© The Authors 2022 International Practice Development Journal 12 (2) [8]
fons.org/library/journal-ipdj-home

International Practice Development Journal

Online journal of FoNS in association with the IPDC and PcP-ICoP (ISSN 2046-9292)

ORIGINAL PRACTICE DEVELOPMENT AND RESEARCH

Successful healthcare technology requires person-centred relationships and contexts: case narratives on medication-dispensing systems

Teatske van der Zijpp*, Shaun Cardiff, Marianne Nieboer, Christi Nierse, Sanne Schepens, Hélène van den Nieuwenhoff and Suzanne Keizer

*Corresponding author: Fontys University of Applied Sciences, Netherlands
Email: t.vanderzijpp@fontys.nl

Submitted for publication: 9th March 2022
Accepted for publication: 15th August 2022
Published: 23rd November 2022
https://doi.org/10.19043/ipdj.122.008

Abstract

Background: Providing person-centred care with a limited workforce is a major challenge in our ageing society. While care technologies such as electronic medication-dispensing systems are a means to help older persons with chronic conditions continue living independently, few studies have explored their implementation and use from a multiple stakeholder perspective. This prompted six Dutch care organisations and a university of applied sciences to collaborate in the Living Longer @ Home practice development project.

Aim: To explore the influence of medication-dispensing systems on service user self-reliance and self-determination, as well as on professional and informal carer workload, in the community setting.

Methods: A total of 14 case studies were used to understand the complexity and particularity of medication-dispensing systems in community care. Case narratives were constructed by (supervised) nursing students, then collated, and critically and creatively analysed by university- and practice-based researchers.

Results: The case narratives reveal that while technology can increase self-reliance and self-determination for service users, it can also raise (new) concerns about medication safety and social isolation. Even after careful medication-dispensing systems indication, introduction and implementation, carer workloads may simply be changed rather than reduced. The dyadic and triadic relationships are affected as roles and responsibilities change, and trust may need to be rebuilt.

Conclusions: Working with medication-dispensing systems entails more than implementing a piece of technology. While these systems can increase the duration of safe independent living, their effect on the lifeworld of those involved also needs to be considered and prepared for. A person-centred and relationship-oriented as opposed to task-orientated approach is advisable.

Implications for practice:

- Before the introduction of care technology, nurses should discuss its impact on service users, informal carers, themselves and the dyadic/triadic relationship
- Practitioners, managers and technicians should collaboratively integrate care technology into community care services
- (Supervised) construction of case narratives enables workplace learning and practice development

Keywords: Medication-dispensing systems, narratives, community nursing, case study, practice development, technology

Introduction

Ageing societies in the developed world are facing a steady increase in the number of older persons no longer able to live independently, alongside an understaffed healthcare workforce (World Healthcare Organization, n.d.). As physical, psychological and social problems arise, so does the need for long-term care, be it home care, community nursing, assisted living, residential care or long stays in hospital. This is creating unprecedented and complex challenges for older persons, their families and health and social care systems. Although Western governments have invested heavily in ICT-guided healthcare tools and services over the past decade, healthcare organisations, researchers and policymakers are expressing a sense of urgency for supportive technology to meet these challenges (Stokke, 2017, 2018; Ministry of Health, Wellbeing and Sport, 2018a, 2018b, 2020; Demiris et al., 2020; de Visser et al., 2021). The desired targets of technology in healthcare include the facilitation of active ageing, independent living and self-determination, as well as preventing or delaying admission to long-term care, thereby reducing financial costs for the system and workforce demands. Alongside this is a call for humanistic framing of healthcare systems, from the macro level of policy to the micro level of care delivery by healthcare practitioners (Phelan et al., 2020). Practice development is an approach to healthcare transformation that can accommodate these technological and humanistic aims as it is 'fundamentally about person-centred practice that promotes safe and effective workplace cultures where all can flourish' (Manley et al., 2021, p 3). Its collaborative, inclusive and participatory approaches to workplace learning, evaluation and transformation ensure attentiveness to the needs of everyone involved in enabling older persons with complex and chronic conditions to live as independently and as long as possible at home. As well as for the older people themselves, the use of technology in healthcare has consequences for staff, who must adjust their practice to accommodate its use, and for organisations, who are confronted with new costs and new jobs or roles that need to be developed.

One form of support technology is electronic medication-dispensing systems (MDS). Many older persons need multiple medications on a daily basis, and comorbidity as well as physical or cognitive impairment can threaten their independence. The ability to self-administer and adhere to a medication regimen is necessary for safe and effective treatment at home (Cross et al., 2020), so when a person's ability declines, self-care is usually supported by informal and/or professional input in the community. Over the past decade, a wide range of promising in-home electronic MDS have been developed, with integrated assistance such as audio and/or visual reminder alarms, automated pill dispensing and real-time adherence monitoring (Kamimura, 2019; Ahmad et al., 2020; Zijp et al., 2020; Arain et al., 2021). Several issues around the use of MDS among older persons with chronic conditions have been studied, such as product design and user perspectives on dispenser attributes such as size, ease of use, reliability and technical robustness (Patel et al., 2020; Zijp et al., 2020). Some studies have raised concerns about ensuring the correct medication and dose is taken regularly and on time, as well as the impact on caregivers' perceived burden (Kamimura, 2019; Arain et al., 2021). One thing is clear, appropriate training of professionals, informal carers and older persons is needed before and during implementation of MDS, with ongoing training afterwards (Hall et al., 2016; Pihlainen et al., 2016; Glomsås et al., 2020). The promotion of MDS can negatively influence the patient-caregiver relationship if either fears that technology is dehumanising care by replacing physical care with technological interventions as a cost-reducing strategy whereby relational trust may be negatively affected (Nakrem et al., 2018; Kleiven et al., 2020). This emphasises the importance of the user involvement and shared decision-making characteristics of person-centred care (Glomsås et al., 2020). Responsibility, regulation and funding issues will also arise (Hall et al., 2016; Rasi et al., 2021) as will the impact on workload (Patel et al., 2020). While these studies demonstrate the importance of technology in extending safe independent living, they also draw attention to the importance of user-friendliness and input of all stakeholders during development and implementation.

As a complex methodology, practice development promotes the use of various forms of evidence to inform transformation. The Promoting Action on Research Implementation in Healthcare Services (PARiHS) framework (Rycroft-Malone et al., 2013) explicates how multiple sources of knowledge (propositional, experiential and local), alongside attentiveness to contextual factors such as culture, leadership and evaluation, should be used to facilitate an appropriate change. Despite the increasing number of MDS being employed in practice, few studies have explored their implementation and use from multiple perspectives. This prompted six Dutch care organisations and a university of applied sciences to collaborate in a practice development project: Living Longer @ Home.

Aims

The overall project aim is to develop a more person-centred approach to the use of supportive technology use within community care. This article presents an initial goal of gaining multiple stakeholder insights into the influence of MDS usage on older persons' self-reliance and self-determination, as well as on professional and informal carers' perceived workload.

Methodology and methods

The Living Longer @ Home project is underpinned by the critical social science assumption that people are relational and embedded in contexts, having the potential to co-create or transform their social world for the better (Fay, 1987). Using a practice development methodology, there should be a focus on person-centredness so all can flourish through the collaborative, inclusive and participatory approaches to knowledge generation, application and workplace transformation (Manley et al., 2021). To transform the way MDS technology is being used in community care, it was decided that more insight was needed into current stakeholder perspectives. The resultant increase in awareness would lay a foundation for empowerment to change what is considered undesirable, and foster emancipation from that which may be holding people back, as is the aim of critical social science (Fay, 1987). In this article, we present the practical knowledge gained – that is, an understanding of stakeholder views of the way things are currently done. This knowledge can then be used to generate critically informed actions in practice.

The overall design was a collaboration between a university-based knowledge centre for person-centred practice, and 12 healthcare organisations (Fontys University of Applied Sciences, n.d.), of which six contributed data to the research. Leaders from each organisation formed a steering committee that gave advisory direction and monitored the inclusion of multiple interests. The overall project was designed using a global framework that could be contextualised to accommodate the needs and particularities of each site and participants. It was agreed that case narratives would be the most useful way of understanding multiple stakeholder perspectives. These reconstructions of stories told and actions, events and happenings observed, weave multiple elements and perspectives into a rich, coherent and temporally organised description of a reality. The narrative presentation helps understanding of the complexity and particularity of a thematic thread/subject matter (Abma and Stake, 2014) – in this case, the use of MDS support for older persons living independently at home. Narratives help answer questions about context and relationships, as they capture processes in detail and address the view that thematic approaches ignore context or differences between individual accounts (Rodríguez-Dorans and Jacobs, 2020). The case narratives were constructed by second- and fourth-year bachelor of nursing students during their internship at one of the partner care organisations, between January 2019 and June 2021. Student preparation and supervision was facilitated by a research team and included instruction manuals, tutorials and consultations. Each case narrative represented a single case (unit of study), telling the story of MDS technology in the care of an older person (phenomenon of study) from multiple perspectives, over an extended period of time. Member-checked case narratives were subsequently collated and analysed by a group of university lecturers and project staff from the healthcare organisations.

Participants

Participant inclusion was emergent, determined per case as events unfolded; for example, if a pharmacist became involved, they would be invited to participate. After identifying and recruiting a service user, students were encouraged to use a non-probability sampling strategy to gather data from those engaging with or affected by the MDS technology. The inclusivity principle of practice development meant stakeholder perspectives could potentially include those of pharmacists, technicians, manufacturers and managers. Despite the various techniques for non-probability sampling, the students predominantly used convenience and voluntary response techniques to recruit service users, their significant others and community care staff. All participants were informed about the study and invited to share their experiences. Written consent was obtained at the beginning, after which consent was sought before each data-collection moment and participants were observed as and when they gave permission.

Data gathering

Data gathering took place during a 10-week internship for second-year students, and a 10-month internship for fourth-year students. Respecting their freedom to learn, students were free to decide when to gather data during their project/research study time as project leader, or during their clinical practice time in the role of carer. They also determined which data-gathering methods they wanted to use; multiple methods from multiple participants and at multiple moments across time could be employed during their internship. While students were facilitated in learning about various methods such as interviewing, surveying, participant observation and practice journaling, narrative interviewing was the predominant method chosen. Students were trained by the research team in a narrative interviewing technique based on Riessman's (2008) work.

Data analysis

To ensure rigorous construction of case narratives, students followed a five-step guideline based on Braun and Clarke's (2006) thematic-analysis method. In step one, all data were transcribed, read and re-read to familiarise the student with the 'whole story'. In step two they were encouraged to creatively express their understanding and visualisation of the whole story using a collage or storyboard. Transcripts were then coded and codes clustered into initial themes in step three, before review for coherence and the addition of citations to the codes in step four (see Table 1). Step five involved re-checking that themes were complete and demarcated so that a resultant thematic framework could help structure and guide the writing of core paragraphs in the narrative (see Box 1). Original participant language and descriptions were used as far as possible.

Table 1: Example of theming with coding and citation

Theme	Codes	Example citations
Building mutual trust	Client and significant other trust in automated help for medication administration	*'For them [service users] it was a big thing that all at once it [medication administration] was automated. But OK, I think if you facilitate the informal carer and family well, you can get a long way ahead. They need to build that confidence.'* (Carer 1, Dec 2020)
	Trust that time will be made available for training	*'But will we actually get the opportunity to work with them [client] for two weeks, because that also means: who's paying for that extra time?'* (Carer 1, Dec 2020)
	Relatives have no confidence in service user's self-reliance	*'I discussed it with my brother and sister, and we're pretty much unanimous that mother isn't going to be able to do that... she still thinks she is very good, whilst she isn't, of course, but she's pig-headed, a bit of a special case. […] she's got keeping up appearances down to a tee, she has always been like that, so yes, you can't compete with that.'* (Family 1, Nov 2020)
	Daring to ask one another for help	*'Some people find it difficult to ask for help from other colleagues'* (Carer 2, Nov 2020)
	Trust in the transfer of knowledge about MDS from professionals to relatives	*'I think it is very important to let the community carers explain it properly, because I think she trusts them the most.'* (Family 5, Nov 2020)
	No control of medication intake	*'… it must be trusted if there is no control from us because we feel that the person can do it him- or herself.'* (Carer 1, Dec 2020)

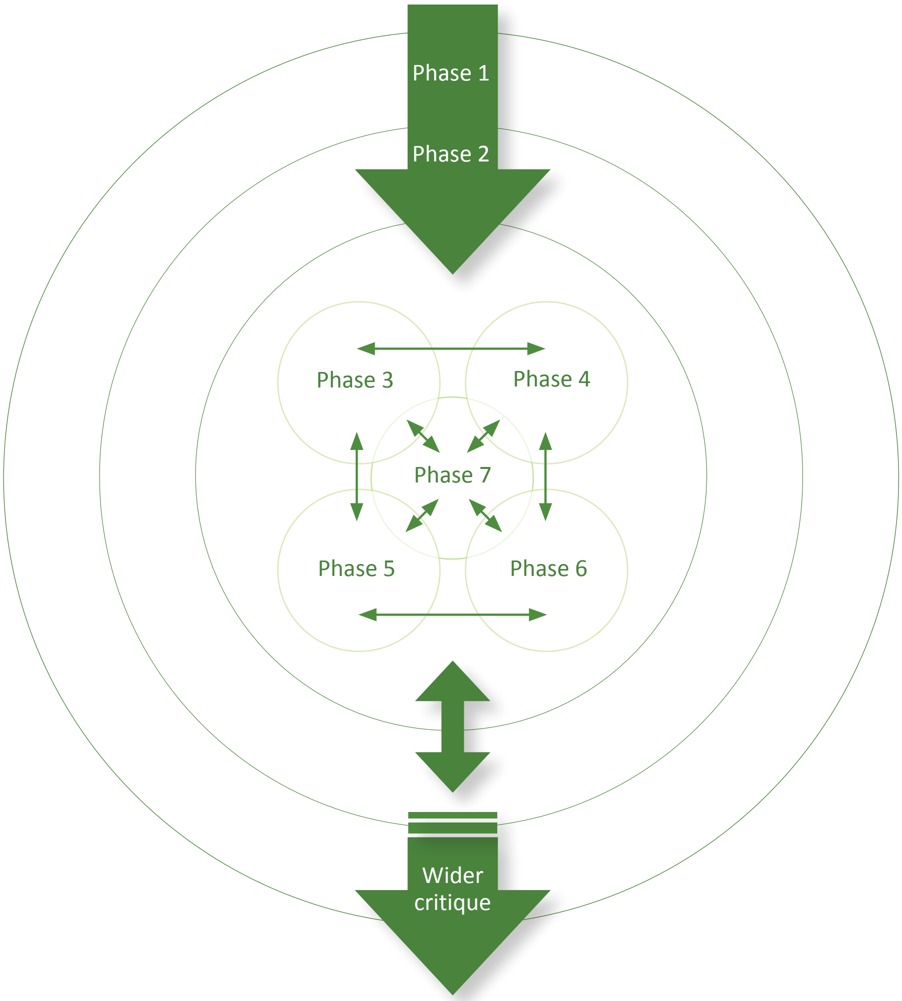
Box 1: Case narrative core paragraphs reflecting the theme 'Implementation-related workload and building trust'

'Mr Smith has home visits from community carers every morning and evening, so is often visited by different caregivers. Every carer has her own way of working, whereby the MDS is operated in different ways. The carers seem to be unclear about who is responsible for what, or who to contact in case of problems with the device.

'Mr. Smith has the impression that there is a lot of confusion among the community carers because each carer started to work with the MDS in her own way and they were working alongside each other instead of with each other. In the eyes of him and his girlfriend, it was as if the carers lost oversight at a certain point along the way. Because each caregiver tried to solve problems with the device in their own way, it had the effect that Mr Smith and his girlfriend increasingly withdrew from operating the MDS.'

A team of six university lecturer/researchers and two researchers/project staff from one partner healthcare organisation (SS, SK) collated and analysed the case narratives. The mix of researchers help ensure the analysis was not too academic or practice focused. All researchers had been involved in student teaching and/or supervision. Following the critical and creative hermeneutic analysis method (see Figure 1) the team members were comfortable in moving back and forth between phases as they contested proposals and sought consensus on the patterns emerging across the case studies for an overarching framework. The final thematic framework is presented in the results section of this article.

Figure 1: Critical and creative hermeneutic analysis method (Cardiff and van Lieshout, 2014)



Phase 1: Preparing raw data as case narratives and inviting student nurse participation as co-researchers
Phase 2: Participant familiarisation with the narratives to get an intuitive grasp of the meanings embedded within the texts.
Phase 3: Participant contemplation – using a variety of techniques to quieten the mind and contemplate (dialogue with self) the thoughts, feelings, and images evoked by the texts.
Phase 4: Creative expression of the 'essence' of the narratives, as a whole, in whatever creative way feels comfortable. Individual expressions may also be merged into one new expression.
Phase 5: Sharing interpretations and critically (yet respectfully) questioning the individual/collective expressions, bearing in mind the research question to be answered.
Phase 6: Blending interpretations into a collective thematic framework. Returning to phases 3, 4 or 5 as necessary before agreement is reached.
Phase 7: Confirming themes by returning to the data and retrieving supportive, additive or contradictory citations. Again, this may instigate a return to previous phases until agreement is reached on the final thematic framework with rich description of the themes.

Ethical considerations

Although ethical approval was granted by the university's ethics committee, multiple strategies were encouraged to enhance ethics, as recommended in person-centred research (Petrova et al., 2014). All service users, significant others and professionals were informed about the project and consent obtained to study their situation before data gathering commenced. Alongside standard informed consent procedures, process consent was given much attention. Discussions were held with students on the importance of building trust and obtaining consent before each data-gathering activity, even if participants had already given informed consent. This enabled students to better sense participant hesitancy, surface questions and alleviate fears. The narrative interview technique, designed to enable interviewee control over the interview process, also fostered ethical action, as did member checking of case narratives before they were used in the critical and creative hermeneutic analysis process.

All data and case narratives used fictive people and organisational names. Students chose whether or not their case narrative could be used in this study and the decision had no influence on their portfolio assessment. Student internships were assessed by lecturers not participating in this study.

Results

In total, 12 narratives (of which two contained two cases) were gathered from six different organisations by six second-year and seven fourth-year students. The narratives described the use of MDS technology in the care of seven male and seven female older persons living independently but with reduced ability to self-manage their medication regimen. Various data-gathering methods were used (see Table 2) and two narratives described the use of two MDS applications. All but one case narrative contained multiple perspectives, but the predominant perspectives were those of service users, professionals and informal caregivers.

Table 2: Case narrative characteristics (n=12)

Service user gender (age)	Living circumstance	Informal carer	MDS indication	Professional	Bachelor student(s)	Data-gathering method(s)	Narrative time period[†]
Female (88)	Alone	Daughter- in-law	Support medication intake; self-determination	Not included	Second year	Interview	Previous two weeks
Female (unknown)	Alone	Neighbour	Support medication intake; self-reliance	Nurse	Second year	Interview	Previous two weeks
Female (unknown)	Alone	Daughter	Forgets to take medication	Nurse	Second year	Interview	Previous two weeks
Female (80)	With husband	Husband	Medication compliance; self-determination	Nurse	Second year	Interview	Previous two weeks
Male (unknown)	Alone	No one	Self-determination	Nurse/carer	Second year	Interview	Previous 18 months
Male (unknown)	Alone	No one	Support medication intake; self-determination	Nurse	Second year	Interview	Previous two weeks
Female (89)	Alone	Daughter	Unknown	Not included	Fourth year	Interview	Present/future
Male (84)	Alone	Son	Forgets to take medication; burden to son	Not included	Fourth year	Interview	Present/future
Not included	Not included	Not included	Pre-implementation	Nurses/carers	Fourth year	Interview	Previous eight months
Female (93)	With son	Son	Forgets to take medication; problems opening packaging; independence	Nurses/carers	Fourth year	Observation; interview; questionnaire	Previous four weeks
Male (82)	Alone	Daughter	Independence	Nurses/carers	Fourth year	Observation; interview	Previous eight weeks
Male (75)	Alone	Wife	Independence; burden to wife				
Male (88)	Alone	Girlfriend	Reminder for medication intake	Nurses/carers; pharmacist; technicians	Fourth year	Observation; interview; focus group; patient records; practice journaling	Previous three months
Male (82)	Alone	Daughters	Self-reliance despite mild cognitive impairment; difficulty opening packaging	Nurses/carers; manager; innovation manager	Fourth year	Observation; interview; focus group; patient records; practice journaling	Previous five weeks
Female (84)	Alone	Not included	Self-reliance despite mild cognitive impairment; medication safety				

[†] *The period of time covered by the narrative*

Three main themes emerged from the critical and creative hermeneutic analysis:

- Increased self-reliance and self-determination but perceived risk to medication safety
- Implementation-related workload and building trust
- Changing roles and responsibilities within the triadic (service user-informal carer-professional carer) relationship

Self-reliance, self-determination and medication safety

MDS appeared to be a suitable means of supporting self-reliance and self-determination for persons who could still do a lot for themselves but occasionally forgot things such as taking their medication. Service users, informal carers and professional carers tended to associate self-reliance with self-administering medication, while self-determination was more often associated with self-control over the medication regimen. Perceptions about the influence of MDS on service user self-reliance and self-determination varied among and between stakeholder groups, but were generally positive.

With regard to self-reliance, many service users expressed a desire to continue doing everything they could for themselves, despite increasing (cognitive) limitations in their 'being'. They did not want to be reliant on others, even for complex medication regimens. For some, the MDS reminder signal helped structure their day, and one carer felt it raised awareness about what medication was taken at what times. One daughter described how MDS helped her father cope with a complex regimen; where he was unable to 'see the wood for the trees' and had become reliant on community care visits with variable visiting times, MDS helped him regain some self-reliance.

Self-determination was usually discussed in relation to regaining control over the medication process and a person's privacy. No longer having to 'wait at the kitchen table for the carers to arrive' fostered feelings of being able to determine what their own day would look like. Some informal carers also experienced a sense of freedom as they were relieved of a care task or burden. One no longer worried about what would happen if he were unexpectedly unable to administer his father's medication. For another lady, MDS meant she could now spend more time in her own home and not worry about her partner's medication.

While acknowledging the benefits of MDS for service user self-reliance and self-determination, some (informal) carers raised concerns about medication safety. There were several narratives in which the service user was convinced they could safely manage their own medication regimen, but their informal and professional carers had strong doubts and concerns. For instance, one professional carer noticed a service user tampering with the MDS medication sachets. When asked, the person explained how she wanted to determine when she took her medication and not have to wait for the MDS to dispense it. Another service user frequently wore headphones due to an hearing impediment, which meant she sometimes missed the MDS reminder signal and so did not take her medication at the prescribed time.

To summarise, while a sense of freedom and control over the medication process was valued and experienced by many service users, some carers had safety concerns in some situations.

Implementation-related workload and building trust

The case narratives revealed that while there was often an expectation of lower workload, the implementation of MDS could in fact negatively influence carer workload. At the individual service-user level, implementation required professional carer time to actively work (hands-on) with service users and build trust so the technology could become part of their daily (self-)care regimen. Some professionals shared how organising 'try outs' helped generate experiential knowledge with the service user, positively influencing perceptions about the value of MDS. However, other narratives revealed that a smooth implementation, with effective collaboration and communication between technicians and community carers, was not the norm.

Despite some expectations that MDS would save time with some service users and thereby create time for others, few professional carers expressed having 'won time'. In terms of workload, community carers generally talked of having to reschedule home visits, recategorise reasons for visiting a service user or having new tasks to complete. For instance, additional visits were often needed to refill the roll of medication sachets, and sometimes home visits were still required as some medications could not be dispensed via MDS.

Although most professional carers found MDS straightforward and user friendly, some said they initially experienced an increase in workload as no time had been set aside in their existing schedule to learn about MDS. While some felt the manual was clearly written and offered good support, this often related to how 'technical' the carer saw themselves as being. At a system level, a lack of technological training and expertise among care staff did contribute to a sense of increased workload if there was and MDS malfunction. Not only did the professional carers often have to phone around for instructions or support, they also had to reschedule visits with other service users. The narratives revealed that particularly during the early stages of MDS introduction, there was a lack of preparation and training for professional carers, leading to ignorance, careless communication, variations in how MDS was used and further malfunctioning. Professional and informal carers wanted more support techniques to boost their self-efficacy. Suggestions included: (video) manuals and face-to-face demonstrations on how to operate and refill the MDS, information about purchase reimbursements as well as an (expert) 'contact person' to solve any problems and train service users/informal carers. The participants felt that such support, alongside key stakeholders' evaluations, would help build the trust needed for a smooth implementation.

Malfunctions also highlighted the importance of role clarity: who was responsible for what? A lack of clarity negatively influenced workload and trust, with malfunctioning during the introduction period particularly problematic in this respect. There were stories of professional carers being unaware of what colleagues had previously done to deal with problems, resulting in sometimes lengthy phone calls to resolve issues. One service user became so irritated by repeated MDS malfunctions that he stopped calling the community carers and used the 'reserve' medication sachets to self-medicate. This incident did trigger a collective response from the community team, who sought contact with the supplier and once repairs had been made and adequate support initiated, the person did resume using MDS. He later reasoned that occasional malfunctions were 'part and parcel of technological innovation' and that time and patience is needed to address initial 'teething problems'.

To summarise, when the implementation of MDS is not accompanied by training and ongoing expert support, it can increase rather than decrease carer workload and trust in the technology. The narratives also made apparent the need for a tailored implementation process so that the right person (professional, informal caregiver and/or service user) is involved at the right time and for the right reason. For instance, some (professional) carers expressed concerns about the appropriateness of MDS for those living with more advanced stages of dementia as it can lead to greater distress than self-reliance. They viewed the technology as unsuitable for those who could no longer adequately respond to external triggers such as the MDS reminder signal, and said it should preferably be introduced while the person is still able to learn a new routine.

Changing triadic relationship

The previous themes illustrate the impact of MDS on the lifeworld of individuals. It creates changes to the structure of daily (working) lives as well as perceived self-reliance, self-determination and workload. Regardless of the introduction process, the case narratives revealed that MDS can also alter roles and responsibilities, and mutual trust may need to be rebuilt.

Carers described how MDS instigated a review of roles and responsibilities, as well as 'learning to let go' in order to enable service user self-determination. Some informal carers continued daily visits to check medication intake or, as one daughter said, 'phoned more often to check that he [father] was okay'. Many professional carers saw the visits to refill the MDS medication sachet rolls as sufficient to assess the home situation and screen for potential problems. Their role during home visits was now less about 'controlling' medication intake and more about 'anticipating and monitoring' the consequences of MDS on medication intake, health and wellbeing. They found themselves searching for a new form of presence, when to be active and when just available. Even when tasks could be easily handed over to informal carers or service users themselves, they maintained a moderator role. Some aspects were unexpected, such as consulting on the suitability of MDS, which device to choose, whether to hire or buy, and coordinating contact with other professionals such as the pharmacist. Other responsibilities were less welcome as they extended beyond their expertise, such as teaching service users and/or informal carers how to operate MDS, troubleshooting and mediating for technical support.

The need for fewer home visits did raise new concerns about social isolation. For example, one service user called her relative more frequently, asking her to visit. Another service user expressed feelings of anxiety and distrust as 'everything is automated and fewer people visit because of these devices being used'. Such experiences contrasted with those who welcomed the decrease in professional carer visits, and the informal caregivers who were pleased to visit without having to perform a care task.

To summarise, the indication, introduction and maintenance of care technology impacts on existing roles and responsibilities around service users' health and wellbeing. While some welcome fewer home visits, others feel unprepared for new tasks and issues. In the first theme, the value of service users' self-reliance and self-determination was seen by some as coming at the cost of safety concerns; this theme adds changes to the triadic relationship and social contact to the list of potential downsides.

Discussion

Person-centred practice draws attention to the meaning and importance of personhood in healthcare, supporting service users' right to self-determination as well as the formation and fostering of healthful relationships between all involved (McCormack et al., 2021). The case narratives on MDS technology in Dutch community care highlight the importance of knowing, engaging and respecting all involved in the healthcare system in order to deliver person-centred care and create cultures where each person can come into their own and have positive experiences. The introduction of MDS has consequences for individual service users, their informal and professional carers, and the triadic relationships. While some in this study viewed MDS technology as increasing service user self-reliance and self-determination, as well as reducing carer workload, others found additional concerns about medication safety, social isolation, and changing roles and responsibilities. Even after careful indication, introduction and implementation of the technology, some effect on dyadic and triadic relationships was inevitable. Consideration of the use of support technology in healthcare should therefore trigger critical questioning about the purpose of the suggested technology for a person, in their particular circumstance and at that particular time, as well as the consequences for others involved.

Although complete consensus about the value of MDS was not evident across the case narratives, there was substantial agreement that MDS positively influences service users' self-reliance in structuring their day and adhering to complex medication regimens. This supports previous studies demonstrating how MDS can improve adherence among persons living with chronic conditions and who take more than four different medications a day (Arain et al., 2021). Our narratives also revealed how technology can enable service users' self-determination, giving them greater control over the medication process compared with home visits by professional or informal carers. The consequences of reduced interventional visits can induce feelings of freedom as people regain their privacy, and informal caregivers are relieved of a care task. This is often expressed as the empowering effect of technology for service users, particularly those who value their independence (Nakrem et al., 2018) and a reduced burden of care for informal caregivers (Kamimura, 2019). However, our findings also revealed that differing perceptions and interpretations of self-reliance and self-determination can influence judgements on the benefits of MDS. Although we did not come across stories of service users feeling embarrassed about their reliance on MDS or playing down the need for technological assistance (Kamimura, 2019), some did feel that MDS restricted flexibility in their medication regimen. Such narratives affirm the importance of exploring the meaning and consequences of MDS for each service user, in their unique context. As with the work of Nakrem and colleagues (2018), our narratives reveal how the introduction of MDS influences the service user-caregiver relationship. Previously established relational trust can be threatened when a service user does not understand or agree with MDS, and 'who is now responsible for what' will always need to be reviewed within triadic relationships.

The aim of practice development and person-centred practice is for all to flourish, so the potential consequences of MDS for all involved should not be overlooked. Informal and professional carer attitudes and perceptions need to be explored and attended to if there is to be smooth implementation of support technology into the care system. Expectations should be realistic; there was a notable lack of carers expressing having 'won back' time, and all narratives highlighted the importance of preparing for role and responsibility changes. A possible explanation for the lack of perceived time benefit is that during the data-gathering period, teams were still investing in learning about and getting to grips with the technology and its implications. They were yet to experience the potential rewards of a fully functioning MDS system. Unfamiliarity with technology and feeling unsupported may have fostered fears about the service user-carer relationship, a known barrier to adopting technology in care (van der Zijpp et al., 2018). Also, a person's values, beliefs and history with technology in general will influence their openness to engage positively with MDS. For example, some service users reacted positively to MDS when it was introduced as a means of continuing their self-management, while others only when it was introduced as a replacement for professional carer visits. What our findings clearly highlight is that perceptions about care technology are personal but can evolve over time. A person-centred approach and a focus on creating positive care experiences are advisable, as previous studies have shown such experiences have a positive influence on perceptions of care technology (van der Zijpp et al., 2018; Kleiven et al., 2020).

At the system level, a lack of technological training and expertise among professional carers, as well as a lack of clarity on who to call about malfunctions, only adds to negative workload perceptions. Our narratives support the importance of attending not only to service users' needs, but also those of the carers. Clarification around device funding and maintenance support were just some issues that could positively impact carer experiences and receptiveness to changed responsibilities, but role clarity needs to be systemwide as new ways of thinking about care and rescheduling workloads are unavoidable (van der Zijpp et al., 2018). Although limited stakeholder perspectives were included in the narratives, the incidents described demonstrated a broad network of people involved in the delivery of care using support technology. Fostering mutual trust should therefore extend beyond the triadic relationship at the point of care delivery, and include other stakeholders such as technicians and pharmacists. Previous studies have already demonstrated that negotiating practical and organisational support, alongside changes to existing work processes, promotes healthcare professionals' trust in MDS and its contribution to safe and good care (Brewster et al., 2014; Pihlainen et al., 2016; Glomsås et al., 2020; Kleiven et al., 2020). Shared decision making about redistributing tasks and responsibilities among professionals, service users and their social support systems is also vital to the introduction of technological support (van der Zijpp et al., 2018; Rasi et al., 2021). Such dialogues and negotiations at individual and system levels help create collective awareness and engagement so the needs of the person are met at the right time and under the right conditions; a person-centred approach.

Strengths and limitations of the study

We found working with student case narratives to be a powerful and meaningful way to illuminate multiple perspectives and enable a collective understanding of the complexity and particularity of MDS among students, carers and educationalists. The prolonged engagement of students with participants during their internship contributed to the credibility of results. However, while students had sufficient time to build trust and rapport with participants before gathering data, initial descriptions of service users, stakeholders and their experiences lacked depth. This wasn't noticed until their narratives were complete and their internship finished. As experienced and reflexive researchers teaching and supervising the students, the authors were quick to adjust student training and supervision, emphasising those areas where students needed to pay more attention. The quality of the narratives from subsequent cohorts improved noticeably.

Although there was diversity among the narratives in terms of indications for MDS and healthcare organisations caring for older persons living at home, the diversity of perspectives for each narrative was limited. This means some perspectives were underexposed or overlooked, for instance those of pharmacists or care technology staff. More experienced researchers would probably have sought greater diversity, which will be valuable for future studies.

It was sometimes unclear how organisations and professionals chose service users for MDS, and while multiple stakeholder experiences were studied longitudinally, most organisations were in the early stages of implementing MDS within their care system. This limits our knowledge of the longer-term reciprocal influence between MDS, persons and systems – such as the effect of MDS on caregivers' perceived workload, or the effect of an evolving service user condition on the appropriateness of MDS.

Conclusion

The case narratives underlying the thematic framework of this article revealed how MDS can be a suitable means of supporting service users' self-reliance and self-determination, but also how perceptions of the benefits and challenges of MDS vary within and between stakeholder groups. How MDS is introduced and implemented at the meso and micro levels will also influence professionals' and informal carers' evaluations of its effect on workload and changes to the triadic relationship in terms of roles and responsibilities.

The results of the study support the use of care technology to extend older persons' ability to live independently with chronic conditions, but also raise awareness of the importance of how it is introduced and implemented at individual and system levels. The results draw attention to the importance of service users' personhood and a relationship-based, as opposed to task-oriented, approach to using MDS. Values, beliefs and needs vary among stakeholders and may evolve over time. For instance, where some stakeholders experienced MDS as liberating, others found it to limit their freedom or socially isolate them. This challenges traditional instrumental approaches of 'what is' and 'what is possible' in terms of pushing technology and encourages the more humanistic approach of 'what is desirable' (Jacobs et al., 2017). While support technology such as MDS offers an alternative to care tasks, it does not replace the physical and social support offered by carers. The introduction and implementation of the technology by health and social care organisations should be person-centred and so foster healthful relationships among all parties involved as they acknowledge and work with differing needs and preferences (McCormack and McCance, 2017). In this way, implementation will flow in alignment with the premise of the PARiHS framework (Rycroft-Malone et al., 2013), that multiple sources of knowledge (propositional, experiential and local) used alongside contextual attentiveness and skilled facilitation, foster successful change with widespread benefits.

Implications for practice

- Healthcare professionals would do well to discuss expectations and the potential impact of care technology on service users, informal carers, themselves and the triadic relationship before its introduction, as the consequences will be experienced by all
- Collaboration and the inclusion of multiple stakeholder voices are important for practitioners, managers and technicians as they integrate care technology into community care services
- The (supervised) construction of case narratives is an effective means of enabling workplace learning and practice development

References

Abma, T. and Stake, R. (2014) Science of the particular: an advocacy of naturalistic case study in health research. *Qualitative Health Research*. Vol. 24. No 8. pp 1150-1161. https://doi.org/10.1177/1049732314543196.

Ahmad, A., Chiu, V. and Arain, M. (2020) Users' perceptions of an in-home electronic medication dispensing system: a qualitative study. *Medical Devices: Evidence and Research*. Vol. 13. pp 31-39. https://doi.org/10.2147/mder.s241062.

Arain, M., Ahmad, A., Chiu, V. and Kembel, L. (2021) Medication adherence support of an in-home electronic medication dispensing system for individuals living with chronic conditions: a pilot randomized controlled trial. *BMC Geriatrics*. Vol. 21. No. 1. pp 1-16. https://doi.org/10.1186/S12877-020-01979-w.

Braun, V. and Clarke, V. (2006) Using thematic analysis in psychology. *Qualitative Research in Psychology*. Vol. 3. No. 2. pp 77-101. https://doi.org/10.1191/1478088706QP063OA.

Brewster, L., Mountain, G., Wessels, B., Kelly, C. and Hawley, M. (2014) Factors affecting front line staff acceptance of telehealth technologies: a mixed-method systematic review. *Journal of Advanced Nursing*. Vol. 70. No. 1. pp 21-33. https://doi.org/10.1111/JAN.12196.

Cardiff, S. and van Lieshout, F. (2014) Het kritisch-creatief hermeneutisch data-analyseraamwerk [The critical-creative hermeneutic data analysis framework]. *KWALON*. Vol. 19. No. 2. pp 30-36. https://doi.org/10.5117/2014.019.002.030.

Cross, A., Elliott, R., Petrie, K., Kuruvilla, L. and George, J. (2020) Interventions for improving medication-taking ability and adherence in older adults prescribed multiple medications. *Cochrane Database of Systematic Reviews*. Vol. 5. Article. CD012419. https://doi.org/10.1002/14651858.CD012419.PUB2.

Demiris, G., Hodgson, N., Sefcik, J., Travers, J., McPhillips, M. and Naylor, M. (2020) High-value care for older adults with complex care needs: leveraging nurses as innovators. *Nursing Outlook*. Vol. 68. No. 1. pp 26-32. https://doi.org/10.1016/j.outlook.2019.06.019.

de Visser, M., Boot, A., Werner, G., van Riel, A. and Gijsberts, M. (2021) *Kiezen voor Houdbare Zorg. Mensen, Middelen en Maatschappelijk Draagvlak. [Sustainable healthcare, a Matter of Choice. People, Resources and Public Support]*. The Hague, Netherlands: Netherlands Scientific Council for Government Policy. Retrieved from: tinyurl.com/devisser-sustainable. (Last accessed 23rd August 2022).

Fay, B. (1987) *Critical Social Science: Liberation and its Limits*. Ithaca, US: Cornell University Press.

Fontys University of Applied Sciences (n.d.) *Knowledge Centre for Person-centredness in an Aging Society*. The Netherlands: Fontys University. Retrieved from: tinyurl.com/LIVT-knowledge. (Last accessed 20th July 2022).

Glomsås, H.S., Knutsen, I.R., Fossum, M. and Halvorsen, K. (2020) User involvement in the implementation of welfare technology in home care services: the experience of health professionals – a qualitative study. *Journal of Clinical Nursing*. Vol. 29. Nos. 21-22. pp 4007-4019. https://doi.org/10.1111/JOCN.15424.

Hall, J., Bond, C., Kinnear, M. and Mckinstry, B. (2016) Views of patients and professionals about electronic multicompartment medication devices: a qualitative study. *BMJ Open*. Vol. 6. e012915. https://doi.org/10.1136/bmjopen-2016-012915.

Jacobs, G., van der Zijpp, T., van Lieshout, F. and van Dulmen, S. (2017) Research into person-centred healthcare technology. Chp 5 *in* McCormack, B, van Dulmen, S., Eide, H., Skovdahl, K. and Eide, T. (Eds.) (2017) *Person-Centred Healthcare Research*. pp 61-68. Chichester, UK: John Wiley & Sons.

Kamimura, T. (2019) Older adults with Alzheimer's disease who have used an automatic medication dispenser for three or more years. *Clinical Gerontologist*. Vol. 42. No. 1. pp 127-133. https://doi.org/10.1080/07317115.2017.1347594.

Kleiven, H., Ljunggren, B. and Solbjør, M. (2020) Health professionals' experiences with the implementation of a digital medication dispenser in home care services – a qualitative study. *BMC Health Services Research*. Vol. 20. Article 320. https://doi.org/10.1186/S12913-020-05191-9.

Manley, K., Wilson, V. and Øye, C. (Eds.) (2021) *International Practice Development in Health and Social Care*. (2nd edition). Chichester, UK: Wiley-Blackwell. https://doi.org/10.1002/9781119698463.

McCormack, B. and McCance, T. (Eds.) (2017) *Person-centred Practice in Nursing and Health Care: Theory and Practice*. (2nd edition). Chichester, UK: Wiley-Blackwell.

McCormack, B., McCance, T., Bulley, C., Brown, D., McMillan, A. and Martin, S. (Eds.) (2021) *Fundamentals of Person-centred Healthcare Practice*. Chichester, UK: John Wiley & Sons.

Ministry of Health, Wellbeing and Sport (2018a) *De Juiste Zorg op de Juiste Plek. Wie durft? [The Right Care in the Right Place. Taskforce Report]*. The Hague: VWS. Retrieved from: tinyurl.com/VWS-right-care. (Last accessed 1st July 2022).

Ministry of Health, Wellbeing and Sport (2018b) *Programma Langer Thuis [The Longer at Home Programme, Report]*. The Hague: VWS. Retrieved from: tinyurl.com/langer-thuis (Last accessed 1st July 2022).

Ministry of Health, Wellbeing and Sport (2020) *Discussienota Zorg voor de Toekomst [Care for the Future, Discussion Paper]*. The Hague: VWS. Retrieved from: tinyurl.com/VWS-future-care. (Last accessed 1st July 2022).

Nakrem, S., Solbjør, M., Pettersen, I.N. and Kleiven, H.H. (2018) Care relationships at stake? Home healthcare professionals' experiences with digital medicine dispensers – a qualitative study. *BMC Health Services Research*. Vol. 18. Article 26. https://doi.org/10.1186/s12913-018-2835-1.

Patel, T., Ivo, J., Faisal, S., McDougall, A., Carducci, J., Pritchard, S. and Chang, F. (2020) A prospective study of usability and workload of electronic medication adherence products by older adults, caregivers, and health care providers. *Journal of Medical Internet Research*. Vol. 22. No. 6. e18073. https://doi.org/10.2196/18073.

Petrova, E., Dewing, J. and Camilleri, M. (2014) Confidentiality in participatory research: challenges from one study. *Nursing Ethics*. Vol. 23. No. 4. pp 442-454. https://doi.org/10.1177/0969733014564909.

Phelan, A., Mccormack, B., Dewing, J., Brown, D., Cardiff, S., Cook, N., Dickson, C., Kmetec, S., Lorber, M., Magowan, R., McCance, T., Skovdahl, K., Štiglic, G. and van Lieshout, F. (2020) Review of developments in person-centred healthcare. *International Practice Development Journal*. Vol. 10. Suppl. Article 3. pp 1-29. https://doi.org/10.19043/ipdj.10Suppl2.003.

Pihlainen, K., Kärnä, E. and Tukiainen, M. (2016) Practical nurses' competency and perceptions of technology use in home care. *In* Järvelin-Pasanen, S. (Ed.) (2016) *Reports and Studies in Health Sciences*. pp 57-60. Kuopio, Finland: University of Eastern Finland. Retrieved from: tinyurl.com/Pihlainen-technology. (Last accessed 23rd August 2022).

Rasi, P., Lindberg, J. and Airola, E. (2021) Older service users' experiences of learning to use eHealth applications in sparsely populated healthcare settings in Northern Sweden and Finland. *Educational Gerontology*. Vol. 47. No. 1. pp 25-35. https://doi.org/10.1080/03601277.2020.1851861.

Riessman, C. (2008) *Narrative Methods for the Human Sciences*. Thousand Oaks, US: Sage.

Rodríguez-Dorans, E. and Jacobs, P. (2020) Making narrative portraits: a methodological approach to analysing qualitative data. *International Journal of Social Research Methodology*. Vol. 23. No. 6. pp 611-623. https://doi.org/10.1080/13645579.2020.1719609.

Rycroft-Malone, J., Seers, K., Chandler, J., Hawkes, C., Crichton, N., Allen, C., Bullock, I. and Strunin, L. (2013) The role of evidence, context, and facilitation in an implementation trial: implications for the development of the PARIHS framework. *Implementation Science*. Vol. 8. Article 28. pp 1-13. https://doi.org/10.1186/1748-5908-8-28.

Stokke, R. (2017) 'Maybe we should talk about it anyway': a qualitative study of understanding expectations and use of an established technology innovation in caring practices. *BMC Health Services Research*. Vol. 17. Article 657. https://doi.org/10.1186/s12913-017-2587-3.

Stokke, R. (2018) Older people negotiating independence and safety in everyday life using technology: qualitative study. *Journal of Medical Internet Research*. Vol. 20. No. 10. e10054. https://doi.org/10.2196/10054.

van der Zijpp, T., Wouters, E. and Sturm, J. (2018) To use or not to use: the design, implementation and acceptance of technology in the context of health care. Chp 6 *in* Ramirez, A. and Ferreira, M. (Eds.) (2018) *Assistive Technologies in Smart Cities*. London: IntechOpen. https://doi.org/10.5772/intechopen.77058.

World Healthcare Organization (n.d.) *Health Workforce*. Geneva: WHO. Retrieved from: tinyurl.com/Workforce-WHO (Last accessed 20th July 2022).

Zijp, T.R., Touw, D.J. and van Boven, J.F.M. (2020) User acceptability and technical robustness evaluation of a novel smart pill bottle prototype designed to support medication adherence. *Patient Preference and Adherence*. Vol. 14. pp 625-634. https://doi.org/10.2147/PPA.S240443.

Teatske van der Zijpp (PhD, MSc), Professor, Fontys University of Applied Sciences, School of People and Health Studies, Eindhoven, the Netherlands.
Shaun Cardiff (PhD, MSc, RGN), Researcher and Lecturer, Fontys University of Applied Sciences, School of People and Health Studies, Eindhoven, the Netherlands.
Marianne Nieboer (BSc, MSc), Researcher and Lecturer, Fontys University of Applied Sciences, School of People and Health Studies, Eindhoven, the Netherlands.
Hélène van den Nieuwenhoff (MSc), Researcher and Lecturer, Fontys University of Applied Sciences, School of People and Health Studies, Eindhoven, the Netherlands.
Christi Nierse (PhD, MSc), Researcher and Lecturer, Fontys University of Applied Sciences, School of People and Health Studies, Eindhoven, The Netherlands.
Sanne Schepens (BSc), Project Lead, Innovation, Vitalis WoonZorg Groep, Eindhoven, the Netherlands.
Suzanne Keizer (BSc), Programme Manager, Innovation, Vitalis WoonZorg Groep, Eindhoven, the Netherlands.