particular dearth of knowledge regarding telecare and service user safety. From this review, evidence suggests education and training, awareness and preparedness are essential to establish safe and effective use of telecare technology. This lack of investigation into the safety and potential risk of telecare is echoed by Stokke et al. (2021) who suggest research into telecare is dominated by effectiveness studies to support policy makers and service providers in the increasing suggestion that telecare is a cost-effective solution for care in the community. Findings from this research argue one way to foster service user safety is to align people and the technology and not view telecare as a standalone solution that is used in isolation. The intricate and interactive relationship between the service user and the carers that use it can enhance safety if attention is paid to the relationship, making adjustments as necessary (Stokke et al. 2021).

Non-technology using community carer participants in study 2 voiced concern about the implications of the introduction of telecare services, particularly the impact on workload. Whilst expressing a potential benefit of saving time, concern was raised in terms of impact on current role. Roberts et al. (2012) evaluated a telehealth programme for long term conditions. The mixed-method study (questionnaire and interviews) included patients, carers and 10 healthcare staff, and identified changes to workload to be a risk of using the home-based technology to monitor COPD and hypertension patients. A larger study investigating perceptions of safety, security and privacy of telecare services conducted a survey with 127 different stakeholders (Brewer et al. 2010). Changes in the nature of clinical work were identified as a source of potential risk to service user safety. Whilst these studies are not directly comparable, the concern highlighted in study 2 are reflected in reality with this evidence.

Health and social care budgets are finite and therefore investment needs to be made into services where incremental costs are matched with the desired incremental benefits. There is yet to be conclusive evidence that telecare services are cost effective. Mistry (2012) conducted a systematic review of 80 empirical studies focussing on the cost effectiveness of telecare and concluded that there is no further evidence to suggest that telecare is more cost effective compared to conventional healthcare. The policy report based on the Diversity in Care Environments (DICE) study conducted by the University of Bristol recommends investment into providing adequate digital infrastructure to enable housing with care residents to form and maintain virtual social relationships (Willis et al. 2022).

Telecare is increasingly being utilised in the current landscape of health and social care, however there is an absence of definitive evidence in relation to associated health outcomes (Humphries 2018). Al-Obaidi et al. (2022) recruited 2387 participants in an exploratory retrospective cohort study to evaluate hospital-based service pre and post installation of telecare in Northern Ireland. Results of the study found that whilst telecare had the likely benefit of providing peace of mind, hospital-based significantly increased after the provision of the service. Reasoning for this may be the nature of maturation and the results may reflect the increasing needs of the elderly population. Conversely to this, a study completed in England in 2021 reported that there was a decrease in falls related ambulance requests as a consequence of the installation of telecare (Watson et al. 2021) which led to a reduction in the use of services. A further study which presented positive findings after the provision of telecare on discharge was completed by Beale et al. (2010) in Scotland. The analysis of 7902 participants showed more than 500 delayed discharges were avoided, saving 5000 occupied bed days, and an estimated 1200 emergency admissions were avoided, saving 13000 occupied bed days (Beale et al. 2010). Inconsistencies in the evidence base may impact on policy makers and also health and social care professionals' decision about where, how and if to implement telecare within services. Further and continued research is necessary to provide evidence to support these decisions.

Social isolation

Participants in study 2 and 3 discussed the experience of social isolation and loneliness in the community, particularly at night time, and the impact this has on the use of telecare services. It was felt that the seclusion experienced by older adults living alone at night led to increased telecare service use in order to alleviate the isolation. Telecare call responders expressed that although they processed and dealt with calls due to this nature, it was outside of the intended remit of their service and therefore an inappropriate use of resources. Loneliness has been described as a growing health epidemic and interestingly, despite living in the most technologically advanced and connected age in history, the rates of loneliness has doubled since the 1980's (Higuchi 2018). The Office for National Statistics (ONS) state that 5% of adults felt lonely 'often' or 'always', and 67% of people living with a disability have experienced loneliness (2017). A dearth of health and social care providers alongside a lack of adequate care and medical provision can lead to loneliness among the older adult population (Broekens et a. 2009), and it is proposed that telecare solutions could benefit the service user and provider (Heide et al. 2012). Improvement in levels of loneliness was reported by Arnaert and Deleise (2007) who studied the use of video communication to connect the elderly to a network of relationships where they felt valued and accepted.

These findings are important as studies show social isolation and loneliness are associated with cognitive dysfunction (Shankar et al. 2011), mortality (Holt-Lunstad et al. 2011), sleep disruption and decreased daytime function (Hawkley et al. 2010), reduced physical function (Hawkley et al. 2010) and mental health issues (Wilson et al. 2007). Current evidence regarding the effectiveness of technology, including telecare, on alleviating isolation is varied. A systematic review exploring the impact of technology on isolation with elderly people concluded that various technologies, including telecare, offer possibility and ways of engaging older adults to have a positive effect on loneliness but suggested further research is required to develop this argument (Khosravi et al. 2016). Research into the impact of telehealth on loneliness conducted by Farrell (2020) found that depression and loneliness was reduced, as measured by the UCLA loneliness scale, after 60 days of receiving weekly video calls to address this issue. Whilst this small-scale study advocates the potential psychological benefits of communicative technology in reducing loneliness and depression, it concludes with demand for further research to substantiate this claim. Contrary to the positive outcomes some studies have suggested, there is a school of thought which argues telecare can be an agent to amplify the isolation felt by older adults (Lynch et al. 2018). Eccles (2010) considers the ethical implications of telecare technologies and debates that if there is a risk of increased social isolation due to the remote nature of telecare, it is often offset by the desire of the individual to remain in their own home. A recent systematic review conducted by Shah et al. (2020) concluded that there is insufficient evidence to conclude that digital technology interventions are effective in reducing loneliness in older adults.

Telecare user participants in study 3 felt that telecare reduced feelings of isolation during the COVID-19 pandemic lockdown as it enabled relationships and connections to be maintained virtually during a period that required the community to stay apart. Findings from an RCT conducted by Wong et al (2023) investigated the effects of telecare during the COVID-19 pandemic. The study focussed on self-efficacy, and whilst no statistical significance was found in relation to positive impact on self-efficacy, it was suggested telecare may increase quality of life and medication adherence for homebound older adults.

Older adults who face isolation due to ageing are less likely to adapt to the social decline compared to younger adults (Czaja et al. 2006). It was proposed by Heinz et al. (2010) that the rise of the internet has improved social, physical, mental and psychological wellbeing of the elderly. Older adults who experience decreased socialisation due to physical function limitations can take advantage of the internet and smart devices to eliminate this problem by connecting remotely online (Orpwood et al. 2010).

Khosravi et al. (2016) completed a systematic review on the impact of technology on older adults' social isolation. The study concluded the introduction of information technology into health and social care has made a significant impact on individuals' lives, with telecare being the most effective category of IT methods in alleviating loneliness in older adults. Implications from the systematic review suggest that health care practitioners and telecare prescribers should promote the use of the service with the focus of it's potential to decrease loneliness.

CareTV is a form of telecare and a technological solution allowing users to connect with their carers and family via the internet. Empirical research conducted by van der Heid et al. (2012) concluded feelings of loneliness significantly decreased after the use of CareTV for one year and proposed that as 30-40% of the elderly population experience loneliness, CareTV may be an appropriate solution.

There was a strong view from telecare call responders in study 2 and 3 that telecare service users activate calls for social interaction purposes, whether this is directly intentional or not. The need for social interaction via telecare was recognised in a study by Percival and Hanson (2006) who attributed this to the rationing of homecare services and a diminishing availability of informal carers. Participants in their study engineered human response through telecare to replace interactions that were otherwise missing in their lives. As with telecare call responders in this research, managers in the Percival and Hanson study voiced frustration about the inability to respond effectively to these social calls due to resources limitations and the intended service provision boundaries of emergency responses. It is proposed that telecare service for use of emotional support is a legitimate reason to activate a response and should be factored into service structures so there are appropriate staff levels to accommodate this need.

Individual assessment for telecare solutions

Findings from a study conducted by Woolham et al. (2021) suggest that individual assessment for the prescription of telecare is paramount for the successful adoption of the service. The study found that 'sub-optimal' staff training and a negligence to regard telecare as a complex intervention impacted on the adoption and usage of the service. It is proposed that telecare prescribers need enhanced training and should veer away from the view that the technology is a 'plug and play' solution. This is supported by Buckle (2015) who identified that potential failure of telecare uptake may be due to inadequate assessment of individual needs.

It is recognised in the literature that telecare is perceived to be appropriate for some, but not all individuals, with medical and social circumstances being an indicator of suitability (Hardisty et al. 2011). Assessing service users against criteria to identify individual need and therefore enabling the service to be tailored would allow maximisation of benefits to achieve intended outcomes (Radhakrishnan et al. 2013). It has been suggested the implementation of telecare without a clear aim or relevance to a service user's specific situation adversely impacts the suitability of the telecare program (Radhakrishnan et al. 2016).

Telecare devices must be designed with service users in mind and tailored to suit the needs of the older adult population, with particular attention to cognitive and sensory skills and computer literacy (Kaufman et al. 2006). Skymne et al. (2012) conducted research into the experiences of frail elderly people when using assistive technology and implicated that elderly telecare users need support in the process of becoming an assistive technology user. They first suggest that it is imperative that older adults are directly involved in the process of telecare prescription, mainly by collaboration in the assessment and identification of individual contexts to tailor the service to their needs. Secondly, training of devices and education on the integration of the service into their everyday life should be timely and monitored to address any change in individual need.

Constraints, challenges and potential

Digital transformation in health and social care services goes beyond transition with the actions required being viewed as a radical change (Kruszynska- Fischbach et al. 2022). The concept of readiness for the integration of technology is considered in the literature with possible solutions to overcome possible readiness barriers. A systematic review conducted by Kruszynska- Fischbachet al. (2022) discussed how the openness to technology solutions was greater when identified problems were recognised as significant and the care givers expressed dissatisfaction which acted as a catalyst to create change. Technology was more readily accepted when there was dissatisfaction with existing manual services leading to a willingness change (Kgasi et al. 2014), and it is recommended that digital innovation must be ingrained with an organisations strategic vision (Lennon et al. 2017). Engagement of stakeholders is imperative to enable a voice to express concerns, hopes and fears (Coleman et al. 2013) which can then feed forward into potential resolutions which in turn will foster digital readiness (Rezai-Rad and Nattagh 2012). Engagement readiness is impacted by strong leadership and organisational 'buy in', and it is believed that the absence of innovative management negatively impacts implementation attempts (Lennon et al. 2017). The notion of co-design is emphasised to create technological solutions to address consumer preferences which may promote societal readiness and user uptake (Kruszynska- Fischbach et al. 2022). Lastly, policy readiness at both institutional and government level is required to guide on procedures, risks and liability promoting a safe and policy informed technology service (Lennon et al. 2017, Rezai-Rad and Nattagh 2012, Jennett et al. 2003).

Whist the benefits of technology have been acknowledged through research, there are barriers to its use, particularly nuanced challenges faced by the elderly population. A study completed by Ikram et al. (2020) found service users can lack internet access or appropriate devices to engage in telehealth communications. This research explored 3 organisations experience of providing telehealth during the pandemic, from the 3 providers 40% of the first service population did not own a smart phone or tablet, 30% of the second did not have adequate access to the internet and 60-70% of the third did not have internet access which was believed to be due to its users being the most vulnerable and elderly users. In response to this, tablets were distributed for those who did not possess one and also gave initial in-person support to educate on its use. Another challenge identified in this study was the impact of dysfunction on the use of telehealth, for example hearing/visual or cognitive impairment. In response to this, non-formal family carers were encouraged to help facilitate the virtual communication by either being present with the service users or joining the video call remotely to provide support. Digital literacy was considered to be a barrier, with one of the providers stating that 50% of their population did not know how to use their devices for video calls, so whilst they were capable, they were not competent. In this instance service users were supported by training and practice sessions to educate them on effective use to enable participation in the service. Ikram et al. (2020) concludes that whilst there are challenges, the elderly population do benefit from telehealth due to their increased access to services. Barriers to telehealth were also explored by Kalicki et al. (2021) who reported 40% of a telehealth providers population had not attended a virtual appointment 4 months after the start of the pandemic when the service was set up with a lack of carer support and cognitive or sensory dysfunction being identified as potential reasons. A novel recommendation from the study was the deployment of community health workers to provide support on setting up and using devices for telehealth services.

The overutilisation or misuse of telecare is a potential costly challenge where the use of technology may trigger the use of in-person services which would otherwise would not have been identified (Mahtta et al. 2021). In a study completed by Ashwood et al. (2017), the analysis of 300,000 patients using telehealth discovered 90% of telehealth contacts constituted additional visits rather than replace in-person contacts. To avoid the overuse of services it is recommended that policies and user protocols are utilised to avert unnecessary expenditure.

Socioeconomic and racial disparities are health inequalities which impact and influence the provision and use of technology services. The risk of affluent urban communities with access to the latest technology overutilising services is balanced by the certain underserved rural populations who experience disparity with access to these services (Mahtta et al. 2021). Those with limited digital literacy and minority cultural groups experience similar barriers whereby the use of telehealth widened the gap in healthcare access (Julien et al. 2020).

The £37million program Delivering Assisted Living Lifestyles at Scale (DALLAS) was implemented in the UK between 2012-2015 and delivered a wide range of digital health products aimed to promote independent living at scale. Analysis of this program suggests the lack of information technology infrastructure, information governance challenges, lack of precedence for accountability and the perception of a difficult landscape to navigate are all hindering factors that need to be overcome by further investment, upskilling providers and implementing guidelines to normalise digital health (Lennon et al. 2017).

When exploring the critical issue of the rise in technology, specifically telemedicine, since the COVID pandemic, it is concluded by Garattini et al (2020) that as telemedicine is likely to improve care services, widespread integration is now reliant on the strategic implementation by organisations and adequate funding rather than further research into this area.

Health, health inequalities and the global context

Sustainable development is paramount in the context of health and social care to address the needs of diverse populations and communities. Limited employment opportunities and restricted access to communities are challenges faced by people with disabilities which effect their ability to access services (Clear 2000). It is also noted that people with the same level of impairment have different experiences of participation depending on their own individual context (Steel 2022). Lack of access to assistive technology is a barrier identified as a contributor to poverty alongside discrimination and lack of accessibility (United Nations 2018). It is possible that assistive technology may aid individuals to participate when environmental demands are misaligned with individual capabilities (Steel 2022). With that being said, the prescription of assistive technology does not ensure improved wellbeing and it is not a case of increasing the provision of products and services (WHO 2022), rather the aim is to foster enabling environments to live long, healthy and creative lives (Steel 2022). In this regard, assistive technology addresses the negative symptoms of living with a disability rather than addressing the origin of dysfunction. People with disabilities seek to be treated as equals and have the same opportunities as others by removing challenges at a societal level rather the provision of additional services (National People with Disabilities and Carers Council 2009). In a recent international policy analysis, it was reported that a shift to a ‘rights-based’ approach as opposed to provision of ‘special treatment’ is proving difficult (Gupta et al. 2022), with the danger that progression is measured in terms of growth of products and not capabilities (Steel 2022). This paradigm needs to be challenged to bring about meaningful change that enables the individual to access services and communities in a way that has parity with others.

With the inevitable progress of digitalisation, existing inequalities have the potential to grow as it is reported that access to technology differs between age, sex, socioeconomic status, education experience, location and disability (Scheerder et al. 2017). Recent uptake and development of digital services during the covid-19 pandemic has shown technology is beneficial in reaching populations that are difficult to reach and this may be extended to capture further groups who are currently underserved due to inequalities (Sanders 2020). Wearable digital technology to monitor health status is readily available to the general public, however certain populations lack accessibility to this due its cost, meaning some people are disadvantaged because of health determinants (Sultan 2015). A paradigm shift is needed to move away from health consumerism as a measure of technological success, and to design ways in which technology is available and accessible to all (Cohen et al. 2020).

The National Disability Strategy- UK (2021) sets out a governmental approach that aims to empower people living with a disability to receive equity and fairness, mitigating creating excluding services by considering disability from the start, allow people with a disability to be involved in the development of services and enable joined up networking across services to understand complex issues. This framework should be considered when planning and implementing digital services to address the potential disadvantages of people living with a disability. Sustainable and strong principles are required to facilitate the transformational process and bring about effective and successful change (van Kessel et al. 2022).

Digital exclusion can be exacerbated by digital health technologies (Yao et al. 2022), which in turn impacts on health outcomes (Sherman 2019). Policy makers are required to explore how socioeconomic factors affect engagement with digital technologies and create ways to overcome these barriers to enable the technologies to reach their full potential (Banerjee 2021).

Despite the benefits assistive technology, including the social and economic return on investment, many do not have access with low and middle-income countries being the most disadvantaged (WHO-UNICEF 2022). The global report on assistive technology presents 10 recommendations to support countries to improve access and work towards universal coverage for sustainable assistive technology. The report calls for countries to improve access for all without any financial hardship and ensure products are affordable and effective. It recognises the importance of workforce knowledge and skills and suggests investments into capacity building and allied health professionals. Users of assistive technology should be actively encouraged to be involved with the development and provision of technology and all stakeholders should endeavour to reduce stigma to achieve a more universal design to facilitate inclusion. All countries are encouraged to invest in evidence-based policies to promote data-informed quality services that can be shared across locations. Finally, the report calls for international networking and collaboration to reduce inequalities and enable universal access to assistive technology for all. This report also supports the sustainable development goals proposed by the UN which aim to reduce inequalities among countries and build infrastructures that foster inclusion by 2030 (United Nations 2016).

It is recognised that there is potential to transform health and social care to be preventative, transformative, and personalised in the UK through the successful application of digital technologies, however current systems- have been described to be far behind where they need to be (Gov.UK 2018). Innovative ways are needed to support the 3 million NHS and social care staff to collaboratively work to provide safe, ethical, and effective technology services (NHS Digital 2018). User need, privacy and security, interoperability and openness and inclusion are guiding principles to transform the health system and healthtech technologies to develop alongside the rapid technological advancements (Gov.UK 2018). From a health perspective, it is envisioned that a person with a long term condition could manage their own health and wellbeing through the use of apps and access to health data, health and social care employees will have access to digital tools that will enable them to fulfil their role and provide joined up care, and developers will have access to evidence-based data to respond to technology advances (for example artificial intelligence (AI), cloud and network technologies) (Gov. UK 2018).

Contribution to practice and new knowledge

The co-creative nature of this research endeavoured to produce findings that could be easily interpreted and applied in clinical practice. Combining knowledge generated from the three studies and the researcher’s experience and knowledge, three recommendations are made to inform existing and potential telecare services.

1. Education and training for service users and service providers

Evidence suggests that successful education and training programs for both service users and care providers have a positive impact on telecare uptake and effective use of the service. Despite this, current training for telecare is inconsistent, non-standardised and found by some to be sub-standard. Recognition that telecare is a complex intervention and treated as such may promote its potential significance in supporting older adults in the community. An in-depth training program would go some way to ensure service users and providers alike are consistent in the use and application of telecare. Evidence also suggests the continued monitoring of telecare so services can be modified and adapted if care requirements change.

2. Individual assessment

There is recognition in the literature that the elderly population have nuanced needs which demand different levels of support and services. Whilst this is widely recognised, the approach to telecare provision remains to be of a ‘blanket’ approach which presents missed opportunities to provide individualised care to service users. Individual assessment and tailoring of the service at the point of telecare prescription may help to provide a bespoke plan to better support the individual. Initial assessment by a healthcare professional, such as an occupational therapist or social worker, may also enhance the quality of assessment as they can use profession specific skills and knowledge to identify needs and make recommendations.

3. Consideration of social needs and building communities

Findings from this research and other existing evidence suggests that social isolation is an increasing issue facing the older population and may be linked to an increased reliance on telecare services. Telecare call responders voice they are regularly faced with the ethical dilemma of dealing with these social calls which detract from the intended purpose of the service of providing a response in emergency situations, which is particularly problematic given the finite resources available. Empirical research into social isolation proposes that telecare may be a solution, however there is incongruence between this recommendation and the reality of telecare remit. Development is required to identify service users who may experience social isolation and consider this in individualised care plans as discussed in point 2. Directing service users who are vulnerable to social isolation to appropriate existing services to address this need may have a positive impact on the misuse of telecare. Findings from study 3 are interesting in that the housing with care participants used the telecare devises to connect with each other, building communities and maintaining social connections. There is potential to utilise these findings and research further into the possibility of older adults forming communities through technology to combat social isolation.

This research adds to the field by further supporting existing knowledge around the use of technology and also contributing to literature to align thinking with proposed plans for a sustainable and equitable provision of assistive technologies currently on the global agenda. The experiences and perceptions expressed by technology users, providers and carers in this research suggest that technology may be a useful vehicle to bolster traditional health and social care provision and boasts potential to improve self-health management and also help form and strengthen social communities which may contribute to healthier lives and enable people to age in place. The positive experiences and perspectives are however counterbalanced by the challenges presented by the logistical and pragmatic obstacles of providing effective services at a large scale which meets the intricate and nuanced needs of the individual. In this regard, the continued study in this arena is essential to construct knowledge that will contribute to understanding in a responsive way that matches the changing landscape to inform future provision in an evidence-based way.

Limitations

The researcher experienced and overcame many challenges that shaped the course of this research. This PhD project was initially part industry funded by a private healthcare company and the research proposal was created collaboratively and guided by specific aims the company wanted to explore. After an initial successful working relationship during the first year of study, progress was halted as the gatekeeper to the company left and was replaced by a chief nurse with limited knowledge and experience of research and this particular study. Effective communication and networking declined impacting on the progression of the research. Data collection was incomplete in 2020 when the healthcare company went into administration and were no longer to participate or support the study. The researcher had to create and build new networks with another organisation, the telecare provider who provided access to participants for study 2 and 3, and re-design the research methods to ensure the research aims were congruent with the new organisation. An extremely successful working relationship was created with the telecare provider which enabled completion of this research.

The impact of the covid-19 pandemic also held huge implications for this research. Priorities of the organisations involved changed as they had to prioritise patient and service user care, and research became secondary which had an impact on the research process. Planned methods of data collection had to be revised to accommodate national lockdown requirements, meaning all interviews and focus groups had to change from the traditional face-to-face to online virtual methods. Whilst the evidence for on-line interviews and focus group suggests that this mode of data collection is as effective as face-to-face data collection, as discussed in the methodology chapter, on reflection the researcher felt that face-to-face would have enabled greater rapport to be established with participants and allowed observation in their own environment.

Credibility of studies 2 and 3 of this research could have been bolstered by member checking. Feeding back data, interpretations and conclusions made to participants along with themes generated would strengthen the data as participant’s view may vary from the researchers. Member checking was not conducted due to time restraints and limited access to participants. Whilst methodological triangulation was somewhat achieved by using multiple methods of data collection and investigator triangulation was attained by the researcher involving their supervisory team in coding, analysis and interpretation decisions, data triangulation would have gone further to enhance the credibility of this research. Data triangulation could be achieved by collecting data across more than the one housing with care facility that was used, gathering data from other stakeholders such as service user family members, involving the views of care staff at the housing with care facility and other health care professionals that prescribe telecare in the community. Prolonged engagement with participants and access to their environment was restricted due to covid-19 regulations meaning persistent observation of the phenomenon was not feasible.

The sample of participants within study 2 and 3 was relatively small and whilst appropriate for qualitative research, a greater number of participants would have enhanced transferability of findings. To mitigate the risks of a relatively low number of participants, the researcher endeavoured to provide a thick description of data to allow the reader to make judgement of transferability to their own context.

On reflection and reflexive analysis, a third focus group in study 2 which involved both participants representative of the community carer and telecare call responder population would have gone further to achieve the desired co-creative approach. A final focus group combining the views of both services, discussing the outcomes of the previous individual focus groups, would have added to the research by enabling collaborative thinking from an organisation who currently do not use telecare technology and another that does.

Future research

There are exciting opportunities to grow the existing knowledge and understanding that surrounds assistive technology and community dwelling older adults. The field of research needs to be responsive to the rapidly growing technology advancements with the aim to provide the most recent and relevant evidence-based recommendations. Technology and its use in health and social care spans vast concepts which can make the study of it difficult to refine and produce a universal solution to its effective prescription and service delivery. The many technology products and their uses coupled with the unique and dynamic nature of its users and health inequalities make the area a minefield of variables which can challenge its application. This research has contributed to the existing body of knowledge and has highlighted areas for future research which will now be explored.

1) Future research; a local perspective

Study 2 and 3 in this research had a very narrow view of 2 health and social care organisations and whilst produced compelling results and recommendations, the transferability of it needs to be judged by the reader and their particular context. Research involving multiple organisational bodies would expand the reach of study and capture the perspectives and experiences of a wider population. The concept of technology use and its impact on society and forming communities emerged from that data collected in this study and shone light on a maybe unintended benefit in the use of technology, particularly telecare. Future research into this area may develop this concept and be able to consider this as a reason for the provision of such services rather than just for the health and monitoring purposes it is currently typically used for.

Whilst health inequalities were an important consideration in the discussion of this research it was not a particular concept that was woven into its methodology or particular focus of the phenomena. The service user participants in study 3 were residents in a housing with care facility who had access to telecare services for which they paid for privately or were socially funded, suggesting they did not face discriminating factors which could impact on access to technology services. Research into the seldom heard voices of those who are recipients of the negative impact of health inequalities may go some way to bridge the gap between disadvantage and provision of the services from which they may benefit. Similarly, as this study only included people with mental capacity, it did not include the population of technology users who lack capacity to explore their experiences and perspectives. Future research with this population as a focus would contribute to their nuanced challenges and experiences.

2) Future research; a global perspective

With assistive technology being on the agenda for global development and sustainability, future research is imperative to achieve the goal of reducing health inequalities and improve access at a global level. Exploring the impact of covid and its impact on technology use is required to learn lessons and identify areas of good practice to take forward and develop in a post-covid world. The aim of equitable access to technology necessitates further research into health inequalities and how they impact on the receipt of required services. Good practices should be explored at an international level with a shared vision to network and continuously develop in the ever-changing contextual landscape. The equality, diversity and inclusivity of global technology provision should be investigated alongside sustainability to foster a global technological community.

3) Future research; OT perspective

OTs are uniquely positioned in the development and provision of technology services with great potential to contribute to its accessibility, acceptance and also theory to support its application. The theme of education and training for those involved with the prescription of services was identified in this research and also reflected in other literature. To move beyond this as a mere recognition of something that needs to happen, research into what training and education currently exists, OTs experience of this and its place in practice and at a pre-registration level would be beneficial to make sure technology services are at the forefront of professional thinking and services. It is important for this to happen to ensure the profession of OT to develop in-line with national and global policies.

OTs work closely with communities and the use of technology to form and maintain communities was a finding from this research. Further exploration into this area may provide evidence to support the possible implementation of technology to community specific work and foster communities to grow with the aid of assistive technology.

Whilst this research initially endeavoured to explore technology from a night time perspective, this was not a theme that emerged from the included data. The phenomena of technology and its use at night time is an area still worth investigating if maybe tackled from a different perspective. OTs could look specifically from an occupations viewpoint to potentially analyse the specific night time occupations and how technology might support these.

Conclusion

To conclude, this research is novel as it adds to the knowledge base about technology use for older adults living in the community and goes some way to build on the particular dearth of research into this area. The research aim of exploring the experiences and perspectives of assisstive technology at night time for older adults and their carers was achieved through the completion of three individual studies which considered exisitng evidence through a qualitative systemtatic review, and empirical research with service users, community carers and telecare call responders. Thematic synthesis and anaylsis was used throughout this research and produced themes reflected in the data.

Themes from study 1 include; 1) Safety and security are more important than privacy, 2) Education is essential for successful implementation, 3) Concern for the implications of technology on traditional healthcare roles and resources and, 4) Successful implementation is paramount in effective disease management.

Themes generated from study 2 are 1) Face-to-face vs. technological care services, 2) Fear of change and repercussions, 3) Going digital and, 4) Is technology reliable?

Themes from study 3 are 1) Social isolation, 2) Sense of community, 3) Technology and individual need and 4) Technology not used as intended.

Broad themes identified across the three studies were discussed in relation to existing evidence in chapter 6. Themes included safety and security, education, face-to-face versus technological care, change, social isolation and individual assessment.

Exploration and analysis of the experiences of service users, community carers and telecare call responders produced findings which enabled the creation of three evidence informed recommendations that can be applied in clinical practice, 1) education and training for service users and service providers, 2) individual assessment and 3) consideration of social needs and building communities.

Chapter 7: A reflexive account of the research

This chapter will explore how the subjectivity involved with qualitative research has shaped the enquiry and its findings. It has been proposed that researcher bias is inextricably intertwined with this research process due to the complexity of making sense of the complex messiness of personal experience to generate data which will inform findings (Olmos-Vega et al. 2023). This reflexive account will follow the framework put forward by Olmos-Vega et al. (2018) and will encompass this research in its entirety. Areas of reflexive consideration include 1) case summary, 2) personal reflexivity, 3) interpersonal reflexivity, 4) methodological reflexivity and, 5) contextual reflexivity.

1) Case summary

This study was completed as post-graduate research by a sole researcher at Coventry University. The research looked to explore the experiences and perceptions of night time assistive technology from community-dwelling older adults and their carers. The study adopted a qualitative approach under a critical realist paradigm, using thematic synthesis and analysis. The researcher was supported by a supervisory team which did change during the course of the research, however the majority of the time the Director of Studies was a Professor in dietetics, and an occupational therapist also provided support and supervision. The researcher is an occupational therapist with 12 years clinical experience in acute physical health.

The research was conducted between 2017 and 2023 and was largely influenced by the impact of the Covid-19 pandemic and also the initial industry funder going into administration and withdrawing support (for a detailed account and timeline of events, see the reflective narrative account and timeline in the introductory chapter).

To answer the research question of 'what are the experiences and perspectives of assistive technology at night time for community-dwelling older adults and their carers, three separate studies were conducted (see chapter 3, 4 and 5). Data collection was conducted via a qualitative evidence systematic review, semi-structured interviews and focus groups.

2) Personal reflexivity

The researcher is a qualified occupational therapy and considers herself aligned with the core principles, values and behaviours from the profession. Whilst the researcher had some exposure to assistive technology within previous clinical roles, it was not something they were competent in or held a vast amount of knowledge about. The extent of involvement when working with service users was to provide a leaflet signposting them to social service departments to investigate technological options, no specific advice was given and the responsibility was passed to the service user to organise any technology. In truth, assistive technology at that point was not something that sparked particular interest in the researcher, meaning that when this research commenced a significant amount of time was required to orientate and understand the technological landscape. This novice starting point may have influenced the line of enquiry and results of this research.

The researcher also felt the restraints of this research being part-industry funded. The private health care company had specific aims for the outcome of the research and there was limited opportunity for the researcher to be creative in approach as they would have been if they were not bound by the particular constraints. On reflection, it is felt that once the private company withdrew support the researcher had greater freedom to direct the research and they believe this is reflected in the data analysis and findings. The findings and discussions around technology and social isolation, education and training and individual assessment were aligned with the researcher's occupational therapy perspective and individual way of thinking, but may not have been of relevance to the agenda of the private company.

As an occupational therapist, the researcher believes themself to possess effective therapeutic communication and interaction skills which had a positive impact on data collection from study participants. On reflection, the interactions between the researcher and participants were positive and the skills employed by the researcher enabled in-depth and rich exploration of the phenomenon. The researcher is very experienced in communicating with older-adults and members of the multi-disciplinary team and was able to adapt communication style to maximise participant interactions. Whilst the researcher had experience of working with the participant demographic, they also attended to formed assumptions that may have existed by trying to work from a 'blank slate' and being as objective as possible during data collection and analysis which was done by reflexive journaling and discussions with the supervisory team. The participants also had a personal impact on the researcher, hearing about their life stories and experiences was a privilege and undoubtably has further shaped existing assumptions which the research will carry forward in future practice and research.

Finally, the researcher being a 'novice researcher' certainly underpinned and shaped some of the research and methodological decisions that were made. The transition from being a clinical occupational therapist into the world of academic research was certainly quite personally daunting as the researcher embarked on the PhD journey. Whilst all methodological decisions were thoroughly considered and justified, the researcher was mindful of their newly developed research skill set and may have taken a more pragmatic approach to the studies. Going forward, with the consolidated skills now held by the researcher, more creative and abstract approaches may be taken in future research.

3) Interpersonal reflexivity

An interesting dynamic worth consideration that was observed by the researcher in the focus group in study 3 which included telecare service users and telecare call responders. One of the service user participants voiced they did not want to say ‘the wrong thing’ in front of the call responders in case of any repercussions. Conversely, another participant voiced the opposite stating it was a forum to express their opinions to people who had the power to act and make changes. This interesting and different perception of the power dynamic of the group may have influenced what participants were willing to discuss and expose, thus impacting on the data collected. The researcher adapted their communication style with all participants accordingly to address the power imbalance between service users and providers to foster equality between the two voices.

The interpersonal relationship between the researcher and gatekeepers was a dynamic and challenging one and had an impact on the research process for study 2 and 3. As the researcher was an ‘outsider’ to both of the organisations involved in this research, there was limited knowledge and access to their services and potential participants. On reflection, an action point from this experience would be for the researcher to be more assertive and have further confidence when liaising with gatekeepers.

4) Methodological reflexivity

A qualitative methodology with a critical realist philosophical approach was applied to this research. Whilst the decision for these methods were considered and justified, they are certainly not the only options the researcher could have selected. The novice experience of the researcher certainly influenced and impacted on the decisions that were made and it might be considered they stayed within their area of comfort when conducting the research. Future research could look to implement different approaches to explore the phenomenon.

Methodological decisions were very much influenced by the practical factors the author experienced throughout the research process. Many lines of enquiry were dictated by the wider contextual factors such as covid and issues around the private healthcare company which left restricted options in the progression of the research that were opposing to the original proposal. Whilst it is acknowledged that research is always a dynamic entity which requires a responsive and adaptable approach, the circumstances faced were significant and ultimately shaped the direction of the studies.

5) Contextual reflexivity

This research was conducted during a time of great social and technological change that was required to respond to the covid pandemic. The experiences and perceptions of technology were undoubtably influenced by the turbulent experiences of the onset of the pandemic. During the time of data collection, the pandemic was in its infancy and people and communities were living through significant uncertainty and many were propelled to used technology in a way they may not have before. It is important to consider this when reading and understanding this research as this very specific context would undoubtably have shaped results, and indeed if the research would have been conducted now perceptions and experiences may have further evolved as people adapted and adjusted to living in a post-covid world.

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Appendix

Appendix 1: Ethics certificate

Certificate of Ethical Approval

Applicant: Joanne Gunning

Project Title: An exploration of values and perspectives of people with long term conditions and their carers regarding home technology at night-time.

This is to certify that the above named applicant has completed the Coventry University Ethical Approval process and their project has been confirmed and approved as Medium Risk

Date of approval: 12 Feb 2021

Project Reference Number: P111615

Appendix 2: Electronic database search strategy example

(MM "Long Term Care") OR "long term conditions" OR "chronic conditions" OR (MM "Chronic Disease") OR (MM "Multiple Chronic Conditions") OR “multiple chronic conditions” OR “chronic disease” or “chronic conditions” or “chronic illness”

AND

(MM "Home Care Agencies") OR (MM "Home Care Services") OR (MM "Home Health Aides") OR "home care" OR "home rehabilitation" OR (MH "Rehabilitation") OR (MM "Home Health Agencies") OR (MM "Home Safety") OR (MM "Home Environment") OR (MM "Telecommuting") OR (MM "Rehabilitation Nursing")

AND

"informal carer" OR "carer" OR "caregiver" OR (MM "Caregivers") OR (MM "Spouses") OR "spouse" OR "famil*" OR "formal carer" OR (MM "Multidisciplinary Care Team") OR "health care professional" OR (MM "Health Personnel") OR (MM "Nurses") OR "nurse" OR (MM "Home Health Aides") OR (MM "Health Personnel, Unlicensed") OR "health care assistant" OR (MM "Health Care Delivery, Integrated") OR DE "ALLIED health personnel"

AND

(MM "Technology") OR "technology" OR (MM "Assistive Technology") OR (MM "Telehealth") OR "telehealth” OR (MH "Telecommunications") OR "telecare" OR (MM "Telemedicine") OR "telemedicine" OR (MH "Telerehabilitation") OR “technology enabled” OR “technology assisted” OR “remote monitoring” OR “digital health” OR “innovat* health” OR “connected health” OR “mHealth” OR (MH "Community Medicine")

AND

(MH "Qualitative Studies") OR (MH "Phenomenology") OR "qualitative" OR (MH "Grounded Theory") OR (MH "Content Analysis") OR (MM "Qualitative Research") OR "qualitative research" OR (MM "Focus Groups") OR “focus groups”

Appendix 3: Data coding example

No	Data extract	Descriptive code	Analytical code
1.	*Feelings of trust and confidence was related to the capability to contact healthcare services when needed. Monitoring, feedback and advice were considered a reassurance and provided a feeling of safety; 'When I replied to the questions and she saw I had deteriorated, she called me up at once, gave advice, and called a doctor; it makes me feel safe' (E). P6*	1. Safety and security at home. 2. Technology and collaborative communication.	Safety and security are more important than privacy.
	'they make everything go faster, help get an appointment at the doctor and then they try to get me into hospital quickly; it's really such a safety' (E). P6,	1. Safety and security at home. 2. Technology and disease management.	
	'*Look at my sensors, they are my watchdogs and they look after me' Mr. A.*	1. Safety and security at home.	

	By handing over some responsibility to the husband/wife, the spouses experienced that the responsibilities to provide support were alleviated thanks to technology P10	1. Safety and security at home. 2. Technology impact on the informal carer	
2.	*An expert should sit down and guide them through the operating process step by step because they believed the device was complicated. (P1),* *It is not appropriate to assume that older people can keep all of this information in their head after just one demonstration. P1*	1. Usability and compliance. 2. Impact of technology implementation. 1. Usability and compliance. 2. Impact of technology implementation.	Education is essential for successful implementation.

3.	*I think certain people at health board level think this is going to be great at reducing home visits and your going to be able to just sit in your office and look at everybody, but these patients still need to be seen…..to put everybody in the same box because they've got a long term condition and think you're going to reduce admissions…it's not necessarily going to be able to do that. (Professional #2) P2*	1. Technology and the traditional roles of healthcare professionals and services. 2. Cost of technology.	Concern for the implications of technology on traditional healthcare roles and resources.
	'the perceived lack of systems interoperability was considered to prevent information sharing with colleagues, and this was felt to be a barrier to care provision' P2	1. Technology and the traditional roles of healthcare professionals and services.	
	'telehealth works better when you know the patient because you can look at the information, you'd know roughly what's been happening with that patient over the past week. If you don't know this it can lead to decisions being made that perhaps are not the best decisions. (Professional #3) P2	1. Technology and the traditional roles of healthcare professionals and services. 2. Technology and disease management.	

4.	*So sometimes I know how to deal with the equipment if it malfunctions. However, if the equipment is broken, I might chose to turn it off. Frequent malfunctioning of the device may make users lose confidence in using it (Case 1) P1*	1. Usability and compliance. 2. Impact of technology implementation.	Successful implementation is paramount in effective disease self-management.
	Once a telenurse from the service centre called me to say I had not measured my blood sugar for a month. But I had. Then she asked me if it was caused by a malfunction of equipment!....but in fact, I still don't know how to check if the machine is broken. (focus group) P1	1. Usability and compliance. 2. Impact of technology implementation. 3. Technology and disease management.	

Appendix 4: Participant information sheet

Participant Information Sheet

I would like to invite you to take part in a research project. Before you decide you need to understand why the research is being done and what it will involve for you. Please take the time to read the following information carefully and ask questions about anything you do not understand. Talk to others about the study if you wish.

What is the purpose of the study?

This research study aims to identify values and perspectives of people living in the community with a long-term condition, their family/friend carer and Interserve Healthcare staff regarding home technology at night time.

Why have I been invited to take part in the study?

You have been invited to take part in this study because you either have a long-term health condition, care for a person with a long-term condition living at home or you are a member of staff at Interserve Healthcare who provides clinical or social care to people in the community.

Do I have to take part?

No, you do not have to participate. There will be no adverse consequences in terms of your legal rights and your care or employment if you decide not to participate or withdraw at a later stage. You can withdraw active participation at any time and can request for your data to be withdrawn until 1st October 2019 without giving a reason and without prejudice.

If you withdraw from the study, identifiable data already collected will be retained if you allow. Anonymous data already collected will be used because we cannot trace the latter information back to you. No further data would be collected or any other research procedures would be carried out on or in relation to you.

What will my involvement require?

If you agree to take part, you will be asked to sign a consent form. If you do decide to take part you will be given this information sheet to keep and a copy of your signed consent form. The research will last until September 2020 but your involvement would only be until July 2019. During this time, you will be either invited to participate in an online focus group or take part in an interview at your home, both of which will last for approximately 1 hour.

What are the risks associated with this project?

There are no risks anticipated with participation in this research.

What are the benefits of taking part?

Not everyone who participates in this research study will benefit personally. Sometimes, your participation in the research study will be of benefit to society by helping researchers to learn more about using technology at home to support people with long-term conditions and their carers.

Data protection & confidentiality

Your details will be held in complete confidence and ethical and legal practice in relation to all study procedures will be followed. Personal data (name, contact details and audio recordings) will be handled in accordance with the UK Data Protection Act 2018 so that unauthorised individuals will not have access to them.

Your personal data will be accessed, processed and securely destroyed by the Principle Investigator. In order to check that this research is carried out in line with the law and good research practice, monitoring and auditing can be carried out by independent authorised individuals. Data collected during the study may be looked at by authorised individuals from Coventry University who will also have a duty of confidentiality to you as a participant.

You will not be identified in any reports/publications resulting from this research and those reading them will not know who has contributed to it. With your permission we would like to use anonymous verbatim quotation in reports.

Research data will be stored securely for at least 3 years following their last access in line with Coventry University policy.

What if things go wrong?

Any complaint or concern about any aspect of the way you have been dealt with during the course of the study will be addressed; please contact myself, Joanne Gunning, Principal Investigator on 07887478286 or via email at smithj13@uni.coventry.ac.uk in the first instance. You may also contact my research supervisor Anne Coufopoulos on 02477657688 or via email ab4289@coventry.ac.uk

What will happen with the results of the study?

The results of this study will be used to help Interserve Healthcare and other services understand how technology can support people living with long-term conditions and their carers. It will also identify factors that need to be considered when introducing home technology at night time.

Who has reviewed the project?

This research has been looked at by an independent group of people, called an Ethics Committee, to protect your interests. This study has been reviewed by and received a favorable ethical opinion from Coventry University Health and Life Science Ethics Committee.

Key contact details

Principle Investigator:

Joanne Gunning, PhD Student Coventry University.

Tel: 07887478286, *Email*: smithj13@uni.coventry.ac.uk

Research Supervisor:

Anne Coufopoulos, Associate Dean Health & Life Sciences, Coventry University.

Tel: 02477657688, *Email:* ab4289@coventry.ac.uk

Thank you for taking the time to read this Participant Information Sheet.

Appendix 5: Participant consent form

Research Study Consent Form

‘An exploration of values and perspectives of people with long-term conditions and their carers regarding home technology at nigh time.’

	Please tick
1. I confirm that I have read and understood the participant information sheet for the above study and have had the opportunity to ask questions.	☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason.	☐
3. I understand that all the information I provide will be treated in confidence	☐
4. I understand that I also have the right to change my mind about participating in the study for a short period after the study has concluded (1st October 2019).	☐
5. I agree to be recorded as part of the research project	☐
6. I agree to take part in the research project	☐

Name of participant: ....

Signature of participant: ....

Date: ....

Name of Researcher: ....

Signature of researcher: ....

Date:

Appendix 6: Study 2 coding

Theme 1: Face-to-face vs. technological care services Stage 1 Free Codes
Technological solutions are not appropriate for all service users
Technological solutions are not appropriate for service users with complex care needs
Technological solutions are not appropriate for service users with complex medical needs
Some service users need 'in-person' supervision
Technology can not replace face-to face care for people with complex needs
Response time needs to be quick for people with complex needs
Remote monitoring is not appropriate for people with complex needs
Carer needs to be present to respond to needs
Individual assessment is required to ascertain needs and suitable technology
Technological solutions may be better for social needs than health needs
Recognition that technology has a place
Awareness and past experiences of technology devices
Can service users be relied upon to activate technology?
Face to face care would be more reliable in an emergency situation
Concern that service users may not activate an alarm when assistance needed
Shared belief that technology can not replace face-to-face care
Acknowledgement that technology does have a purpose and can support care delivery
Telecare can still provide an element of social support
Technology is advancing and being integrated into health and social care
Lack of employed care staff has meant an increased push and interest in technological services
Technology services could support carers and reduce pressure
Some service users have 'live in' carers at night so how could technology fit in?
What is the purpose of technology if a carer is present?
Acknowledgement that face-to-face care is preferred
Service users like human interaction and face-to-face care
Face-to-face care is not feasible for all service users due to being so many
Service users using telecare often also have social care support
A combination of technology and social care would be optimal

Technology can identify unmet care needs
Not all service users have the luxury of a ‘live in’ carer
Questioning the actual benefits of a carer being there over a telecare response
Live in carers for all is not feasible
The outcome of a carer and telecare responder would ultimately be the same
A combination of a telecare service but also access to a carer if required would be a solution
Having a carer present could reduce inappropriate ambulance use
Individual preference influences if a technological or care service is preferred
Increased use of online services by elderly people during the pandemic
Elderly people can and do use technology
Technology equipment and services need to be adapted to the service user’s needs
Older adults are becoming increasingly competent and confident with technology
As generations age, the challenge of the elderly population using technology will no longer be a problem
The older adult population may need support in using technology services
The notion of all service users receiving face-to-face care is regarded as utopian.
Quotes
‘there is one little boy erm, you have to be in the room with him and watching him whilst he is sleeping because if his alarm goes off it means he’s stopped breathing’
‘He suffers from sleep apnoea and you have to be there. You have to be there to get to him fast. You can’t do that if you are not in the same room kind of thing.’
‘I am in the same room as two of them and the other one we are in the room next door with a monitor that we watch all the time’
‘ you have to be able to get to him fast because he suffers from a lot of different types of epilepsy, and you have to get to him fast.’
‘If we were any further away than where we are now then it would be a problem yes’
‘I think it’s gonna come down to the individual needs of the clients’
‘there are some clients that maybe those devices would work for, but I think, when we are talking about complex care, if the carers are on waking nights, they are very close by.’
‘depending on the social needs, in those situations where you are not needed to be as attentive and as close all the time.’

‘I know there are also the mats that can be put down beside the bed, that will set an alarm off if the person gets out of bed. I’ve worked with these kinds of things in the past.’
‘Yeah, like if I was someone who was having a stroke or a heart attack, would I have it in my mind to press the alarm? Would they think about, in a panic situation, would they think ‘ooh I have to press the alarm?’. You don’t think of that when you are in a state of panic do you?’
‘It doesn’t come to your mind instantly you got a button to press.’
‘I don't think it probably can replace it, I think.’
‘It's still though a very useful tool’
‘we do have social interactions but over the intercom system’
‘But I think it is the way everything is going in terms of uh, you know, life as a whole’
‘It's in the lack of kind of care staff around that that are bringing our technology you know’
‘Uh, it kind of, takes the pressure off. Maybe that then so not to replace them, but to take some of the pressure off. Then maybe this is still have technology as an emergency backup’
‘obviously face to face care is always going to be the ideal scenario’
‘something that obviously a lot of our service users also enjoy’
‘which is you know a little over 300,000 service users now is that you can imagine how many carers we'd need to be able to service that amount of people’
‘There would be a high percentage with carers, I know 50%, maybe more. I would say 50% of those people yeah’ (have carers)
‘So face to face backed up by the technology if the carer can't be available 24/7 then which is kind of the service we provide in many ways I would say’
‘Well, the I guess the most people do not have a night-time carer. They do not have someone living there always. Now they go in for their 15 minute calls two or three times a day.’
‘The world you know that they were that I haven't come across that many, many service uses an at night that do have a live in carer. Occasionally we come across them, but very very few and far between that’
‘Are they able to lift up? Sorry, I mean they are. They are they able to lift Joanne if someone falls? Are they able to get them up?’
‘If they fall and they were an awkward position, they could put them in a more comfortable position. They could stem any flow of blood, or you know, so yeah, I mean again, it's it's a lovely scenario to have a live in carer in all of our properties’
‘Apart from the part about getting the initial assessment, which we do very well over, our warden calling him at the actual time waiting for help would be exactly the same, because obviously the care would call an ambulance and the ambulance will respond’

‘Some of our big sites have got over 1000 flats. I mean that would be 1000 carers. Could you imagine it like every night as they pulled up to work you need a car park the size of a runway just to park their cars’
‘I don't know what it would look like, but it would be the best care home ever, that's for sure.’
‘but I think that's probably the best of both worlds where we had a scheme with lots of independent people living in it with on call carers who are there 24/7.’
‘so it also means that you know there's no waste sometimes of ambulance time, because if we have frequent occurrences where service users may press the alarm, but for whatever reason they pressed it accidentally, and then they don't hear us, so an ambulance is called. So where this car was you can attend, they just go and check on that service user, and if none of this is needed, they let us know and they stay with that service user. But again, if it's a mistake then there's no waste of ambulance.’
‘so some people might go quite well with not having their care about having somebody calling them three times a day to see how they're doing’
‘I know more people are able to take this this stuff in it as well, or you know, pretty much as well with a bit of coaching and a bit of a patients as younger people’
‘we need to make the technology suitable for the person that is going to be using it’
‘but the pendants have a big red button on for a reason because it's very clear what you should be pressing there’
‘I think it's really important for the technology companies like ourselves to make sure that the equipment is directly designed for the service user in mind’
‘But I think that the next generation behind them, which sadly is me, people in their 50s and 60s now it won't (be a problem). This is a problem that will eventually go away because, you know, I can use a phone’
‘I think it's having clear instructions, clear support, and some kind of bit of a confidence boost set, you know, just just to go that they that it can be used and it is accessible and it is for them. It's not something that young people or you know it, it is for them and to help them.’
‘let's design the stuff for the people we're intending it for’
‘There's no point in giving somebody a super fancy iPad who only want a red and a green button, really.’

‘Until we get robots that can do it, but they are right face to face (care). I think you can tell from our responses, Joanne that you know face to face, live in carer- Oh my goodness, you know utopian, isn't it?’
‘And even though the answer appears on the surface relatively simple, which is a mixture of both, is your ideal scenario possible because you can't have 100,000 carers for 100,000 service users. But I don't know how that business model would look. Tim (CEO) would probably faint.’

Theme 1: Face-to-face vs. technological care services

Stage 2 Descriptive Categories

Descriptive codes	Sub theme
Recognition that technology has a place in the current health and social care landscape	Current health and social care landscape
Technology is advancing and being integrated in health and social care	
A lack of care staff has meant an increased push and interest in technology services	
Face-to-face is not feasible for all service users due to high demand	
Not all service users have the luxury of a ‘live-in’ carer	
Increased use of on-line services by elderly people during the pandemic	
Elderly people are becoming increasingly competent and confident with technology	
As generations age the challenge of the elderly population using technology will no longer be a problem	
‘But I think that the next generation behind them, which sadly is me, people in their 50s and 60s now it won't (be a problem). This is a problem that will eventually go away because, you know, I can use a phone’	
‘The world you know that they were that I haven't come across that many, many service uses an at night that do have a live in	

carer. Occasionally we come across them, but very very few and far between that’	
‘Well, the I guess the most people do not have a night-time carer. They do not have someone living there always. Now they go in for their 15 minute calls two or three times a day.’	
‘There would be a high percentage with carers, I know 50%, maybe more. I would say 50% of those people yeah’ (have carers)	
‘There would be a high percentage with carers, I know 50%, maybe more. I would say 50% of those people yeah’ (have carers)	
Individual assessment is required to ascertain needs and suitable technology	Face-to-face and technological care: the best fit
Technological solutions may be better for social care needs than health care needs	
Face-to-face care would be advantageous in an emergency situation	
Technology services could support carers and reduce pressures	
What is the purpose of technology if a carer is present?	
Acknowledgement that face-to-face care is preferred	
Telecare recipients often receive social care also	
A combination of technology and social care would be optimal	
Questioning the actual benefits of a carer being there over a telecare response	
‘live-in’ carers are not feasible for all service users	
The outcome of a technological and carer response would ultimately be the same	
A combination of a telecare service but also access to a carer if required would be a solution	
Having a carer present may reduce inappropriate ambulance use	
Technology equipment and services need to be adapted to the service user’s needs	
‘Until we get robots that can do it, but they are right face to face (care). I think you can tell from our responses, Joanne that you know face to face, live in carer- Oh my goodness, you know utopian, isn't it?’	

‘so it also means that you know there's no waste sometimes of ambulance time, because if we have frequent occurrences where service users may press the alarm, but for whatever reason they pressed it accidentally, and then they don't hear us, so an ambulance is called. So where this car was you can attend, they just go and check on that service user, and if none of this is needed, they let us know and they stay with that service user. But again, if it's a mistake then there's no waste of ambulance.’ ‘but I think that's probably the best of both worlds where we had a scheme with lots of independent people living in it with on call carers who are there 24/7.’	
‘I don't know what it would look like, but it would be the best care home ever, that's for sure.’	
‘Some of our big sites have got over 1000 flats. I mean that would be 1000 carers. Could you imagine it like every night as they pulled up to work you need a car park the size of a runway just to park their cars’	
‘Apart from the part about getting the initial assessment, which we do very well over, our warden calling him at the actual time waiting for help would be exactly the same, because obviously the care would call an ambulance and the ambulance will respond’	
‘So face to face backed up by the technology if the carer can't be available 24/7 then which is kind of the service we provide in many ways I would say’	
Technological solutions are not appropriate for all service users	Service user needs and preferences
Technological solutions are not appropriate for service users with complex care needs	
Technological solutions are not appropriate for service users with complex medical needs	
Some service users need ‘in-person’ supervision	
Can service users be relied on the activate technology when required?	
Concern that older adults will not use the technology as intended	

Some service users have ‘live-in’ carers- how would technology fit in this circumstance?	
Service users like human interaction and face-to-face care	
Individual preference influences if technological or care service is preferred	
Older-adults can and do use technology	
The older adult population may need support in using technology services	
‘There's no point in giving somebody a super fancy iPad who only want a red and a green button, really.’	
‘let's design the stuff for the people we're intending it for’	
‘I think it's having clear instructions, clear support, and some kind of bit of a confidence boost set, you know, just just to go that they that it can be used and it is accessible and it is for them. It's not something that young people or you know it, it is for them and to help them.’	
‘I think it's really important for the technology companies like ourselves to make sure that the equipment is directly designed for the service user in mind’	
‘but the pendants have a big red button on for a reason because it's very clear what you should be pressing there’	
‘we need to make the technology suitable for the person that is going to be using it’	
‘so some people might go quite well with not having their care about having somebody calling them three times a day to see how they're doing’	
‘Are they able to lift up? Sorry, I mean they are. They are they able to lift Joanne if someone falls? Are they able to get them up?’	
‘something that obviously a lot of our service users also enjoy’	
Technology can not replace face-to-face care for people with complex needs	Service provider views and opinions
Response time needs to be quick for people with complex needs	

Remote monitoring is not appropriate for people with complex needs	
A carer needs to be present to respond to needs	
Awareness and past experiences of technology	
Shared view that technology can not replace face-to-face care	
Acknowledgement that technology does has a purpose and can support service delivery	
Telecare can provide social support	
Technology can identify unmet care needs	
The notion that all service users should receive face-to-face care is regarded as utopian.	
'And even though the answer appears on the surface relatively simple, which is a mixture of both, is your ideal scenario possible because you can't have 100,000 carers for 100,000 service users. But I don't know how that business model would look. Tim (CEO) would probably faint.'	
'I know more people are able to take this this stuff in it as well, or you know, pretty much as well with a bit of coaching and a bit of a patients as younger people'	
'If they fall and they were an awkward position, they could put them in a more comfortable position. They could stem any flow of blood, or you know, so yeah, I mean again, it's it's a lovely scenario to have a live in carer in all of our properties'	

Theme 2: Fear of change and repercussions Stage 1 Free Codes
Fear of adverse outcomes when/if technology fails
Concern of the service users response to technology
Service users may perceive using technology is detracting from hands-on care
Experience of service users complaining about substituting hand-on care for technology

Devices may keep the service user awake at night time
Service users perceive technology as taking away time that could be spent for face-to-face contact
Elderly service users may not understand the potential benefits of technology
Concern of inadequate wifi and technology infrastructure
Some service users live in remote areas with poor phone signal and wifi coverage
The service user would need to install broadband
Not all service users have broadband
Elderly service users may not have broadband
Carers confidence and ability to use the prescribed technology
Training would need to be provided for carers
Service users may be unhappy if care was taken away and replaced with technological services
Face-to-face care enables a rapport to be build
Concerns that a technology service may not meet the needs of the service user
Telecare are more of an ‘emergency support line’ and do not provide more general social support
Concern that taking away the care aspect will mean taking away the social support
Quotes
‘if the lady next door hadn’t heard her fall we would have lost her. She was pouring blood from her forehead cut before the paramedics got there, if the lady next door had not heard her fall we would have lost her. She would have been there all night in the cold’
‘The other thing, especially the youngsters we care for, the parents complain we are spending too much time writing. In a service I used to work for we had laptops that we would take out, until the parents complained the carers spent more time on their laptops than actually looking after their child which actually wasn’t true.’
‘if you have a tablet or something, they complain about the light from the tablet as everything is pitch black, so it will wake them up or irritate them’
‘It can appear that way sometimes if they walk into the room when you are catching up because its quiet, so those are, you know, they would complain we were playing on our devices or whatever, rather than looking after, reading to the child or doing something for the child and again I think that was unfair’
‘that was the complaint of one mum who said we were too tech minded and getting away from what we were there for which was to provide care and be attentive to the child, you know, all the little things you do like read to the child and playing with them and entertaining them and playing games you know, we all do that anyway, but they just see that we were on gadgets. It was a case of explaining what the gadgets were for whilst we were using them’

‘But I don’t think everybody would, like the elderly people we are looking after and its their husband saying you should be spending more time doing things with my wife, she needs this and this is why you are here to give her your attention.’
‘I was going to say, depending on where you are, some of the locations we go to, its just making sure the connections and Wi-Fi so the devices actually work for us. That was one of the issues I have found, we’ve been in a couple of places where the laptop didn’t work and mobile phone reception isn’t great. We need to try and make sure we get the best broadband and all the rest of it’
‘You may have people that don’t have broadband, elderly people again, the older generation are scared of it I think because they don’t understand it.’
‘I mean its going to come down to some people are extremely good with technology and I a going to be one of them, but you will have some that will maybe need a little more planning and practise, some people are naturally very good, I have to come and get (name) so I think its down to the individual but I think we are (inaudible) and we have the opportunity to have a practice and fiddle with it I think it would be ok.’
‘I think if I was now the person and I was told no, the carer I had been coming to see me for the last five years was no longer coming to see me and I was presented with a pendant alarm to press if I needed help I think’……’ As a person, I think I'd be rather concerned and upset that my needs were no longer being considered and that I would miss the carer who I built a rapport with’
‘you could imagine how those people would struggle with that most certainly.’
‘we used to be called Care Line UK for a reason, because it was all very fluffy and very oh hi Joe, how are you today you going shopping? How's things? and gradually over the years we've turned into more business where we are now, an emergency Control Centre. Much like the ambulance service etc and not on a not bragging that that's exactly what we've turned into. We are there for medical emergencies the majority of the time, whereas other care lines still exist’

Theme 2: Fear of change and repercussions Stage 2 Descriptive Categories

Descriptive codes	Sub theme
Fear of adverse outcomes as a result of technology	Perceived risk of using technology
Concern that technology could fail	
Potential complaints about substituting care with technology	
Devices may impact sleeping patterns and behaviours at night	
Carer's ability to use the prescribed technology	
Carer's confidence in using technology	
Training would need to be given to carers on the use of technology	
Concern that technology will not be able to meet the needs of the service user	
'if the lady next door hadn't heard her fall we would have lost her. She was pouring blood from her forehead cut before the paramedics got there, if the lady next door had not heard her fall we would have lost her. She would have been there all night in the cold'	
'if you have a tablet or something, they complain about the light from the tablet as everything is pitch black, so it will wake them up or irritate them'	
'It can appear that way sometimes if they walk into the room when you are catching up because its quiet, so those are, you know, they would complain we were playing on our devices or whatever, rather than looking after, reading to the child or doing something for the child and again I think that was unfair'	
'that was the complaint of one mum who said we were too tech minded and getting away from what we were there for which was to provide care and be attentive to the child, you know, all the little things you do like read to the child and playing with them and entertaining them and playing games you know, we all do that anyway, but they just see that we were on gadgets. It was a case of explaining what the gadgets were for whilst we were using them'	
Technology may be viewed as taking away face-to-face care	Concern of the service user's perception of technology
Concern about the service user response to technology	

Time spent by carers using technology may be viewed as time that could be spent for face-to-face contact	
Service users may be unhappy if technology replaced face-to face care	
Face-to-face care enables a rapport to be build between service user and carer	
Telecare is an ‘emergency’ support line and does not provide more general/social support	
‘The other thing, especially the youngsters we care for, the parents complain we are spending too much time writing. In a service I used to work for we had laptops that we would take out, until the parents complained the carers spent more time on their laptops than actually looking after their child which actually wasn’t true.’	
‘I think if I was now the person and I was told no, the carer I had been coming to see me for the last five years was no longer coming to see me and I was presented with a pendant alarm to press if I needed help I think’……’ As a person, I think I'd be rather concerned and upset that my needs were no longer being considered and that I would miss the carer who I built a rapport with’	
Elderly service users may not understand the potential benefits of technology	The older adult population and technology
Elderly service users may not understand how to use technology	
Elderly people do not possess the skills to operate technology	
‘But I don’t think everybody would, like the elderly people we are looking after and its their husband saying you should be spending more time doing things with my wife, she needs this and this is why you are here to give her your attention.’	
‘You may have people that don’t have broadband, elderly people again, the older generation are scared of it I think because they don’t understand it.’	

‘I mean its going to come down to some people are extremely good with technology and I a going to be one of them, but you will have some that will maybe need a little more planning and practise, some people are naturally very good, I have to come and get (name) so I think its down to the individual but I think we are (inaudible) and we have the opportunity to have a practice and fiddle with it I think it would be ok.’	
‘you could imagine how those people would struggle with that most certainly.’	
‘we used to be called Care Line UK for a reason, because it was all very fluffy and very oh hi Joe, how are you today you going shopping? How's things? and gradually over the years we've turned into more business where we are now, an emergency Control Centre. Much like the ambulance service etc and not on a not bragging that that's exactly what we've turned into. We are there for medical emergencies the majority of the time, whereas other care lines still exist’	
Concern of inadequate internet and technology infrastructure	A technological future: are we ready?
Current technological landscape is insufficient to support technology services	
Older adults would have to subscribe to broadband	
Poor internet connection in rural areas	
Older adults are less likely to have broadband	
‘I was going to say, depending on where you are, some of the locations we go to, its just making sure the connections and Wi-Fi so the devices actually work for us. That was one of the issues I have found, we’ve been in a couple of places where the laptop didn’t work and mobile phone reception isn’t great. We need to try and make sure we get the best broadband and all the rest of it’	

Theme 3: Going digital Stage 1 Free Codes
Written paperwork is time consuming
Written documentation impacts on the time spent providing ‘hands-on’ care to the service user
Services are working towards a technological future to support non-clinical processes
A growing awareness of services implementing technology to support processes
Pressure to document quickly and concern over the quality of the notes
Carers are busy with hands on care and find it difficult to find time to write notes
Balance between documentation and ‘hands on’ care
Documentation adds to the workload
Documentation is regulated by the CQC
Written documentation can be sub-standard due to time pressures
Belief that technology could be a solution for documentation challenges
Documentation can be problematic at night time due to the dark
Documentation is important
Technology can speed up the process of documentation
Completing documentation to the required standard can mean working over shift time
Digital notes could improve communication
Digital notes could speed up the process of information sharing
Digital documentation could free up time for face-to-face interaction
Digital documentation could benefit service users with complex health needs
Digital documentation could improve the standard of the documentation
Digital documentation could make the home environment less ‘clinical’
Carers want more hand-on care time with service users
Current practice of hand delivering notes is inconvenient and time consuming
If digital documentation was implement successfully it could have a positive impact on the carers work experience
Digital documentation would allow the use of functions such as taking photographs to document things
Digital notes could improve interagency communication
Communication between agencies could improve care for the service user
Data protection needs to be considered and adhered to with interagency communication

Service users may be opposed to sharing their data
Getting all services/agencies on board would be a huge task
Not all information is appropriate to be shared
Documentation holds sensitive information about the service user
Service users would have to give consent for data sharing
Telecare responders and carers do have interaction but limited
Quotes
‘I know that there’s something ‘cos I’m in touch with a lot of my friends up North and in their care roles they have started using little tablets…each client has been supplied with a tablet that’s kept away until the carer gets there and they like sign in and out’
‘The daily logs that we write they do it all on the tablet and its sent straight to their office so it cuts out the paperwork side of things.’
‘we got as far as laptops and devices being considered, moving towards more things that will help us whilst we are out and about’
‘its time to write when you are busy. Its really hard for the carers, well for anyone really, to keep track of what they have done, document it down quickly, explain in the detail they wish to’
‘I know there may be little lulls in the shift where you can sit sit down and catch up, but that doesn’t always happen and that puts pressure on the end of your shift. Have I got everything down? When the records go back to the office, have I explained enough’
‘I think that is one of the frustrations is the time to do practical hands-on care and the record keeping’
‘we are regulated by the CQC, they look at our record keeping and see if we have delivered the care we have been commissioned for and its very hard to’
‘They do a fantastic job and the quality of logs we have back in brilliant, but there are gaps sometimes as they literally don’t have time to put it down’
‘If there was some devices that could help with that it would be much easier I think?’
‘the package I am on at present, to sleep they have to have pitch black, the same as another client that I am just moving away from, erm, you don’t have any lighting devices with you apart from your mobile phone to write the notes at all’
‘You’ve got the emergency box, the ventilators and machines- you have to check them in pitch black because the client is asleep’
‘The time you need to write notes can be more than the time before she needs more attention, and you come back and think ‘right what did she do then?’

‘Doing the notes is the hard part. I don’t do things briefly, as Tom would probably know, its probably like reading a book when you read my notes, but at least I don’t miss much’
‘I can be there 15/20 minutes after my shift has finished just to make sure my notes are completed, but I will do it as the office needs to know’
‘But I feel if we were doing it on a computer or laptop or any kind of device its quicker to put in’
‘Plus it gets to the office quicker. We collect them at the end of the month, they don’t know what has happened at the beginning of the month. If it is anything urgent we obviously contact the branch by phone and let them know but this will get it through to the branch quicker. And they can have a look at the decline of someone’s health or something overall. They can see it quicker if they sent through.’
‘If its done quick on a computer we have more time to spend with your child, than sitting hours on end, you know, writing notes, you know and they have agreed.’
‘Old school (laughs), older than me school, may not understand the technology and how fast it makes note taking for us and how fast it can get back to the office, that is my love of it, the fact the information about the clients, especially the more technical and complex clients that we have, the information is getting back to base faster.’
‘I just think if you have a computer, an iPad or something you can just tap everything out in each section and send it off and its done with’
‘You’ve not got big books of paperwork cluttering the persons house as well apart from your care plan’
‘and this is all in the dark and writing at the same time it can be quite difficult and time consuming.’
‘I think it would give us more time with the patients, it would cut down the admin time and give us more caring time, that will be for all of us really.’
‘if she had something where she could get home a bit earlier and put her head down and not worry about stuff. We are very fortunate that we work with people who have what I would call a professional conscience, and if there is still stuff there after an intense night, I know they cant rest until they have off loaded that, again having something that would help speed up that process would be a good thing I think.’
‘Your ability to take photographs, you know, if you are doing medication changes, you can send that back to the office, pieces of equipment that the girls are looking at, service numbers and all

the rest of it, doing all of the equipment checks. You can share pictures, you can write notes, you have got access to the professionals you need, so that's the sort of thing I'd be looking for anyway.'
'the extra running around we don't really need when we already do so many miles that could be taken away if we did it on tablet'
'so if if, say, a carer visited someone today and we could say see that you know, I don't know that they did comment, made a comment that that person wasn't particularly well that day or or something along those lines. If we then got to a call on the alarm later that night, let's say then we would have a bit more background. I guess as to what what was happening currently with that particular service user'
'data protection would feed into that unfortunately.'
'So and you can see if we would have a multi agency digital system that I, I guess all you have to do is get all the service users to sign up'
'And even then you are looking at some potentially extremely sensitive such information, especially people that are feeling particularly suicidal. You know that being held in some sort of location where it can be, it would be very difficult to share that sort of information'
'we probably have to sign some sort of contract that they were happy to have it shared. Amongst which organisations would have access to it, maybe'
'Sometimes it's the carries who found someone who's who's fallen or needs medical help. And then they ask us to press the alarm to call an ambulance service. So yes, we do.'

Theme 3: Going digital

Stage 2 Descriptive Categories

Descriptive codes	Sub theme
Written documentation is time consuming	Current practices: written documentation
Written documentation impacts on the time spent providing 'hands-on' caret to the service user	
Carers are busy with hands-on care and can find documentation challenging due to time restraints	

The balance of hands-on care and documentation	
Documentation adds to the workload	
Documentation is regulated by the CQC	
Written documentation can be sub-standards due to time pressures	
Documentation at night can be challenging due to darkness and lack of light	
Documentation is important	
Completing documentation to the required standard can mean working over shift time	
Carers want more ‘hands-on’ care with service users	
Current practices of hand delivering notes is inconvenient and time consuming	
‘the extra running around we don’t really need when we already do so many miles that could be taken away if we did it on tablet’	
‘and this is all in the dark and writing at the same time it can be quite difficult and time consuming.’	
‘You’ve not got big books of paperwork cluttering the persons house as well apart from your care plan’	
‘I can be there 15/20 minutes after my shift has finished just to make sure my notes are completed, but I will do it as the office needs to know’	
‘Doing the notes is the hard part. I don’t do things briefly, as Tom would probably know, its probably like reading a book when you read my notes, but at least I don’t miss much’	
‘The time you need to write notes can be more than the time before she needs more attention, and you come back and think ‘right what did she do then?’	
‘You’ve got the emergency box, the ventilators and machines- you have to check them in pitch black because the client is asleep’	
‘the package I am on at present, to sleep they have to have pitch black, the same as another client that I am just moving	

away from, erm, you don’t have any lighting devices with you apart from your mobile phone to write the notes at all’	
Services are working towards a technological future to support non-clinical practices	The potential of digital notes
Growing awareness of services implementing technology to support processes	
Belief that technology could be a solution for documentation challenges	
Technology can speed up the process of documentation	
Digital notes could speed up the process of information sharing	
Digital notes could improve communication	
Digital notes could free up time for face-to-face communication	
Digital documentation could benefit service users with complex health needs	
Digital notes could improve the standard of documentation	
Digital documentation could make the home environment less ‘clinical’	
Digital notes could have a positive impact on the carers work experience	
Digital documentation would allow the use of functions such as taking photographs to document things	
Digital notes could improve interagency communication	
Communication between services could improve care provision	
‘so if if, say, a carer visited someone today and we could say see that you know, I don't know that they did comment, made a comment that that person wasn't particularly well that day or or something along those lines. If we then got to a call on the alarm later that night, let's say then we would have a bit more background. I guess as to what what was happening currently with that particular service user’	
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numbers and all the rest of it, doing all of the equipment checks. You can share pictures, you can write notes, you have got access to the professionals you need, so that's the sort of thing I'd be looking for anyway.'	
'if she had something where she could get home a bit earlier and put her head down and not worry about stuff. We are very fortunate that we work with people who have what I would call a professional conscience, and if there is still stuff there after an intense night, I know they cant rest until they have off loaded that, again having something that would help speed up that process would be a good thing I think.' 'I just think if you have a computer, an iPad or something you can just tap everything out in each section and send it off and its done with'	
'I think it would give us more time with the patients, it would cut down the admin time and give us more caring time, that will be for all of us really.'	
'Old school (laughs), older than me school, may not understand the technology and how fast it makes note taking for us and how fast it can get back to the office, that is my love of it, the fact the information about the clients, especially the more technical and complex clients that we have, the information is getting back to base faster.'	
'If its done quick on a computer we have more time to spend with your child, than sitting hours on end, you know, writing notes, you know and they have agreed.'	
'But I feel if we were doing it on a computer or laptop or any kind of device its quicker to put in'	
'Plus it gets to the office quicker. We collect them at the end of the month, they don't know what has happened at the beginning of the month. If it is anything urgent we obviously	

contact the branch by phone and let them know but this will get it through to the branch quicker. And they can have a look at the decline of someone’s health or something overall. They can see it quicker if they sent through.’	
‘If there was some devices that could help with that it would be much easier I think?’	
‘They do a fantastic job and the quality of logs we have back in brilliant, but there are gaps sometimes as they literally don’t have time to put it down’	
Data protection	
Data protection needs to be considered and adhered to with interagency communication	
Getting all agencies on board would be a huge task	
Not all information is appropriate to be shared	
Documentation holds sensitive information about service users	
Service users need to give consent for their data to be shared	
Telecare responders and carers do have interaction but limited	
‘Sometimes it's the carries who found someone who's who's fallen or needs medical help. And then they ask us to press the alarm to call an ambulance service. So yes, we do.’	
‘we probably have to sign some sort of contract that they were happy to have it shared. Amongst which organisations would have access to it, maybe’	
‘And even then you are looking at some potentially extremely sensitive such information, especially people that are feeling particularly suicidal. You know that being held in some sort of location where it can be, it would be very difficult to share that sort of information’	
‘So and you can see if we would have a multi agency digital system that I, I guess all you have to do is get all the service users to sign up’	
‘data protection would feed into that unfortunately.’	

Theme 4: Is technology reliable? Stage 1 Free Codes
Associated risk of using technology.
Technological response is not as reliable as human response
Concern of the location of the carer in relation to the service user
The carer needs to be located near the service user to provide an effective response
False alarms
Technology can trigger false alarms
Questioning the reliability of available technology
Scepticism of technology
Experience of when technology failed
Fall sensor did not detect the fall
Fear of undesired outcomes due to shortcomings in technology
Concern that service users may not activate an alarm when it is needed
Telecare responders do escalate issues e.g., safeguarding concerns
Technology can identify unmet care needs
Telecare responders ask NOK to attend if ambulance required and carer not present
Telecare responders find it beneficial when a carer is present to assist with the call response
Carers are able to share more information with paramedics when an ambulance is required
Technological equipment can malfunction
Technology can malfunction but face-to-face care also has its challenges
Procedures are in place when there are problems with equipment
Equipment malfunctions are dealt with relatively quickly
Telecare services should be improved when migrated from analogue to IP
Quotes
‘they do work quite well but at the same time, its how fast does this person get to the front door before you can get to them and stop them wondering to the end of the street?’

‘If I were gonna be in the house then it would probably work. If I am gonna be situated somewhere different it would have to be someone who lived on the same street as me to be able to get there fast’
‘The other thing is you don’t know why…the alarm mat…if it goes off, has the person fallen out of bed or just got out of bed? If they have fell out of bed and hit their head on something you’ve got to be there fast if they’ve had a head injury.’
‘She missed the falls mat completely, erm and the ambulance was called, we were already on our way to the next call and we had to try and get back to her, erm that is kind of one scenario, erm, so yeah and also she missed the mat so the alarm did not go off’
‘if the lady next door hadn’t heard her fall we would have lost her. She was pouring blood from her forehead cut before the paramedics got there, if the lady next door had not heard her fall we would have lost her. She would have been there all night in the cold’
‘It doesn’t come to your mind instantly you got a button to press.’
‘I mean, we raised like things like safeguarding concerns.’
‘If we come across service users who don't seem to be getting the care they need. Or they regularly pressing their alarms. And then there is of process that we go to the you know that we will follow that up then with their family etc goes to a different department. And yes we would raise concerns.’
‘ambulance procedures over the last year since COVID is that we always ask next of kin to attend now, which we never used to do.’
‘Now that's where the carer situation really is a massive advantage because a lot of the people can't tell us what's wrong.’
‘They can triage the calls so much better to ambulance control, whereas we obviously cannot Passover limited details. So it's a fair point. It's all about resourcing, really.’
‘Well, I'm not going say things don't ever go wrong with equipment. Uh, because it does, but on the top of that I, I guess you know things go wrong with care is they run late or you know there are issues there I'm sure. But yes, but so yes things do go wrong with equipment.’
‘we have very clear procedures as to, you know, getting things reported’

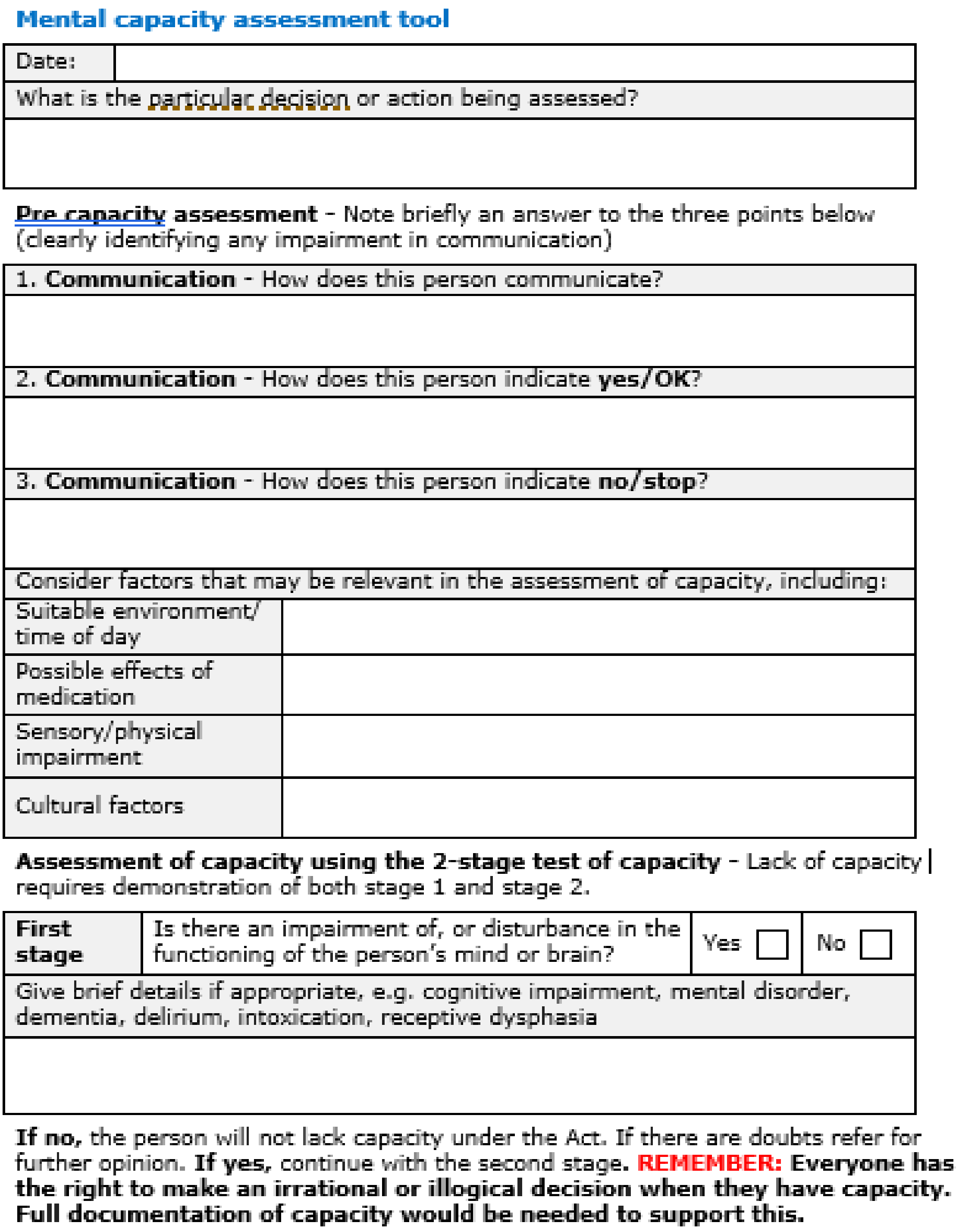
‘There is very strict protocols and making sure that if there is a problem it is dealt with quickly and services restored as soon as possible’
‘I would say that 99% of any faults are repaired within 24 hours.’

Theme 4: Is technology reliable? Stage 2 Descriptive Categories	
Descriptive codes	Sub theme
Associated risk of using technology	The perceptions from a non-technology service
Technological response is not as reliable as human response	
Concern of the location of the carer in relation to the service user	
The carer needs to be located near the service user to provide an effective response	
False alarms	
Technology can trigger false alarms	
Questioning the reliability of available technology	
Scepticism of technology	
Past experiences of when technology has failed	
Falls sensor did not detect fall	
Fear of undesired outcomes due to the shortcomings of technology	
Concern that service users may not activate an alarm when needed	
‘It doesn’t come to your mind instantly you got a button to press.’	
‘if the lady next door hadn’t heard her fall we would have lost her. She was pouring blood from her forehead cut before the paramedics got there, if the lady next door had not heard her fall we would have lost her. She would have been there all night in the cold’	
‘She missed the falls mat completely, erm and the ambulance was called, we were already on our way to the next call and we	

had to try and get back to her, erm that is kind of one scenario, erm, so yeah and also she missed the mat so the alarm did not go off’	
‘The other thing is you don’t know why…the alarm mat…if it goes off, has the person fallen out of bed or just got out of bed? If they have fell out of bed and hit their head on something you’ve got to be there fast if they’ve had a head injury.’	
‘If I were gonna be in the house then it would probably work. If I am gonna be situated somewhere different it would have to be someone who lived on the same street as me to be able to get there fast’	
‘they do work quite well but at the same time, its how fast does this person get to the front door before you can get to them and stop them wondering to the end of the street?’	
Telecare call responders do escalate issues e.g., safeguarding concerns	The experiences of a telecare service
Technology can identify unmet care needs	
Telecare responders as NOK to attend if an ambulance is required and carer not present	
Telecare responders find it beneficial when a carer is present when a carer is present to assist with the call response	
Carers are able to share more information with paramedics when an ambulance is required	
Technological equipment can malfunction	
Technology can malfunction but face-to-face care also has its nuanced challenges	
Processes are in place for when equipment malfunctions	
Equipment malfunctions are dealt with relatively quickly	
Telecare services should be improved when migrated from analogue to IP	
‘I would say that 99% of any faults are repaired within 24 hours.’	

‘There is very strict protocols and making sure that if there is a problem it is dealt with quickly and services restored as soon as possible’	
‘we have very clear procedures as to, you know, getting things reported’	
‘Well, I'm not going say things don't ever go wrong with equipment. Uh, because it does, but on the top of that I, I guess you know things go wrong with care is they run late or you know there are issues there I'm sure. But yes, but so yes things do go wrong with equipment.’	
‘They can triage the calls so much better to ambulance control, whereas we obviously cannot Passover limited details. So it's a fair point. It's all about resourcing, really.’	
‘Now that's where the carer situation really is a massive advantage because a lot of the people can't tell us what's wrong.’	
‘ambulance procedures over the last year since COVID is that we always ask next of kin to attend now, which we never used to do.’	
‘If we come across service users who don't seem to be getting the care they need. Or they regularly pressing their alarms. And then there is of process that we go to the you know that we will follow that up then with their family etc goes to a different department. And yes we would raise concerns.’	
‘I mean, we raised like things like safeguarding concerns.’	

Appendix 7: Mental capacity assessment tool



Mental capacity assessment tool

Date:	
What is the particular decision or action being assessed?	

Pre capacity assessment - Note briefly an answer to the three points below (clearly identifying any impairment in communication)

1. **Communication** - How does this person communicate?	
2. **Communication** - How does this person indicate **yes/OK**?	
3. **Communication** - How does this person indicate **no/stop**?	
Consider factors that may be relevant in the assessment of capacity, including:	
Suitable environment/ time of day	
Possible effects of medication	
Sensory/physical impairment	
Cultural factors	

Assessment of capacity using the 2-stage test of capacity - Lack of capacity requires demonstration of both stage 1 and stage 2.

First stage	Is there an impairment of, or disturbance in the functioning of the person's mind or brain?	Yes ☐	No ☐
Give brief details if appropriate, e.g. cognitive impairment, mental disorder, dementia, delirium, intoxication, receptive dysphasia			

If no, the person will not lack capacity under the Act. If there are doubts refer for further opinion. **If yes,** continue with the second stage. **REMEMBER: Everyone has the right to make an irrational or illogical decision when they have capacity. Full documentation of capacity would be needed to support this.**

Second stage	Is the impairment or disturbance sufficient that the person lacks the capacity to make this particular decision?

Hints and Tips - There is a need to be clear about the decision or decisions to be made and what the options may be. Consider carefully how best to put across relevant information to the person concerned. For example:

- The decision that needs to be made;
- Why the decision needs to be made;
- The likely effects of each option available in relation to the decision.

How information is given will affect the ability of the person to understand. Use broad terms and language that is appropriate to the person. It is not always necessary to explain everything in great detail. **Summarise evidence of discussion for each point below: It is not sufficient to state diagnosis such as 'has dementia'.**

Does the person understand the information relevant to the decision? If no, give details of why not.	Yes ☐	No ☐
Is the person able to retain the information and process it? If no, give details of why not.	Yes ☐	No ☐
Can person weigh up the pros and cons of a decision? If no, give details of why not.	Yes ☐	No ☐
Can person communicate their decision by any means possible? If no, give details of why not.	Yes ☐	No ☐

A "no" to any of the above questions will demonstrate lack of capacity for this decision.

Is capacity likely to improve or fluctuate?	Yes ☐	No ☐
Can decision be delayed? **If yes,** reassess.	Yes ☐	No ☐
Date of reassessment		

PLEASE COMPLETE THE BOX FOR THE APPROPRIATE EVIDENCED DECISION

This person **LACKS** the capacity to make the decision detailed above			This person **HAS** the capacity to make the decision detailed above	
Name of assessor			Name of assessor	
Signature			Signature	
Designation			Designation	
Expected review date			Expected review date	

Appendix 8: Service user patient information sheet

my
information
booklet

An exploration of values and perspectives of people with long term conditions and their carers regarding home technology at night time

My name is Joanne.

I am a researcher at Coventry University.

I would like to invite you to take part in a new research study.

Before you decide if you want to take part, it is important for you to understand why the research is being done and what you will do.

Please take time to read this information booklet and talk about it with others if you wish.

You should only take part in this study if, after reading this sheet, you are happy that you understand it and want to join in.

You do not have to take part if you do not want to.

And you are still free to leave the study at any time and without giving a reason.

Please ask if you have any questions or if you would like more information or time to make up your mind.

Who is involved?

To join this study you need to:

- Live at home
- Receive help from Interserve Healthcare
- Be 18 years old or above
- Be able to provide feedback in English

Will the information gathered be kept confidential?

All information collected in the study will be recorded and stored securely and anonymously on a password-protected computer at Coventry University.

I will write a report once the information has been collected and data will be presented together as a group and not each person. Other researchers may read this report.

You will not be identified personally in this report.

That data used to write the report will be securely stored for at least 3 years.

Background to the study

A research study is a way to learn new things.

There are lots of different technologies available to support people who are living at home.

This study is a way to find out new things about what people who live at home think and feel about technology that may help you at night time.

Sometimes, taking part in the study will benefit society by helping the researcher to learn more about how technology can support people like you at home.

What do I have to do?

If you do choose to take part, I would like to find out your thoughts and feelings about having technology at home to support you alongside the care you would usually receive.

I will do this by visiting your house and asking you questions that will help you to think about home technology. This is called an ‘interview’.

The interview will last about 45-60 minutes.

What risks are there?

No risks are foreseen by taking part in this project.

If you do experience any issues you are free to leave the study at any time and will be offered appropriate support if needed.

include me

I have listened to Jo’s description of the research and below is what I am invited to do:

Name…………………………………………………………………

Signature……………………………………………………………...

Date……………………………………………………………………

Appendix 9: Study 3 coding

Social Isolation Stage 1 Free Codes
Patterns of behaviour are different at night time
Ethical and moral considerations of call centre staff with inappropriate use of service
Service users have different values which affects their use of the technology
Increased use of the service could be an indicator of unmet needs
Isolation as night time increases the use of service
Day time services that do not fully meet service user needs impacts on the use of technology at night time.
Responsibility of services to respond even though inappropriate use of service
Increased demand has an impact on call handler well being
Technology can combat loneliness at night time
Social isolation and minority groups
Service users want social connection
Online communication can be negative to wellbeing
Technology has aided communication during pandemic lockdowns
Lack of communication causes feelings of loneliness
Communicative technology provides reassurance
Technology enables engagement and fulfilment of activities of daily living
Cognitive impairment can lead to inappropriate use over night
Service users with cognitive impairments are awake and functioning during the night
Service users with cognitive impairment can become distressed at night
Technology offers reassurance that someone is there and will always respond at night
The possibility of adding mental health services to existing technology
Face to face interaction is better than communication online
Communication because of loneliness is time consuming and occupies call responder time
Loneliness can lead to anxiety at night time which increases service use
Perception that problems because of mental health cannot be resolved
Cognitive impairment can cause day and night reversal behaviours
Physical presence may be better than virtual contact for service users with cognitive impairment
Most health and social care services are facing pressures and have to prioritise service provision

Loneliness at night time is prevalent for the service provider
The response to loneliness is a misuse of resource
Online communication has enabled social connections during the pandemic
Quotes
we have to be very weary of that but at the same time, there’s no denying we carry out huge amounts of welfare calls at night for people that are just lonely and doing crazy stuff that they shouldn’t be doing.
here’s the nice people on the end of this button that I can have a nice chat with and unfortunately we are an emergency service effectively, so we have to be very weary of that but at the same time, there’s no denying we carry out huge amounts of welfare calls at night for people that are just lonely and doing crazy stuff that they shouldn’t be doing.
I find it quite interesting actually the difference in that … I spoke to a lady quite recently, I won’t mention her by name but after speaking to her in the morning, she’s 101 and after speaking to her in the morning, she informed me that she’d had a fall over night and she didn’t press her button because she didn’t want to bother us at night time.
That’s sort of a prime example and yet other people that shall we say who would be seemingly fitter and more able than her, call quite regularly and I found that quite interesting
the other huge side of the conversation which I’m sure we’ll share another time is of course the effect of all these calls on the operators, you know, they are sponges and you know, health and wellbeing has never been more of a massive subject at the moment and these guys are taking 135 – 150 calls a night and, you know, they haven’t got limitless amounts of empathy and eventually it gets them.
And they may have a carer who is always running late who dashes in, come on then, let’s get you ready for bed and you know before they know it, they’ve gone from the sofa onto the bed, they’re in the pyjamas tucked in, night then, see you in the morning, you know, and so we are probably, for some of those people, especially the ones that call us a lot, we’re probably the only people they ever speak to

Yes I’m a transgender lady and I have no family in England, so yes I am on my own.
I tend to use it to chat with other people in the block who suffer from what I do, with insomnia. So it’s a way of alleviating the long hours of the night from being totally and utterly wasted
Yeah so to be able to just chat to somebody is a bonus.
Because I’ve suffered since I left Zimbabwe with Post Traumatic Stress Disorder and things and I find because of my voice being more masculine than feminine, I find that when I talk to people online and things, I get oh my god you sound like a man and all this stuff, so I just basically, I gave up.
It helps with the lockdown and not being able to meet people, yeah because since I’ve moved here I’ve made some good friends and I can still talk to them on it.
You don’t feel lonely on your own when you’ve got someone to talk to.
At least you’ve got somebody you can talk to especially if you need something, there’s usually somebody that will probably help you.
If I felt ill and I didn’t want to go out and I needed something, I know there’s people I can call there
a new contract to us and she has early stage dementia and she starts calling from two o’clock in the morning wanting to have a chat
She’s not needing medical help, she wants to talk and to have contact with somebody that she knows and yes it’s quite upsetting actually because she can be quite teary but there’s notes to say that that’s how she is currently, but yes we’re getting quite a lot of calls from this particular lady

at the moment and it’s just doing our best to reassure her as much as we possibly can that it’s the middle of the night
So it’s definitely isolation in terms of people maybe using their alarms when it’s not the purpose it’s there for certainly, to get someone to speak to because we’ll always answer, so yes.
if it’s clear that someone is wanting to chat and wanting to just talk to a human being.
I was wondering if there was some way you could be put through with maybe a button that you guys have which would send either Samaritans, Silver Surfers, the Big White Wall or somewhere like that where they then start to gain a little more friendship but without it being personal.
Because it ties up one of you guys for hours on some occasions.
Well yes I’m afraid so and that’s because the Samaritans, again, have a limited resource and they are there in their …
And all it is, is the loneliness. so at night and when you’re not well or things, the weight of loneliness can be absolutely soul destroying
it’s just something to calm the anxiety, to calm the feeling of total loneliness.
It’s like having a phone number that they remember and they’ll just use it and they’ll keep doing that to Appello I’m afraid, there’s no stopping that.
The other thing that I was just thinking as well, especially with regards to dementia patients is the people that are on the day and night reversals. So they don’t quite understand that obviously when they’re awake at two o’clock in the morning and there is nobody around,

there has to be some sort of physical presence that we could send to them or even if it was a responder or even a reassurer as opposed to a responder, just someone that's able to sit with them
But if there was a 24 hour line there for people that are generally lonely and need some social contact, we would be hitting that line, I would imagine, to the form of … I'm not exaggerating Emma, George, 100 times a night maybe
Whereas at the moment we're calling next of kin, we're calling ambulances which is as you say Lisa, quite correctly, is a complete waste of resource.
we do fulfil that function, don't get me wrong, we fulfil that function every night, however with an emergency care line, we're also very conscious of people in the background waiting to be answered who perhaps have a more serious issue but we never, we never detract or deter people from calling us because the time that that happens is the time they'll leave us.
I've been in touch online with a friend and one group in particular, I got very active in sending stuff round amongst us and keep friendships, contact, you know.

Theme 1: Social Isolation Stage 2 Descriptive Categories	
Descriptive codes	**Sub theme**
Patterns of behaviour differ between night and day time	
Night time behaviours increase inappropriate service use	
Night time behaviours possibly indicate day time services do not meet individual needs	
Service user values influence the use of the service at night time	
Lack of social contact and communication at night time	

Service users want social connections over night	Night time behaviours impact service use
Lack of social connection at night causes loneliness	
The impact of cognitive impairment on night time behaviours; day and night reversal	
Preference of face-to-face contact to combat loneliness at night	
Loneliness leads to anxiety which increases service use	
in the morning, she informed me that she'd had a fall over night and she didn't press her button because she didn't want to bother us at night time.	
here's the nice people on the end of this button that I can have a nice chat with and unfortunately we are an emergency service effectively, so we have to be very weary of that but at the same time, there's no denying we carry out huge amounts of welfare calls at night for people that are just lonely and doing crazy stuff that they shouldn't be doing.	
I tend to use it to chat with other people in the block who suffer from what I do, with insomnia. So it's a way of alleviating the long hours of the night from being totally and utterly wasted	
Service providers feel a sense of responsibility to respond to inappropriate calls	
Impact on service provider wellbeing	
All services are under pressure and have to prioritise service provision	
Inappropriate service use is time and resource consuming	
Service user knowledge they will always get a response to any call	
Personal responsibility of the service provider vs company service level agreements	

'The boy who cried wolf'	Service provider ethics, moral considerations, and judgement calls
The impact of inappropriate service use on other services	
we do fulfil that function, don't get me wrong, we fulfil that function every night, however with an emergency care line, we're also very conscious of people in the background waiting to be answered who perhaps have a more serious issue but we never, we never detract or deter people from calling us because the time that that happens is the time they'll leave us.	
Whereas at the moment we're calling next of kin, we're calling ambulances which is as you say Lisa, quite correctly, is a complete waste of resource.	
Because it ties up one of you guys for hours on some occasions.	
Social isolation is a prevalent issue in the community	
Increased service use can be an indication of an individual's unmet needs	
Increased service use during COVID-19 lockdown	
Technology goes some way to combat loneliness and social isolation	
Increased inappropriate use of service by service users with a cognitive impairment.	
Social isolation increases service use	

Service use for social isolation is an inappropriate use of resource	Corelation of social isolation and increased service use
‘here’s the nice people on the end of this button that I can have a nice chat with and unfortunately we are an emergency service effectively, so we have to be very weary of that but at the same time, there’s no denying we carry out huge amounts of welfare calls at night for people that are just lonely and doing crazy stuff that they shouldn’t be doing.’	
‘I tend to use it to chat with other people in the block who suffer from what I do, with insomnia. So it’s a way of alleviating the long hours of the night from being totally and utterly wasted ‘	
At least you’ve got somebody you can talk to especially if you need something, there’s usually somebody that will probably help you.	
So it’s definitely isolation in terms of people maybe using their alarms when it’s not the purpose it’s there for certainly, to get someone to speak to because we’ll always answer, so yes	
Online engagement of minority groups	
Face-to-face communication is preferred by minority groups	
Minority groups face nuanced challenges with service use	
Experience of service use influences future use	
Online communication can have a negative impact on minority groups	
‘Yes I’m a transgender lady and I have no family in England, so yes I am on my own.’	

'Because I've suffered since I left Zimbabwe with Post Traumatic Stress Disorder and things and I find because of my voice being more masculine than feminine, I find that when I talk to people online and things, I get oh my god you sound like a man and all this stuff, so I just basically, I gave up. '	Minority groups, social isolation, and service use

Sense of Community Stage 1 Free Codes
Technology enables a sense of community amongst service users
Technology unites people in the same community
Technology connects the service user to face to face contact
Service users use the technology regularly for social connections
Technology enables communication with family
The use of technology encourages friendships and social connections
The community technology creates offers a sense of purpose
Being part of a community enables fulfilment of activities of daily living
Quality of technology and communication can be a barrier to engaging in virtual communities
Technology builds online communities within a geographical community
Being part of a community creates feelings of reassurance and security
Quotes
I usually get at least half a dozen calls from other people in the block who I have become friendly with.
We then use it to keep in contact, so we could be chatting on it for an hour or two
Well yeah it alleviates the feeling of total isolation
So we have our on-site carer who is, if you press it in the middle of the night, she comes up and talks, so that also proves quite useful.

Yes it has been and I speak to people a couple of times a day on it.
we keep in touch with the kids with it
My wife uses it to talk to her friends and the other apartments more than I do but she has a good old chinwag on it occasionally
we keep in touch with each other and make sure we're all okay. If one of us is going out, if we want anything from the shop sort of thing.
Just occasionally I've tried it. It's not exactly a comfortable thing to do because it all sounds very artificial.
Oh I contact other people who are living in this block.

Theme 2: Sense of Community Stage 2 Descriptive Categories	
Descriptive codes	**Sub themes**
Technology enables friendships to be formed which enhances wellbeing	
Social connections offer a sense of security and provides reassurance	
Social connections reduce feeling of isolation and loneliness which may decrease inappropriate service use	
Technology for social connections is beneficial for people who live alone	
Technology enables social connections at night time and can decrease loneliness and feelings of anxiety and isolation	
The quality of technology impacts on the relationships formed	

Communication between service users online can lead to face-to-face meetings	The use of technology to form social connections
‘Well yeah it alleviates the feeling of total isolation ‘	
‘I usually get at least half a dozen calls from other people in the block who I have become friendly with.’	
‘we keep in touch with each other and make sure we’re all okay. If one of us is going out, if we want anything from the shop sort of thing.’	
‘Just occasionally I’ve tried it. It’s not exactly a comfortable thing to do because it all sounds very artificial.’	
‘My wife uses it to talk to her friends and the other apartments more than I do but she has a good old chinwag on it occasionally’	
Online interactions can lead to face-to-face social meetings	
Formed communities can lead to the fulfilment of activities of daily living	
The benefits of community	
Geographical communities	
Family communities	
Social care communities	
Technology has the potential to form new communities	
‘Oh I contact other people who are living in this block.’	

‘we keep in touch with each other and make sure we’re all okay. If one of us is going out, if we want anything from the shop sort of thing. ‘ So we have our on-site carer who is, if you press it in the middle of the night, she comes up and talks, so that also proves quite useful	Technology unites people in the same community

Technology and individual need Stage 1 Free Codes
Individual needs can change at night time and are different from the day
Lack of day time service availability at night time
The impact of false alarms on other service at night time (ambulances)
The impact of false alarms on the next of kin of the service user.
Environmental and logistical placement of technology equipment in the home environment
Increased service use can be an indication of unmet needs
The impact of health inequalities and financial ability to fund services
Service provider do not hold personalised information about their service users.
Service users want more from the technology
Physical location of the technology can be a barrier
Portable technology would increase accessibility
Service users ar4e purchasing additional technology to meet particular needs
A blanket approach to technology provision does not cater to individual needs
Individual preference on compliance with technology
Service users perception that they do not need the technology provided
Service user reluctance to use technology as want to be independent
Some service users may not have the cognitive ability to use the technology
Making technology more nuanced may extract from the original simplicity
There is no such thing as a universal design for technology
Service users are purchasing personal technology to meet individual needs
Nuanced technology exists to meet individual needs
Service users can feel scared of and not comfortable with technology

Blanket technology provision.
Service users provided technology even though no necessary need for it
Opposition to a technological future
Technology and implementation is advancing too quickly
Perception that elderly service users are not capable of using technology
Older people own and use personal technology (smart phones etc.), can this be used instead of telecare?
Technology is used for leisure activities
Technology is perceived as a lifeline and offers reassurance
The needs of a service user living alone may be different to a service user living with a spouse
Technology provision is part of the tenancy agreement and not individually considered
Service users are educating and training each other in the use of the technology
Service user perception that the service needs to offer more
Training for the service is insufficient
Service users do not use the technology (falls alarm) as they feel they do not need to
Night time behaviours are different from day time
Cost is a consideration for level of technology purchased
Resistance to technology but moving forward with the flow
Cost of technology and services is viewed as expensive
Service user resentment as provision is compulsory
Functional ability impacts on the use of the technology- all technology is standard and not individually assessed
Service users resent the technology if they perceive they do not need it but it is compulsary
Quotes
I would say that at night time, a lot of service users have hearing difficulties and at night they don't wear hearing aids, so you can get false alarm calls or even genuine calls but it can be difficult to communicate with those service users. They don't have their hearing aids in and you can struggle to work out exactly what has gone on and what the situation actually is.
I think one of the biggest challenges we face at night is that the service users seem to be well controlled during the day whether that be by care staff, housing staff, next of kin, family, they're kind of controlled but unfortunately or fortunately at night, they've napped all day and a great majority of them are wide awake and they're left to their own devices, so they are free, free as a

bird, it’s like a Disney movie out there and they are doing crazy stuff. They are cooking Sunday roast on a Wednesday at 4 in the morning.
you tend to end up either calling their family for assistance now or going to the lengths of calling an ambulance if we’re having no joy and we have received that positive activation from their home.
It can be certainly, so yes if they fall in the bedroom and the main equipment is in the living room, you can sometimes hear quite a blurry noise in the background, I’ve fallen and yes it can be difficult
can’t help you, we’re not here for that, you know, ultimately that is the truth but we don’t just talk to people like that, obviously we do try to find out what’s happening with them, if there’s any support, can we raise a safeguarding issue for them or a concern for welfare and try to get as much support but the sad fact is,a lot of these people are lonely
some pay for a higher service than others and we need to protect that because obviously there would be fines or there would be a dissatisfaction there
I think one of the biggest challenges we face at night is that the service users seem to be well controlled during the day whether that be by care staff, housing staff, next of kin, family, they’re kind of controlled but unfortunately or fortunately at night, they’ve napped all day and a great majority of them are wide awake and they’re left to their own devices, so they are free, free as a bird, it’s like a Disney movie out there and they are doing crazy stuff. They are cooking Sunday roast on a Wednesday at 4 in the morning. We have limited information with regards to maybe their major medical conditions, whether that’s Alzheimer’s or whatever it may be, so we have some. So it is pretty much, normally the kind of bare bones information on them I think one of the biggest challenges we face at night is that the service users seem to be well controlled during the day whether that be by care staff, housing staff, next of kin, family, they’re kind of controlled but unfortunately or fortunately at night, they’ve napped all day and a great

majority of them are wide awake and they’re left to their own devices, so they are free, free as a bird, it’s like a Disney movie out there and they are doing crazy stuff. They are cooking Sunday roast on a Wednesday at 4 in the morning.
So service users cannot understand how to use the equipment properly so they may well hit the alarm inadvertently and then hit it again to try and turn it off but that just results in a follow up call
it would be nice to have access to say, some of the charities and things that deal with issues for people in situations like this.
And there’s one other thing I would like to see would be that the tablet which is fixed to the wall, could be removable.
possibly another site where you could plug it in to keep it charged up and then you could have it in your lap or something if you’re in the lounge, so you can talk to people.
I’ve got a little thing I bought which you set the timer on it and you can have different sounds through the night. So, for example, sometimes I need to hear white noise, sometimes you put on bird sounds and things like that,
I do tend to try and do it myself if I can.
Yeah there will be some people who won’t actually realise or understand the App,
when they launch that emergency call, it can be generated from almost anywhere on the screen whereas if you’re using an individual App, it’s a bit more tricky

Another thing that I find for my own personal use, I mean I have by my bed, I've got a white noise and various noises that I can use to calm myself when I'm having one of my anxiety attacks or panic attacks or something like that and I have white noise
We do currently have units in the field that are exactly like that where their GPS based devices that have an in zone and an out zone that when they trigger past certain points or certain GPS coordinates they then fire a signal through to us at the control room and then we can track them from there all the way up until we have someone directly with them. So it is something, the technology exists.
There are a lot of people who are technophobes and the mere fact that there's a tablet on the wall freaks them out.
I mean I have my fob around my neck usually but I've never yet pressed it once, even to do the checks which you're supposed to do once a month
I think it's all in the realms of fantasy for all this technology.
So yes technology is now taking over and for the very elderly, I feel it's moving too quickly but for someone like myself, I love technology, I'm very good with my hands, it's a totally different story.
people tend to assume that anyone elderly aren't capable of operating this equipment and they're not capable of thinking for themselves and I think you guys have proved beyond any doubt that you know, when people move into sheltered housing or they require some sort of care line system to help them, it doesn't mean that they are completely helpless in all areas of their life
We've got two laptops, two Amazon Fire Tablets, two smart phones, our Wi-Fi printer and a smart TV.
we really just use them for reading books

I don’t think we’re getting enough
it’s almost a lifeline
No we haven’t actually because there’s two of us here, one always looks after the other.
It’s part of the tenancy conditions
actually apart from teaching my wife how to use it.
Well I haven’t felt that vulnerable
Right, I do have to get up to the loo in the night but I have to say I’m greatly blessed. I can have a bad night like anybody can but more times than not, I sleep well.
We have a pendant that we wear which is exceptionally expensive. We have to have it, it’s compulsory to pay for it.
I never wanted a blinking mobile in the first place but then you know, you grow with it and you soon get what they say that people get very attached to their mobile
Well I’m disabled so I can’t stand for more than a few seconds, I have to sit down and if the tablet goes off - I never know what to call it - it’s too high, nobody can see me when I’m sitting down so I’m forced to stand up
So many people here are perfectly okay, so they’re just as normal and they begrudge paying it, it’s something they don’t need or use

Technology and individual need

Stage 2 Descriptive Categories	
Descriptive codes	Sub themes
Individual needs are unmet due to blanket provision of services	Blanket provision and lack of individual assessment for technology services
Technology services are compulsory and provided even when there is no identified need	
Blanket provision offers reassurance to the service user	
Service users are reluctant to pay for services when they feel they do not need it	
Resentment towards the service due to expense	
Service users want more from the technology	
Opposition to a technological future	
Technology services and provision are advancing quickly	
Reluctance to use the services as service users want to be independent	
More nuanced technology services may detract from the original simplicity	
'So many people here are perfectly okay, so they're just as normal and they begrudge paying it, it's something they don't need or use'	
'We have a pendant that we wear which is exceptionally expensive. We have to have it, it's compulsory to pay for it.'	
'I don't think we're getting enough'	
'So yes technology is now taking over and for the very elderly, I feel it's moving too quickly but for someone like myself, I love technology, I'm very good with my hands, it's a totally different story. '	
Increased use of technology at night time may be an indication of unmet needs	
Lack of day time services may impact on the use of the service at night time	

The difference between living alone or living with a spouse	Night time needs differ from day time needs
Cognitive ability and cognitive impairment impacts on the use of services at night time	
Increased inappropriate use of services at night time compared to the day	
Limited access to information about the service user at night time	
Sensory functioning and subsequent challenges at night time	
'I would say that at night time, a lot of service users have hearing difficulties and at night they don't wear hearing aids, so you can get false alarm calls or even genuine calls but it can be difficult to communicate with those service users. They don't have their hearing aids in and you can struggle to work out exactly what has gone on and what the situation actually is.'	
'I think one of the biggest challenges we face at night is that the service users seem to be well controlled during the day whether that be by care staff, housing staff, next of kin, family, they're kind of controlled but unfortunately or fortunately at night, they've napped all day and a great majority of them are wide awake and they're left to their own devices, so they are free, free as a bird, it's like a Disney movie out there and they are doing crazy stuff. They are cooking Sunday roast on a Wednesday at 4 in the morning.'	
'We have limited information with regards to maybe their major medical conditions, whether that's Alzheimer's or whatever it may be, so we have some. So it is pretty much, normally the kind of bare bones information on them'	

Service users are purchasing technology privately to meet needs	Health inequalities
Technology service is viewed as expensive	
Technology exists to meet individual needs but not provided	
Service users resent paying for technology services	
Financial impact of paying for services	
Lack of access to individualised technology solutions	
‘So many people here are perfectly okay, so they’re just as normal and they begrudge paying it, it’s something they don’t need or use’	
‘We have a pendant that we wear which is exceptionally expensive. We have to have it, it’s compulsory to pay for it.’	
‘We do currently have units in the field that are exactly like that where their GPS based devices that have an in zone and an out zone that when they trigger past certain points or certain GPS coordinates they then fire a signal through to us at the control room and then we can track them from there all the way up until we have someone directly with them. So it is something, the technology exists. ‘	
‘I’ve got a little thing I bought which you set the timer on it and you can have different sounds through the night. So, for example, sometimes I need to hear white noise, sometimes you put on bird sounds and things like that, ‘	
‘I’ve got a little thing I bought which you set the timer on it and you can have different sounds through the night. So, for example, sometimes I need to hear white noise, sometimes you put on bird sounds and things like that, ‘	
Technology can be physically inaccessible	
The physical environment can be a barrier to technology use	
There is no such thing as ‘universal design’	

Services users unable to use technology effectively due to functional dysfunction	Environmental and logistical considerations of technology
Technology is not assessed to individual functional needs	
Fixed positioning of the technology unit is a barrier	
Service users want portable devices	
‘Well I’m disabled so I can’t stand for more than a few seconds, I have to sit down and if the tablet goes off - I never know what to call it - it’s too high, nobody can see me when I’m sitting down so I’m forced to stand up’	
‘people tend to assume that anyone elderly aren’t capable of operating this equipment and they’re not capable of thinking for themselves and I think you guys have proved beyond any doubt that you know, when people move into sheltered housing or they require some sort of care line system to help them, it doesn’t mean that they are completely helpless in all areas of their life’	
‘possibly another site where you could plug it in to keep it charged up and then you could have it in your lap or something if you’re in the lounge, so you can talk to people.’	
‘And there’s one other thing I would like to see would be that the tablet which is fixed to the wall, could be removable.’	
‘It can be certainly, so yes if they fall in the bedroom and the main equipment is in the living room, you can sometimes hear quite a blurry noise in the background, I’ve fallen and yes it can be difficult’	

Technology not used as intended

Stage 1 Free Codes
'The boy who cried wolf'
The fourth emergency service
Service is meant for emergencies and acute illness
Lack of formal and standardised training leads to inappropriate use
The service is addressing a need but not the one that is intended
Moral responsibility vs business service level agreements
Service users can lack confidence in using the technology
The impact of inappropriate use of technology i.e. inappropriate use of ambulance service
Service users want education on how to use technology
Frustration at the lack of education and training
Individual assessment would encourage appropriate use of technology in situ
Service users want accessibility which may improve appropriate technology use
Service users call emergency services directly- do they need the telecare service?
Service user experience influences use of technology
Insufficient training and service user education may lead to inappropriate use
Service users are afraid to use service as do not want to use services inappropriately
Quotes
False alarms as well, sometimes service users may activate their alarm or whatever in their sleep or by accident when they get up to go to the loo or whatever which obviously makes it more difficult for us to be able to contact them to check they're okay and potentially raising alarms unnecessarily.
because one day, that lady that calls a thousand times for relatively menial things is actually going to press a button because she really needs us.
There's a lot of calls there that aren't emergencies.
I mean they should be telling them that it's there for emergencies, if they're unwell, if they need an ambulance, they need a doctor, they need a family. I don't know if that's always the case

they’re lonely and they can’t get to the kitchen and they’re stuck in their chair and it’s not really an emergency but if I just press it then I’ll just speak to Emma and she’s so lovely and she’ll just call someone and so on.
by pressing the alarm they are guaranteed to get a human intervention of some description which at night time, as Gavin said, if you’re on your own and you’re struggling to get up to make your cup of tea, you’re struggling to get out of your chair, you might well just press the alarm to say I’m struggling. It’s not really part of our remit but those are the calls we do end up kind of fielding overnight
Now, it’s always a tricky one, we are a business, so therefore the quicker we can answer calls and the quicker we can clear the line, the quicker we can get to the next call and so on and we can provide those service levels for our customers and so sometimes it has to be said, we have to say to service users, there is nothing more we can do to help you…
Since I’ve been in here, I’ve only had one fall and I didn’t use it. I haven’t actually, as yet used the function for seeking assistance
Or whatever it says, I can’t remember the difference, I always forget. It’s simple if you know what you’re doing but I suppose it could be a bit trial and error
But what happens for someone who has no next of kin? In that case we would be calling emergency services to check on them. That again is, in some cases, is a waste of service use.
Would it not be a lot simpler if whenever people are accepted and they do all the procedures, whether they’re not just taught how to use the blooming thing and taught not to be afraid of it

and that they can't break it, we hope and just for them to get used to it and to learn what it can do and what it does do and what it doesn't do.
Yeah I do get that and then obviously the mention as well with regards to the assessment of what type of alarm that goes into the property, that could also help to identify any care needs or extra support that's also needed.
Yeah, so if you did need anything like that, you would call it yourself, directly rather than go through ...? P: Yeah.
And once I was told I'd been put on hold and I'm thinking why press it for an emergency and then get put on hold.
Absolutely not. And I was the very first person to move into this block and she said then, I'll come up and show you and she never did and then once, I remember, Sharon was walking past my door, so I said Sharon just come in and show me this and she went through it but because she's deaf, it was very difficult to communicate...looking at the screen on the wall because she can't lip read and at the end, when she left I was no better off than before she came in.
She's frightened of calling them in an emergency when it isn't an emergency.

Theme 4: Technology not used as intended Stage 2 Descriptive Categories	
Descriptive codes	Sub themes
'The boy who cried wolf'	
Misuse of resources and time when responding to inappropriate calls	

Individual assessment and provision of technology may reduce inappropriate use of services	Inappropriate use of technology service
Service providers are meeting a need but not one that is intended	
Service user reluctance to use service for fear of using inappropriately	
Lack of triage and prioritisation of calls	
The financial implications of inappropriate calls to the service provider	
Ethical dilemma:	
‘because one day, that lady that calls a thousand times for relatively menial things is actually going to press a button because she really needs us.’	
‘There’s a lot of calls there that aren’t emergencies.’	
‘Now, it’s always a tricky one, we are a business, so therefore the quicker we can answer calls and the quicker we can clear the line, the quicker we can get to the next call and so on and we can provide those service levels for our customers and so sometimes it has to be said, we have to say to service users, there is nothing more we can do to help you…’	
‘which is a hard conversation to have, it’s tough but it’s true and the way that we rationalise that is that when there’s a queue of calls on the board and I say board, it’s just a TV monitor with all the little queues jumping up and down, one of those is a heart attack, one of those is somebody who can’t breathe and we’re talking to Doris who hasn’t had her cocoa and you know, we do, not me personally because I’m a coach now but the frontline operators, including Emma and Chris and the front, their levels of	

responsibility are just massive to make that judgement call. When do I let Doris go because Mr Brown is sitting there clutching his chest right now and I need to get to him? It's tough, it's a tough call for them to make but it's one they make every night.'	
'In that case we would be calling emergency services to check on them. That again is, in some cases, is a waste of service use.'	
'She's frightened of calling them in an emergency when it isn't an emergency.'	
There is a lack of formalised training for technology service	Education and training
Service users want training on the technology	
Lack of training could lead to inappropriate use of the service	
Frustration at the lack of education and training	
Service users report they teach each other to use the technology equipment	
The challenges of providing training for service users with cognitive impairment	
Communication challenges and training	
'I mean they should be telling them that it's there for emergencies, if they're unwell, if they need an ambulance, they need a doctor, they need a family. I don't know if that's always the case'	
'Would it not be a lot simpler if whenever people are accepted and they do all the procedures, whether they're not just taught	

how to use the blooming thing and taught not to be afraid of it and that they can’t break it, we hope and just for them to get used to it and to learn what it can do and what it does do and what it doesn’t do.’	
‘Absolutely not. And I was the very first person to move into this block and she said then, I’ll come up and show you and she never did and then once, I remember, Sharon was walking past my door, so I said Sharon just come in and show me this and she went through it but because she’s deaf, it was very difficult to communicate…looking at the screen on the wall because she can’t lip read and at the end, when she left I was no better off than before she came in.’	
False alarms are a prevalent issue in the technology service	
The impact on cognitive impairment on false alarms	
False alarms take up time and resources	
Night time behaviours and false alarms	
The impact of false alarms on other services	
The impact of false alarms on the next of kin	
The physical used of equipment and false alarms	
‘But what happens for someone who has no next of kin? In that case we would be calling emergency services to check on them.	

That again is, in some cases, is a waste of service use.'	The impact of false alarms
'I mean they should be telling them that it's there for emergencies, if they're unwell, if they need an ambulance, they need a doctor, they need a family. I don't know if that's always the case'	
'There's a lot of calls there that aren't emergencies'	
False alarms as well, sometimes service users may activate their alarm or whatever in their sleep or by accident when they get up to go to the loo or whatever which obviously makes it more difficult for us to be able to contact them to check they're okay and potentially raising alarms unnecessarily.	