Unraveling Tensions and Paradoxes: Middle Managers in the Hospital Digital Transformation towards Remote Monitoring

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Abstract

The healthcare system in the Netherlands faces significant challenges due to demographic changes, rising complex care needs, and chronic illnesses, with projected shortages of 155,000 healthcare personnel by 2032, necessitating alternative care delivery methods through digitalization and hybrid care models. Remote monitoring (RM) facilities this way of alternative care delivery. This study examines the digital transformation (DT) towards RM from the viewpoints of hospital middle managers. Focus lies on identifying tensions and paradoxes they encounter within the DT to RM. For this research, a case study was conducted in a top-clinical hospital in the Netherlands, in which sixteen semi-structured, qualitative interviews were held with primarily team- and department managers. The collected data was coded and analyzed with an inductive, grounded theory approach, following the Gioia method. This resulted in the identification of three tensions that middle managers encounter in the DT to RM, namely: *aligning with doctors*; *balancing between quality and quantity;* and *temporal tensions.* These three tensions are interwoven and visualized in a 'tensional knot', which highlights the complex position that the middle managers find themselves in during the DT to RM. The study's findings contribute to understanding the challenges of implementing RM in hospital settings. It shows that RM cannot be seen separately from the socio-technical system it is brought into, underscoring how DTs impact different relationships and balances, causing tensions and paradoxes. Moreover, the study offers insights for policymakers and healthcare leaders to better attune their approach of the DT to RM to the complexity of reality.

Keywords: remote monitoring, digital transformation, hospital management, middle managers, tensions, paradoxes, sociotechnical systems, healthcare

Unraveling Tensions and Paradoxes: Middle Managers in the Hospital Digital Transformation towards Remote Monitoring

The healthcare system in the Netherlands is facing major challenges (RIVM, 2023). Due to demographic changes, a rise of complex care needs and chronical illnesses, the demand for healthcare will exceed the supply in the years to come (RIVM, 2023; IZA, 2022). In a letter to parliament, the then Minister for Long-term Care and Sport warned that the shortages of healthcare personnel will increase from 2026, leading to expected shortages of 155.000 people in the healthcare sector in 2032 (Helder, 2023). This raises important questions about what we define as good-quality care and the exploration of alternative methods for the delivery of care (RIVM, 2023). With the 'Integraal Zorgakkoord' (IZA; Integral Care Agreement), the Dutch Ministry of Health, Welfare and Sports made an agreement with a large number of parties in the Dutch healthcare sector, including hospitals, mental healthcare, and elderly care organizations. This is an agreement on how they intend to maintain the quality of healthcare, while keeping it accessible and affordable in the future (IZA, 2022). One important subject on the agenda of this agreement is digitalization. This pertains to, for example, electronic health records and data exchange as a precondition for good and safe healthcare, as well as the reduction of workload for healthcare personnel. Moreover, the agreement stresses the necessity of 'hybrid care', which refers to the combination of delivering care in physical- and in digital form (IZA, 2022).

Digitalization can be defined as the diverse sociotechnical phenomena and processes of adopting and using digital technologies in broader individual, organizational, and societal contexts (Gimpel et al., 2018). However, the introduction of digital technologies into organizations typically involves more than solely adopting and using them; it often requires comprehensive adaptation to these technologies, since technology is inherently interrelated with the social environment (Berg et al., 2003). 'Digital transformation' (DT) relates to how the rise of digital technologies affect contemporary organizations and their need to adapt to these technologies (Bohnsack et al., 2018). A sociotechnical approach helps to understand how, within DTs, new digital technologies are developed and introduced, and how they become a part of - and redefine - social practices (Berg et al., 2003).

Within healthcare, a digital transformation is seen as essential for coping with the aforesaid challenges, since it has the potential to fundamentally transform almost every aspect of health services (Agarwal et al., 2010). It aims to, for example, improve efficiency, reduce

costs, enhance the overall quality of healthcare, and facilitate a more patient-centered approach (Raimo et al., 2023; Stoumpos et al., 2023; Agarwal et al., 2010), all of which are important themes for making healthcare future-proof. However, questions and concerns have been raised over the digital transformation of healthcare practices. First off, about the protection of data and privacy, and prevention of leakages, since vast amounts of patient health data is collected when care tasks become digital (Iyengar et al., 2018). Second, concerns are in place over ethical standards of healthcare delivery in a digital age. For instance, the concern that it will widen inequalities between the digitally skilled or higher educated people and the less digitally skilled, lower educated people, as the first group will better know their way around the digital health services (McKee et al., 2019). Third off, questions surrounding the quality of healthcare. For example, about a lack of personal touch, when healthcare is delivered through a digital platform instead of in real life. Additionally, adequate training is necessary in the usage of applications and the interpretation of technology in order to uphold ethical standards (Dhingra & Dabas, 2020). Fourth, concerns about the work outcomes and experiences of the healthcare professionals working with digital tools. In their systematic review, Wosny and colleagues (2023) identified several frequently reported negative outcomes, such as an increased workload in case of suboptimal use and functioning of the technologies, and complications and interruptions in workflow. Moreover, the unique context of healthcare organizations complicates DTs, since these organizations are never fully predictable and there is an ongoing stream of sudden events (Berg, 1990). Thus, noteworthy challenges to realize the potential advantages of the digital transformation of healthcare exist, and unintended consequences are possible (Agarwal et al., 2010).

One form of a digital transformation happening within Dutch healthcare is hospitals shifting towards hybrid healthcare delivery. This way of combining the delivery of care in physical- and in digital form is made possible by 'telemedicine'; the remote delivery of healthcare services through the use of digital technologies (Binci et al., 2021). One specific archetype of telemedicine is remote monitoring (RM). With RM, "disease-related and physiological data of the patient are digitally transmitted via telephone, Internet, or videoconferencing, from the patient's home to a health care center, providing clinical feedback" (Farias et al., 2020, p.1). The DT to RM means a true change in the way that care is delivered, therefore, also in the way that hospitals are organized and hospital employees perform their jobs. Thus, the DT to RM reconfigures current work practices and socio-material relationships, triggering shifts in coordination mechanisms and work processes (Nicolini, 2006).

Within these sorts of organizational changes in hospitals, middle managers play a pivotal role (Giauque, 2015; Kokshagina, 2021; Birken et al., 2012). Middle managers - "employees who are supervised by an organization's top managers and who supervise frontline employees" (Birken et al., 2012, p.1) – function as a bridge between boardroom policy and work floor dynamics. They are key players in putting the hospital's objectives into practice (Gjellebæk et al., 2020). While doing so, they gather the needs, concerns and ideas from frontline employees, and disseminate this input bottom-up (Birken et al., 2012). In their position, they mediate between implementing strategic objectives and managing the day-to-day activities, which can result in having to deal with challenges, tensions and paradoxes (Gutberg & Berta, 2017). In dealing with those tensions, they have to balance between "competing and often incompatible institutional demands and situational requirements" (Stoltzfus et al., 2011, p.35), which highlights the complexity of their position.

Despite their key role within aforementioned organizational changes, middle managers have been rather overlooked in health services research and research on healthcare innovation implementation (Birken et al., 2012; Gjellebæk et al., 2020). In addition to this, Nadkarni and Prügl (2020) state that the middle management perspective is an underdeveloped aspect of our comprehension of DTs. With this research, the aim is to contribute to filling this gap, thereby helping to develop an understanding of middle managers and their role in digital transformations in hospitals. Moreover, according to Hanelt and colleagues (2020), there is a need for more research on DT using an inductive, grounded theory approach, which is the approach that this study takes on. Furthermore, the World Health Organization (WHO) expressed a need for more empirical insights about telemedicine (e.g. remote monitoring) from the perspective of its adoption (Binci, 2021). This study aims to enrich our understanding of and knowledge about the DT to RM within the hospital setting, considering the perspective of the middle manager and the complexities they encounter within the sociotechnical system of their hospital.

The social objective of this study is to help stakeholders (e.g. clinicians, health administrators, and policy makers) to both comprehend and improve their way of evaluating the DT to RM in healthcare, which is critical given the fact that the quality of healthcare is at stake and large investments are involved (Burton-Jones et al., 2020). As mentioned, the exploration of alternative methods for the delivery of healthcare is needed (RIVM, 2023), and a necessity for gaining more insight into RM in practice is present (Binci, 2021). This study contributes to both of these needs, by gathering practical insights about RM from the

underexposed viewpoint of hospital middle managers. More specifically, within the IZA, parties agreed on the goal of making 70% of healthcare provision hybrid by the end of 2026 (IZA, 2022). However, in the recent mid-term evaluation of the agreement, healthcare providers currently believe that no more than 50% of the provided healthcare can be made hybrid (RIVM, 2024). With RM playing a substantial role in hybrid healthcare, and MMs bridging the gap between policy and everyday healthcare practices, this study can help to better understand the practical reality of the DT to RM. This can help policy makers and the parties involved in IZA to gain better insights on the discrepancies between policy goals and actual practical possibilities, by taking into account the complexities and possible paradoxes surrounding the transformation to RM in hospitals. Moreover, hospitals can refine their approach to RM based on this study's insights, as this study shows that the DT to RM is not merely about starting to use RM; the whole sociotechnical system of the hospital is affected by it. Ultimately, this ensures a more well-informed transition to RM by integrating all relevant perspectives, including those of middle managers.

In order to realize these objectives, this study focuses on the following research question:

What are possible tensions and paradoxes that hospital middle managers experience within the digital transformation towards remote monitoring?

Sub-question 1: *How do they perceive this digital transformation towards remote monitoring?*

Sub-question 2: *What role do they take on within this digital transformation?*

This study is structured the following way. First, the theory section extends on the themes central to this study, such as remote monitoring, digital transformation, middle manager role and position, and possible tensions and paradoxes they might experience are addressed. After this, the methodology of this qualitative case study is provided. Additionally, the results of the interviews are analyzed, followed by a conclusion on the research questions. Finally, the results are discussed through the theoretical implications of this research's findings, the studies' strengths and limitations, policy implications, and suggestions for future research.

Theory

Remote monitoring

Remote monitoring (i.e. telemonitoring) makes it possible to "monitor an individual's health status through a remote interface and then transmit the information to the healthcare provider" (Davis et al., 2014, p. 428). This can take form in a handheld device such as a smartphone with an application in which the patient frequently inserts their physiological metrics such as blood pressure or temperature. These metrics can also be measured and communicated through a wearable device or even an implanted monitoring device (Farias et al., 2020). RM enables the more effective detection of diseases, disease progression and the monitoring of changes over time (Davis et al., 2014; Farias et al., 2020), which helps in gaining a better understanding of the patient's condition (Huygens et al., 2020), and in the earlier identification of deterioration (Serrano et al., 2023). Moreover, RM can decrease unnecessary hospital visits, and the necessary visits will become more efficient, since the health care practitioner has access to data about the patient's health in advance. In addition, RM shows a more realistic view of the patient's vitals (e.g., blood pressure), since these might be diverging during the hospital visit. This more realistic view of the patient's health status helps in their treatment, ultimately benefiting the patient (Serrano et al., 2023). Together, benefits of RM can help in the more tailored delivery of care, and the possible improvement of the patient's quality of life, as they get more self-management over their condition, need less hospital visits and get to live at home longer (Walker et al., 2019; Huygens et al., 2020; Serrano et al., 2023).

Although RM offers many opportunities, there are also challenges associated with its use. Serrano and colleagues (2023) conducted a systematic review of thirteen studies, which covered the perspectives and experiences of a total of 2351 health care practitioners (e.g., nurses, clinicians) about RM use. In addition to the beforementioned chances that RM offers, they identified several possible downsides and challenges of RM. First of all, concerns about a significant rise in workload for the practitioners, due to the substantial amount of data the monitoring generates. This concern stems from the arduous task of determining which data is valuable and needs follow up action, and which is irrelevant. On top of this, the integration of the gathered data into the patient's electronic health record is sometimes inhibitory, given the diversity of software manufacturers and difficulties in the normalization of the data. Moreover, practitioners expressed their concerns about privacy and security issues, since third-party software is used for the gathering and storage of the patient's information. Lastly, concerns about data accuracy were highlighted, which stem from a lack of trust in the technology and

possible invalid patient measurements, as they need to measure and admit their own physiological information.

Regarding the patient's expectations and experiences, Walker and colleagues (2019) identified several themes about patient's perceptions on the RM of their chronical diseases out of a systematic review of sixteen studies. A first concern is that of the possible additional burden of RM for the patient. Patients in several studies were hesitant to start RM due to concerns that learning to use the technology would add an extra burden, with older patients particularly worried about being confused by the data. Additionally, a lack of trust in technology was noted, especially among older patients, though many overcame these concerns with continued exposure and personalized training and support. Patients in multiple studies expressed concerns that RM might replace personal care and human interaction with clinicians, fearing that clinicians might focus more on data than on their expressed symptoms and concerns. The second theme of concern is about the possible lack of personal touch. Some patients were worried about reduced face-to-face contact with healthcare providers, emphasizing the importance of personal interactions for building trust and improving communication, and hoped RM would complement rather than replace these interactions.

In the light of the beforementioned challenges the healthcare system is facing, RM can be an outcome, as it helps to deal with shortages in healthcare personnel (Davis et al., 2014). Moreover, RM can contribute to realizing reductions in healthcare costs, face-to-face visits, and hospital (re)admissions (Lanssens et al., 2017; Huygens et al., 2020; Davis et al., 2014). This shows how the hospital's transformation to RM plays a pivotal role in keeping healthcare accessible in the future. Nevertheless, this section also highlighted multiple concerns and risks that require careful consideration in the digital transformation to RM.

Digital transformation & sociotechnical systems

'Digital transformation' (DT) is the "managed adaptation of organizations as they capitalize on digital technologies to change business models, improve existing work routines, explore new revenue streams, and ensure sustainable value creation" (Gimpel et al., 2018, p.4). DT relates to how the rise of digital technologies affect contemporary organizations and their need to adapt to these technologies, connecting it closely to the field of organizational change (Bohnsack et al., 2018). It can thus be described as "organizational change that is triggered and shaped by the widespread diffusion of digital technologies" (Bohnsack et al., 2018, p.2). These digital technologies are the "combination and connectivity of innumerable, dispersed information, communication and computing technologies" (Hanelt et al., 2020, p.2).

Literature describes the introduction and use of digital technologies to have an inherently disruptive nature (Vial, 2019; Binci et al., 2021), which explains the close connection between DT and the matter of organizational change, since organizations are both affected by these disruptions and they need to adapt to them (Hanelt et al., 2020). In the process of DT, organizations respond to disruptions created by digital technologies, seeking to alter ways of value creation, while at the same time managing the structural changes and organizational hurdles that may affect the outcomes – positive and negative – of that process. This can lead to the reorganization of current organizational structures and the adoption of new ways of working (Vial, 2019).

To further deepen our understanding of the disruptive nature of a DT, an approach through a sociotechnical lens is useful. From this approach, "work practices are conceptualized as networks of people, tools, organizational routines, documents and so forth" (Berg, 1999, p.89). The roles of, for instance, doctors, nurses, and middle managers are interwoven with those elements to achieve the hospital's objectives, such as the delivery of quality care. Tools and documents are essential components of these practices, making the concept of a physician or nurse inseparable from the interconnected network in which they operate. The introduction of a new element – such as a RM - into this network, can significantly influence the healthcare practices within that hospital. The sociotechnical theory stresses that work activities are a result of the sociotechnical assemblage they unfold themselves in; they are situated. This means that work practices cannot precisely be captured in predefined workflow models, as the exact shape they take on is a result of the context they develop themselves in (Berg, 1999). The same applies to the introduction of RM: one may try to pre-determine how this will function in practice and how people in different roles adapt to this introduction, but: "the work and the technology configure each other in practice." (Beane & Orlikowski, 2015, p.3). As Hanelt and colleagues (2020) explain, "contextual conditions define the onset of DT" (p.7). Thus, by studying the DT towards RM within one specific hospital (i.e. context) by using a sociotechnical lens, we can gain a comprehensive understanding of the multifaceted impact the DT may have on a hospital and the different roles within.

Middle managers

As mentioned in the introduction, hospital middle managers play an important role within organizational changes, due to their unique, boundary-spanning position between upper and lower levels within healthcare organizations (Gutberg & Berta, 2017; Birken et al., 2012). Within their coordinating role, they mediate, negotiate and interpret between the strategic and

operational levels of the organization (Conway & Monks, 2011). In doing so, hospital middle managers are, together with healthcare professionals, responsible for providing high quality healthcare which fits in their unit's allocated budget. Hence, important in their role is to balance quality and costs (Okkerman & Dankbaar, 2022).

With healthcare organizations generally being highly hierarchical and often structured in silos of professional groups (e.g., nurses, surgeons), middle managers function as a bridge between the different groups (Gutberg & Berta, 2017). Their scope and influence is bidirectional; they distribute information both vertically – from top management to the employees on the work floor and vice versa – and horizontally, across the frontline (Birken et al., 2012). With an increased focus on the functioning on team-level and the running microsystems in hospitals, leadership is becoming more spread out across the organization, causing the middle manager to have an increasingly key role in leading and improving the organization (Gutberg & Berta, 2017). Due to their position and increasing responsibilities, middle managers have the opportunity to influence organizational changes through facilitating the communication across the organization (Gjellebæk et al., 2020), and therefore can be considered as change agents, more so than mere change implementors (Conway & Monks, 2011). And, as they are positioned close to the frontline employees, they are informed on their prevailing attitudes and needs, which in its turn helps the middle manager to maintain the momentum for a change initiative or innovation, by knowing how to manage and guide their employees during that specific change (Huy, 2001).

Taking the above into account, middle managers have an important role in the implementation of RM. Birken and colleagues (2012) present a theory on the role of middle managers in healthcare innovation implementation. This theory suggests that in the case of the implementation of an innovation, middle managers take on various tasks towards the employees: they distribute the necessary information about the innovation; synthesize the information; mediate between strategy and day-to-day activities; and sell the innovation to the employees by stressing its relevance for the employees (Birken et al., 2012). However, engaging in these change processes can impose extra stress on their working lives, leaving them with additional stress and strains of the change process (Conway & Monks, 2011). Prior research on the role of middle managers in industries other than healthcare suggests that their influence on the innovation implementation may be in favor of a rapid implementation, however, they may also decide to postpone or delay that implementation process. Middle manager's commitment can, amongst other things, help to realize strategy, increase operation

efficiency and implementation speed, and improve overall effectiveness of the set goals. However, they may just as easily obstruct or delay the implementation by, for example, deciding to pursue other priorities first, speaking negatively of an innovation, or preventing employees from engaging with implementation activities, for instance when they need them elsewhere (Birken et al., 2012). The middle manager's influence on the realization of change processes or innovation implementation is important to take into account within this study, as it may help us to understand their role within the adoption of RM.

The middle manager's role in healthcare can be described as semi-autonomous, since they are bound to contextual constraints, such as the demand of their profession, the patients and senior management; they are to some extent "stuck in the middle" (Gutberg & Berta, 2017, p.2; Gjellebæk et al., 2020). Deploying this bridge-function between different groups in the healthcare organization also means that middle managers have to balance and deal with the sometimes competing interests of these different groups, keeping the day-to-day healthcare delivery up and running while also answering to strategic organizational objectives (Gutberg & Berta, 2017). They "have the challenge of grasping a change they did not design and negotiating the details with others equally removed from the strategic decision making" (Balogun & Johnson, 2004, p.543). The middle managers try to make sense of these decisions, in order to transmit the necessity of the change to their employees, while often struggling with the change themselves (Lüscher & Lewis, 2008).

Working through tensions and paradoxes

Within this context of organizational change – such as within DT- experiences of complexity and ambiguity arise, due to shifting, multiplying, and potentially conflicting work demands and possible confusion about these new work demands. This often leaves the people involved struggling with their changing roles, work processes and relationships (Lüscher & Lewis, 2008). Moreover, the change generally comes along with tensions and paradoxes – situations in which "no choice can resolve the tension because opposing solutions are needed and interwoven" (Lüscher & Lewis, 2008, p.229). In these cases, there is a discrepancy between reality and one's beliefs and outlook on what this reality should entail (Stoltzfus et al., 2011). These paradoxes may impose cognitive disorder for the middle manager, such as confusion, and the experience of unclarity about the mandates of the executive decisions. This state of confusion can have paralyzing effects on the manager's decision making and implementation efforts, limiting the implementation of the implied change (Lüscher & Lewis, 2008).

Lüscher and Lewis (2008) explain three specific paradoxes that middle managers have to 'work through' when dealing with organizational change. First, the "paradox of performing" (p.230), is about different, conflicting views on managerial success: does it entail prioritizing productivity or creativity, emphasizing efficiency or quality, and favoring control or empowerment? Second, the "paradox of belonging" (p.232) is about coping with changing relationships, and tensions between self and the other. For example, how can the middle manager be part of the team they are managing, without losing their independent position? Third, the "paradox of organizing" (p. 233) describes how the very process of organizing change spurs paradox, as conflicts arise between the old and the new. Stoltzfus and colleagues (2011) describe that once work practices are seen as normal and legitimate, "any disruption becomes perceived as intentional and threatening" (p.353).

Since the term *paradox* is often used interchangeably with other types of organizational contradictions, it is important to clarify the distinction between the different terms (Putnam et al., 2016). Underlying all different forms of contradictions is *tension*, which can be defined as "stress, anxiety, discomfort, or tightness in making choices, responding to, and moving forward in organizational situations" (Putnam et al., 2016, p.5). These tensions can also be present when one encounters a *dilemma*, which is a situation in an organization in which an either-or choice has to be made between mutually (un)attractive options (Putnam et al., 2016). In a hospital setting, this might involve the middle manager having to decide on which telemedicine initiative to prioritize, for example, the implementation of a new patient scheduling tool, or the expansion of RM capabilities. Given limited resources or budget, the manager needs to prioritize between the two, deciding which one will give the most immediate benefit to, for example, their patients or their team, while considering the potential trade-offs and implications of their choice (Putnam et al., 2016).

Another archetype is a *duality*, which can be defined as the "interdependence of opposites in a both/and relationship that is not mutually exclusive or antagonistic" (Putnam et al., 201, p.5). Thus, in contrast to a dilemma, which can be settled by evaluating the costs and benefits of each option and determining which one is most advantageous, there is no either/or option within a duality, since both ends are complementary influences. These only become contradictory when framed as opposites. Examples of dualities within organizations may be work/-life balance or self-interest/collective good (Stoltzfus et al., 2011). Thus, there lies potential conflict between the two, however, in themselves they are not automatically paradoxical. Only when the two must be addressed simultaneously, then likelihood for the

emergence of paradox is increasing (Stoltzfus et al., 2011; Karhu & Ritala, 2020). In their work, managers often need to consider contradictory alternatives (e.g., long-term versus short-term, innovation versus tradition), of which both options are important but partially conflict with each other (Karhu & Ritala, 2020).

Once these interdependent, opposing elements continuously interact with each other in an ongoing process, then we can speak of a *dialect*. Here, both elements exist in a "dynamic interplay as the poles [opposites] implicate each other. Focus lies on the unity of opposites and the forces or processes that connect them" (Putnam et al., 2016, p.7). In that sense it differs from dualisms since the mutual definition is emphasized, rather than the separate development (Putnam et al., 2016). In the context of hospital middle management, there can be a dialectical relationship between the provision of quality medical services and maintenance of a sustainable business model (Cho et al., 2007). Such dialectical tensions may result in challenges in the middle manager's decision making processes (Putnam et al., 2016).

Lastly, *contradictions* refer to "bipolar opposites that are mutually exclusive and interdependent such that the opposites define and potentially negate each other" (Putnam et al., 2016, p.6). They can be seen as two sides of the same coin. When actors chose to move to one side, the more they feel pulled to move to the other (Putnam et al., 2016). They often are interactive inconsistencies that influence organizational development (Stoltzfus et al., 2011). As illustrated by Temple (2014), a fundamental contradiction exists within the hospitals, namely, the aim to prevent hospital admissions (leading to less income), while at the same time needing to increase revenue.

The middle manager's engagement with and articulation of paradox – instead of avoidance – can stimulate organizational effectiveness and contribute to the realization of change initiatives (Stoltzfus et al., 2011). These dualities and paradoxes are inherent to change, thus, it is better to acknowledge them rather than to deny their existence. Following Cho and colleagues (2007), assumed within this research is that the acknowledgement of the existence of these different types of tensions will help to sensitize us for the challenges that middle managers have to work with in the DT towards RM. Moreover, it will help us understand the complexity of the middle manager's job within DT, the tensions they have to deal with, how they perceive the change. Additionally, Conway and Monks (2011) suggest that for understanding the middle manager's reactions to change, it is useful to speak in terms of 'ambivalence' (e.g., paradoxes) instead of resistance, since the ambivalence is at the very heart of the different ways in which the managers respond to the imposed digital changes.

Methodology

Research design

The research strategy employed in this study is a case study, in which qualitative data was collected by conducting semi-structured interviews with participants. Moreover, it allows the study to approach "the complexities and contradictions of real life" (Flyvbjerg, 2006, p.237), and helps to provide the researcher with an in-depth understanding of the case in question (Creswell, 2007). These characteristics of the case study are relevant for answering the research question, since it makes it possible to get an in-depth understanding of the middle manager's perceptions of the DT to RM, and the complexities of possible tensions and paradoxes surrounding the transformation, as seen through a first-person perspective, because of the qualitative nature of the data (Boeije & Bleijenbergh, 2019).

The first-person perspective was enhanced by the choice for the Gioia methodology in this inductive study, since it foregrounds the participant's interpretations, without imposing prior constructs and theories on them. This helps to develop knowledge, since the base of this study isn't rooted too strongly in what is already known, as this could delimit what *can* be known through this research (Gioia et al., 2012). This inductive technique is used for interpreting the collected data, on which theories about the phenomenon in question can then be built (Bhattacherjee, 2012). This research, however, started out with a theoretical framework to create theoretical sensitivity and inform our initial understanding of the topic that is under study. Nevertheless, the goal was to allow the data derived from this study to speak for itself, and to maintain open to new insights that could contribute to the building of new theory. In practice, the process of this research took an iterative form of alternating between data and theory (Bryman, 2016).

Studying middle managers in the DT within the bounded system of one hospital, makes this method a single case study (Creswell, 2007). Specifically, this is a 'typical' or 'exemplifying case' (Bryman, 2016, p.62), meaning that the objective is to capture the circumstances and conditions (e.g. perceptions, tensions, paradoxes) of the everyday situation in the hospital within the DT processes.

The case

The case central in this study, is that of a public, top clinical hospital in the Netherlands. The hospital covers thirty specializations, with an emphasis on heart, vascular, lung, and cancer.

They have 500 beds and over 6000 employees, of which approximately 1900 nurses. The hospital is located in two locations in the agglomeration of one of the top five biggest cities in the Netherlands. The hospital is part of a partnership of seven top clinical hospitals spread across the country. Apart from having medical specialists (e.g. doctors) in employment, the hospital also knows self-employed specialists, who are joint together within a partnership with other doctors of the same specialization in the hospital. Program managers are responsible for the guidance of the hospital's DT in general, or specific programs for RM.

Since the COVID pandemic in 2020, the hospital's RM practices gained momentum and were rapidly developed and expanded. For instance, the vulnerable groups such as COPD patients could from then on be monitored from their homes. Since then, the hospital has put effort in their further DT to RM. A 'home monitoring team' (HMT) was established to which the different departments and teams can delegate their RM-tasks. Different apps are used for the monitoring of vitals, of which the Luscii app is the most commonly used. Sometimes more care specific apps are used, such as the SanaCoach for COPD patients, or PregnaOne for the monitoring of pregnant women.

Method of data collection

The data was collected by conducting qualitative, semi-structured interviews. With a few exceptions, the interviews took place on-site at the participants' workplace, in their office or an other secluded place. The instrument for conducting the interviews was an interview guide (see Appendix A); a list of questions and topics to be addressed within the interview, based on sensitizing concepts from relevant theory (e.g., the possible existence of paradoxes), without containing theoretical preconceptions and terminology (Gioia et al., 2012). The interview guide provided initial direction to the interviews. However, the content covered, the sequence of topics discussed, and the responses given could be influenced by the flow of the interview and the individual participant. The interviews lasted approximately between 30–50 minutes. The interview was recorded – after the participant gave their permission – and then transcribed.

Participants

This research aims to study middle managers within a hospital, their perceptions of digital transformation to remote monitoring and their role within this transformation, hence the necessity to select participants that 1) suit the description of middle manager (i.e., employees who are supervised by an organization's top managers and who supervise frontline employees), and 2) have experience with the DT towards RM. Since the researcher is an outsider of the

hospital organization, a representative from the hospital's top management helped out in demarcating the sampling frame. As a result, the selection of respondents was made from the people with the job title of 'department manager' or 'team manager', from teams or departments where remote monitoring was already in place, or would soon be developed.

A total of sixteen participants were interviewed. Participants were selected via non-probability, convenience sampling, as they were recruited via a representative from the hospital, who made a list of employees who fit the sample frame. Efforts were made to equally represent both the department managers and team managers in this sample, so that the potentially different perspectives of the two positions are equally highlighted. Eventually, five department managers and seven team managers were interviewed. For an initial exploration of the topic under research, two program managers were interviewed. Moreover, two nurses were interviewed as well to gain a comprehensive understanding of the case under study. The researcher approached possible participants via e-mail, explaining the research briefly and asking for their participation.

Table 1

Participant characteristics

Participant	Position	Since	Background	Type of unit
P1	Program manager	0.5 year	Consultant & manager	Staff
P2	Program manager	2 years	Nurse	Staff
P3	Team manager	6 years	Nurse	Clinic & outpatient
P4	Team manager	11 years	Nurse	Nursing ward
P5	Team manager	5 years	Nurse & manager	Outpatient clinic
P6	Team manager	2 years	Nurse	Nursing ward
P7	Team manager	3 years	Physiotherapist	Outpatient clinic
P8	Department manager	1.5 years	Nurse & department manager of different departments	Nursing ward & day care
P9	Department manager	8 years	Nurse & manager	Nursing ward & day care
P10	Team manager	5 years	Nurse	Clinic & day care
P11	Department manager	4.5 years	Business	Nursing ward
P12	Nurse specialist	18 years	Nurse	Nursing ward
P13	Team manager	1 year	Doctor's assistant & manager	Outpatient clinic
P14	Department manager	0.5 year	Nurse & manager	Clinic, outpatient clinic, nursing ward & day care

| P15 | Department manager | 16 years | Nurse | Clinic, outpatient clinic, nursing ward & day care |
| P16 | Hybrid nurse | 1 year | Nurse | Nursing ward & outpatient clinic |

Method of analysis

As noted, the recorded interviews were transcribed. The data was then coded using Atlas.ti coding software. The analysis and coding of the data was done systematically by following the Gioia method, meaning that first a "1st-order" analysis was done, in which the participant's own terms were used in the coding. An example of a 1st-order code, is that it is 'difficult to reach consensus with the partnership of doctors'. This step was then followed by conducting a "2nd-order" analysis, in which 1st-order codes were organized into themes. Continuing with the example, the previous 1st-order code was categorized with another 1st-order code ('good relationship with doctors') in the 2nd-order theme 'communication with doctors'. These 2nd-order codes (e.g., themes, terms, and dimensions) were then assembled into aggregate dimensions (Gioia et al., 2012), in which the example 2nd-order theme became part of the aggregate dimension 'Tension: aligning with doctors'. This full set of steps is presented in the data structure in Figure 1, which is a "graphic representation" of how the raw data is progressed and analyzed (Gioia et al., 2012, p.6).

Figure 1

Main themes based on interview data
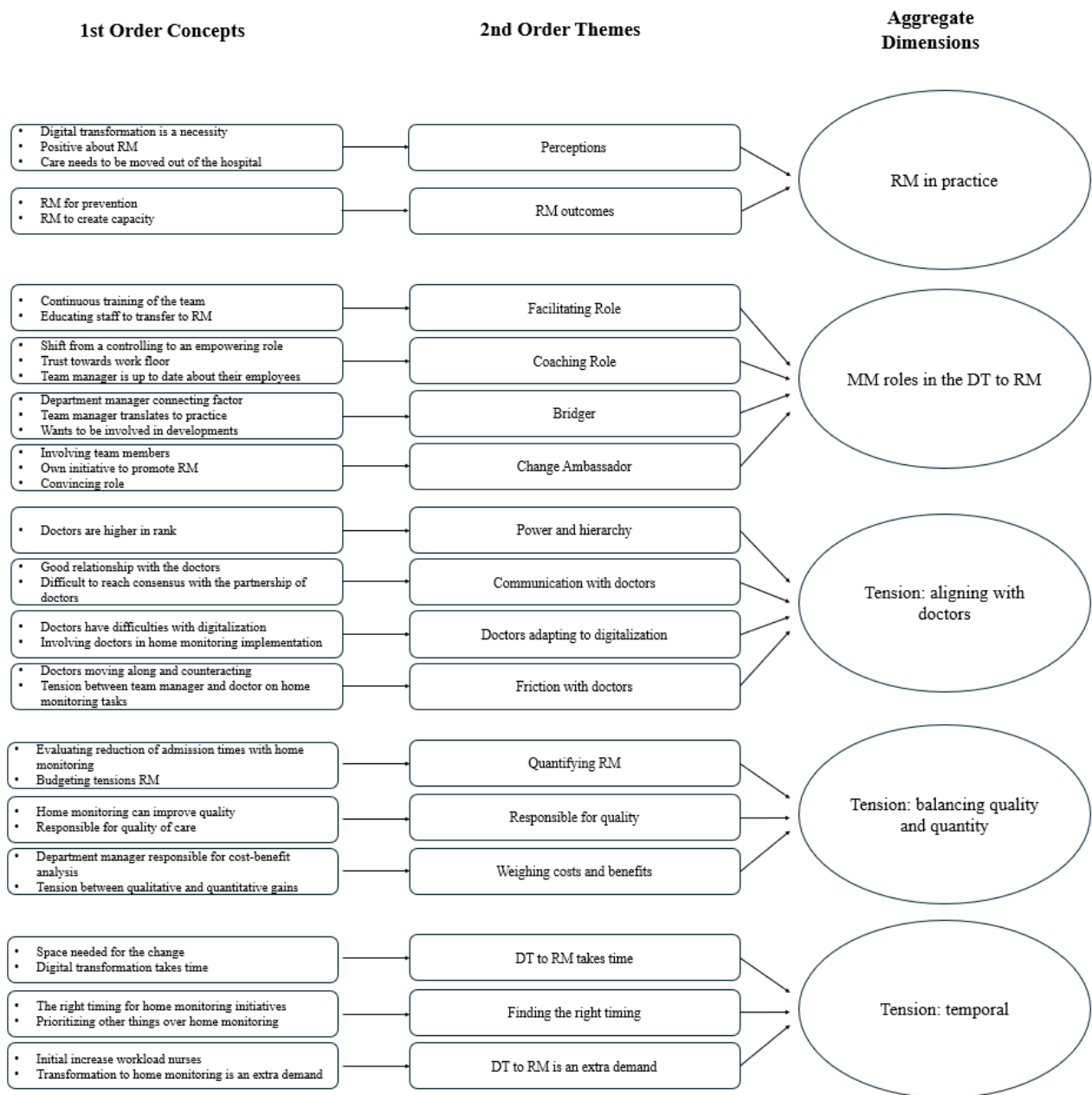
Ethical considerations

Prior to the interviews, a consent form – based on the informed consent template distributed by Erasmus University Rotterdam – was sent to the participants, to confirm that they agreed to their data being collected, analyzed, and retained for this research. At the outset of the interview, the participants were asked if they had any inquiries regarding the consent form, and permission was reiterated to record the interview. To ensure the participants' anonymity, their

names and other personal details were anonymized in the interview transcripts and in further reporting in this study. Interviews are securely stored in accordance with Erasmus University regulations.

Moreover, reflections should also be made about the politics in social research. Access to the hospital was gained though the researcher's professional network. However, gaining access is a political process, which is usually influenced by an organization's 'gatekeepers', who are concerned with what the organization can gain from the research, and often seek to influence the investigation; e.g., the focus of the study and the question's asked (Bryman, 2016, p.142). While on forehand exploratory conversations were held about the topic of this research and the case in question, the researcher consciously maintained a professional and neutral stance during the course of the research, avoiding close relationships or frequent interactions that might compromise objectivity. Additionally, preliminary results were deliberately withheld from stakeholders and participants. This was done in order to preserve the research integrity, ensuring that the final results accurately reflected genuine data collected without external influence.

Results

This section presents the result of this study by drawing on the data collected through the interviews. It is organized following the five aggregate dimensions as presented in Figure 1. By expanding on these themes, this section aims to create an understanding of the DT to RM in practice from the MMs point of view, the role they take on, and the complexities that MMs face within the hospital's DT to RM in working through a variety of intertwined tensions.

RM in practice

Overall, the participants were positive about RM in practice and its potential for the future of healthcare in general. Recurring advantages of RM that were mentioned, relate to how it can help in the prevention of hospital readmissions as RM allows for timely interventions in the course of the patient's disease. Moreover, its use can shorten the length of the patient's admission in the hospital and decrease the frequency of their visits to the hospital. In addition to how the patient benefits from this, it also helps to create capacity at the MMs' teams or departments (both at the outpatient clinic, as the nursing ward and clinic), the participants said. This leaves space to see emergency patients, and it prevents patients from being denied hospital admission. Moreover, with the monitoring tasks outsourced to the home monitoring team, "*a*

nurse can help the patients who are in actual need of hospital care." (P13). Thus, according to the participants, RM facilitates a more efficient way of healthcare delivery. This can help to create capacity in MMs' teams or departments, which can help them deal with the growing challenges of a shortage in healthcare personnel and the rise in care needs. As one participant explained:

> When you know that that group [of chronical ill people] is growing. And there is a decreasing amount of healthcare professionals, also due to an aging population. Then RM can be a good intervention to fill that gap. (P8)

In line with this, another participant explained as follows:

> The chance of opening more beds or anything else simply doesn't exist, considering staffing levels and challenges. But also due to the financial aspect of healthcare. And we all want to be able to receive care in the future. Then I truly believe that this [RM] is a positive development. (P10)

Thus, the challenges the healthcare sector is facing, as illustrated in the introduction (e.g., personnel shortages, ageing population), are confirmed by the MMs within their practice, and they denote that RM can form an outcome to help deal with those challenges. However, it is worth noting that the perceptions shared by MMs are primarily reasoned from their own position, in which they are responsible for resource allocation within their departments or teams. This results in them emphasizing the benefits and efficiencies brought about by RM. These viewpoints may not fully encompass the potential downsides or risks associated with RM, such as a lack of personal touch, and privacy- and security issues, as highlighted in other studies that included the perceptions of other stakeholders such as doctors and patients (e.g. Serrano et al., 2023; Walker et al., 2019).

MM roles in the DT to RM

In the initial stages of this research when exploratory conversations were held, skepticism amongst higher-level hospital representatives regarding MMs' involvement in and understanding of the DT to RM was notable. Moreover, I was informed that a nurse from the HMT expressed that the team managers did not play any significant role in the transformation to RM. Thus, overall, uncertainty existed whether the MMs played any significant role in the DT at all. In the interviews, a program manager explained that in the development of RM, it are often the people with the substantive medical knowledge who are involved, such as the doctors, nurse specialists, medical specialists and people from the HMT; *"and then that middle manager has no real role in it."* (P2). However, within the DT to RM in practice, the data

shows that the MMs actually perform many tasks all at once, and play a considerable role in the transformation. This illustrates that in practice, the significance of the MM role is just as overlooked as in research (Birken et al., 2012; Gjellebæk et al., 2020).

First of all, the MMs facilitate the DT to RM through the distribution of their department's or team's resources, such as personnel, budget, and equipment, to support adaptation to RM. This involves them actively asking what it is that their team members need (e.g., schooling) to be able to adapt to working with RM. A department manager explained that it is their responsibility to make their staff digitally skilled. A nurse exemplified: *"That we got the time for this* [skill learning for RM]*, we got that from them. [...] Without them, this wouldn't have worked. So you really need the management team for this."* (P16).

Second, within the DT to RM, MMs strive to provide their team or department with guidance and support, fostering open communication and addressing concerns to effectively navigate challenges. A participant explained: *"The question is, and this is the observation for us as team leaders, what do people need to participate in this* [DT]*?"* (P15). They empower employees by involving digital change enthusiasts in the development and implementation of RM, and utilize nurses with strong communication skills to promote RM within their departments.

A third role that was distinguished from the interview data is the 'bridger'. This entails connecting between different layers within the hospital (e.g. doctors, nurses, project teams and other managers) during the DT. This role ensures practical considerations are integrated from the outset of RM development, bridging the gap between strategic plans and practical implementation, as noted by a department manager: "*I ensure that* [in the development of RM] *the right people are involved from the start.*" (P15).

Lastly, a role that the MMs take on in the DT to RM, can be described as a 'change ambassador'. This corresponds to the view illustrated by Conway and Monks (2011) that MMs are not mere implementors of change. They deploy a more crucial position, which is illustrated by the following quote: "*Once I don't move, they* [team members] *are not going to move either.*" (P3). The role encompasses innovating, involving team members, and maintaining good communication. Several MMs talked about how they came up with their own ideas to catalyze the DT towards RM. One team manager explained that they independently set up the promotion of RM on the TVs above the beds in their nursing ward. Another department manager described that they introduced a new role in their department, namely that of a hybrid nurse, whose main

role is to explain and promote RM to their patients in order to include an increasing number of them for RM.

Thus, the results above show how MMs take on a large variety of roles in the DT to RM, and can be seen as important agents within the hospital's DT to RM. However, within carrying out those roles, the MMs face a variety of different tensions that surface during the hospital's DT to RM.

Tensions and paradoxes in the DT to RM

Different tensional fields are derived from the interview data, and categorized into three themes (as shown in Figure 1); 'aligning with doctors', 'balancing quality and quantity', and 'temporal tensions'. As described by Putnam and colleagues (2016), tensions underly all different types of contradictions, such as dialects, paradoxes and dualities. Within each theme, these forms of contradictions that MMs encounter in the DT to RM are highlighted. Together, these tensions expose the complexities that the MMs have to work through in the DT to RM.

Aligning with doctors

One topic that nearly every participant touched upon was that of working with doctors and the importance of their involvement and cooperation in the adoption of RM, in order for the DT to succeed. One participant mentioned the importance of having a good relationship with the doctors, since "*everything depends on it*" (P11). Three participants explained that the introduction of RM in their teams went smoothly due to the good relationship between them and the doctors, and the clear mutual communication. These results indicate that the cooperation of doctors is essential for the DT to RM to succeed.

Nevertheless, the majority of the participants expressed to have difficulties in aligning with doctors on RM and other digital changes (e.g. the use of electronic health records), as doctors – from the MMs point of view – seem to have difficulties with digitalization within their work, which tends to stagnate the DT. Moreover, participants talked about the existence of skepticism and fear of transforming to digital ways of working with the doctors. One department manager explained: "*Often, it fails because the doctor doesn't believe in it, thinks it's nonsense, or is afraid that it will create more work.*" (P14). In this respect, one interviewee stated the following about the introduction of RM at their department:

> I was interested [in RM] right away, but the [doctor] had no interest whatsoever, neither did the specialists initially. Maybe because they also experience the downsides of digital care. They really have cold feet. (P9)

The resistance of doctors in cooperating in the DT is frequently mentioned, which participants regard as *"annoying"* and *"frustrating"*. These are typical feelings when one encounters tensions in their work (Putnam et al., 2016). A quote which is illustrating for the prevailing sentiment is the following: *"Well, you always have a bit of conflict with doctors. But you do need them."* (P3). This shows the tension that the MMs have to deal with, as they depend on the doctors to join them in the DT towards RM, which highlights their semi-autonomous position. They are constrained in carrying out the demands of their professions (e.g. facilitating the DT to RM at their team/department) by the context in which they operate, namely the hospital context in which they have a dependency on the cooperation of doctors (Gutberg & Berta, 2017; Gjellebæk et al., 2020).

Repeating the message about RM's necessity and maintaining clear communication are mentioned as common strategies to deal with this tension. The participants explain that they try to convince doctors to be open to RM: *"I think that is a role I have: to get them enthusiastic about it, to signal to them, to motivate them, and also to help set it up."* (P9). Other strategies MMs used to convince the doctors are the repetition of their message about the necessity and relevance of RM to the doctors, and clear communication, which corresponds with the tasks that MMs generally take on in the implementation of an innovation, as described by Birken and colleagues (2012).

However, some MMs expressed to sometimes find it challenging to convince doctors to adopt RM or delegate certain monitoring tasks to the Home Monitoring Team, due to their own lack of substantive medical knowledge. One participant explained how they wanted to transfer the task of judging the outcomes of a CTG-scan – in which a baby's heart rate is monitored – to the HMT, to free up capacity at their own department. However, doctors told them that the judgement of such outcomes is too specialized and difficult to delegate. The manager explained:

> Maybe I don't have enough understanding of the theory behind the CTG. It is very difficult, I understand that too. I also understand that you are less likely to want to hand over that care. And yet I think that people can also be trained in it. (P3)

The above illustrates a difficult position the MMs find themselves in. This involves managing the ongoing interplay between promoting DT for efficiency and respecting doctors' professional judgments and concerns about quality care. They need to find an equilibrium between the two. Where do they push through, and where to they agree on that it simply is not possible? They are operating in the context of the hospital, in which quality care needs to be guaranteed and no mistakes can be made. But to know whether a doctor is reluctant as a result

of their personal skepticism towards digitalization, or that the MMs' convictions about RM are simply not feasible, is a difficult consideration. A way to deal with this, one team manager explained, is by involving other team members with the required medical knowledge to judge the situation and to come up with solutions:

> When I believe that something can be done more efficiently, then I immediately involve the necessary team members. I am not going to judge it myself. I lack enough detailed knowledge, and sometimes simply don't know well enough. And then I involve the staff and let them think about how it could be done better or faster. (P5)

Apart from doctors' reluctancy to transform to RM, there were also instances where the doctors were eager to start or accelerate the DT:

> Well, the [doctors] were very eager to start home monitoring in the department. They wanted to do it during the past winter period. Both I and the department manager faced a significant staffing challenge, especially since we had deployed many temporary employees. We had to consider the possibilities carefully—where could we make it work, and where might we still lack the capacity? Ultimately, we decided to postpone it until the right time. (P10)

The above exemplifies how the MMs must navigate between doctors' varying levels of enthusiasm for RM and the practical limitations of their own resources. This balancing act requires MMs to carefully assess the feasibility of implementing new technologies like RM, taking into account not only the willingness and readiness of doctors but also the availability of necessary resources, such as staffing and budget. This underscores the complexity of the decision-making process, where MMs must weigh the potential benefits of accelerating the DT to RM against the risks of overburdening their teams or compromising on the quality of care.

Another recurring subject that is creating tension, is that of the doctors independent position, higher up in the hospital's hierarchy. The doctors tend to do keep doing their work the way they want to, even when this conflicts with the new direction the hospital is taking, e.g., the DT to RM. This causes a tension for the hospital's MMs, as they are the ones who are typically invested in putting the hospital's objectives into practice (Gjellebæk et al., 2020). One department manager illustrated this with the following quote:

> And where I say, yes, we are definitely going to do this remote monitoring. All the nurses are just going to do it, that is the instruction. I don't accept it if one of them says, 'yeah, I'm not going to do it.' [...] But somehow, even if we set that goal as a hospital, as a doctor, you can still say, 'well, I'm just not going to do it'. (P14)

In addition to this, interviewees mentioned how doctors are often organized in separate silos of partnerships, which makes aligning with them on subjects such as RM implementation difficult. One MM explained as follows:

> And a partnership, sometimes consisting of thirty doctors. All of whom have different opinions. And in a partnership, it's not always very clear what they think about something. Or to reach

consensus about; 'we're doing it this way'. So you see a lot of side paths in what they do. […]
And then I think, can't you just coordinate with each other about what you want? Because that
would make it easier. And you often speak for your own parish or on behalf of yourself. (P4)

The tensions described in this section can be seen as underlying a duality between the MMs'
perspective and the doctors'. These two perspectives are not inherently paradoxical, but
potential conflict may arise between them (Stoltzfus et al., 2011). On one side is the MMs'
perspective, which focuses on promoting efficiency, following the hospital's objectives, and
managing resources within the DT. On the other side is the doctors' perspective, which,
amongst others, prioritizes maintaining their professional autonomy and expertise. These
objectives can be conflicting and create tensions, as presented above. Nevertheless, no either/or
option is possible since both perspectives are relevant and need to be considered for the
hospital's functioning during the DT to RM. Their perspectives are complementary and must
be integrated. As shown in the results, both perspectives on RM are influenced through
dialogue, adjustments, and compromises. This process of continuously trying to unify the
sometimes opposing perspectives can be seen as dialectical (Putnam et al., 2016), with MMs
acting as the main force behind bridging the opposing views on the DT to RM.

Balancing between quantity and quality

MMs explained to be both responsible for quality development in their teams or departments,
as well as for the allocation of their team's or department's resources, such as personnel, budget,
and equipment. Within this set of responsibilities already lies a paradox, namely the 'paradox
of performing', as described by Lüscher and Lewis (2008). In this paradox, a conflict exists
between different views on what constitutes managerial success. On one hand, there is a focus
on prioritizing quality in healthcare delivery, which emphasizes the importance of patient
outcomes and innovative care practices. On the other hand, there is an equally critical need to
prioritize efficiency in the allocation of resources, which involves quantitative measures such
as budget and full-time equivalents (FTEs). This dual focus creates a tension between
maintaining high standards of care and ensuring that resources are used in the most cost-
effective manner in this DT to RM. This creates a tightness in making choices for the middle
manager, as inherent conflicts will arise in the balancing of the two, resulting in a variety of
tensions, which the participants talked about, and will be elaborated on below.

First off, the tension of how a rise in quality of care as a result of innovation (e.g., RM)
is not always quantifiable. A department manager explained:

Look, you have a numerical calculation, and then you can say, well, you know, it doesn't yield
anything. But if, on the other hand, it benefits the patient a lot, sometimes the monetary aspect

> isn't always applicable. We're in healthcare, you see. And I understand, on the one hand, that the bottom line must be good. But providing care also means that not everything can be quantified in terms of money. (P11)

This underlines how this managerial tension is specifically challenging given the healthcare context these MMs operate in. Not prioritizing on quality is non-optional, as the provision of good care is fundamental for hospitals.

However, only qualitative gains are not enough, according to the interviewees. They have to make the financial ends of this DT to RM meet, which is something that MMs indicate as a struggle. This brings us to a second underlying tension, namely that of the monetary investments needed for the DT to RM. The majority of the participants talked about the high costs that are associated with the use of RM apps, such as the Luscii app, and the appliances needed for RM (e.g., specific blood pressure monitors). One participant was positive about the pilot they had with RM at their department, but explained:

> The Luscii app is rather expensive. […] At some point, I was informed that we had to start paying for it ourselves. Well at that moment, I honestly said, well then I have to pull the plug. Because it was such a significant amount of money. (P11)

Even though in this case the manager and the work floor were positive about RM, the costs involved were too much for them to carry through on the implementation. This shows how the MMs cannot solely prioritize the development of quality through innovations such as RM, as they are always tied to their budgets. Which, again, is also crucial for the running of the hospital, since healthcare needs to stay affordable, which must be done by sticking to the allocated budgets.

Third off, there lies a contradiction in the implementation of RM. Namely, that its use can mean a loss of income to the MMs' departments. The usage of RM generally means that patients are handed over to HMT, which is outside of the MMs' department. This causes a transfer of the income that patient generates, away from the department, which is a *"complex matter"* (P14). Moreover, the department's revenues can diminish as a result of RM, since it can prevent hospital (re)admissions and shorten the length of the patient's stay in the hospital. One team manager explained:

> Reductions in hospital admissions also means a decrease in income. So, you'll need to generate income elsewhere. Ambulatory care, well, that has a lower rate than clinical care. […] You also have to take that into account budget-wise. So, there are a lot of complexities involved in that. (P3)

This contradiction which occurs in the DT to RM, is exemplary for the fundamental contradiction within hospitals, as described by Temple (2014), since the preventive objective

of the DT to RM leads to less income, while simultaneously the need exists to increase revenues.

Fourth, the dilemma of prioritizing between different options to spend their unit's budget on. Once a MM decides to prioritize the DT to RM, this might mean that they have to reduce funding which previously was allocated to other operational tasks. One participant provided the following example:

> But I think that it [RM] is such an important task, so I'm going to use part of my budget for it. But I must not exceed that budget. So I'll have to cut something else. And that might mean that I'll say, well, I won't need a secretary here all day anymore. (P8)

The DT to RM thus imposes a dilemma of prioritizing between different operational tasks for the MM. Cutting on resources for other operational tasks may have implications on how, for instance, the quality of the care is judged. In this example of P8, cutting on the presence of a secretary could possibly mean that their administrative tasks fall onto the medical staff. Or patients may deem their hospital visit of lower quality, when they are not received by a secretary upon arrival to their appointments. Thus, the MMs continuously need to prioritize within their budget, which may leave them with a dilemma on whether or not to prioritize on the DT to RM, while considering the possible implications and trade-offs their choice brings about (Putnam et al., 2016).

The participants said to employ different strategies to 'work through' these different types of tensions. Firstly, having a long term vision is said to be necessary. Because, *"once it* [RM] *is all up and running, you can often better quantify the gains."* (P14). Secondly, the importance of approaching the DT to RM in a holistic way. The MMs emphasized the necessity to have a wide scope, in which they look further than their individual teams or departments. A MM explained as follows:

> […] then you need to look at it as a whole, I believe. We are one department, but we're part of the rest of the hospital. So, yes, if you lose something here, you gain something elsewhere. In this department it's the same: I occasionally lose something, but on the other hand, I also sometimes gain something. (P11)

Thus, the paradox of performing in the DT to RM consists of a constant trade-off that has to be made by the MM between qualitative and quantitative gains, since quality needs to be remained, however, healthcare needs to be kept affordable, which means that MMs must realize quality developments within their allocated budget. Again, underlying this paradox is a dialectical relationship between the two opposites in which they continuously interact and are interdependent. The unification of these two opposites is fuelled by the MMs' efforts to balance both qualitative and quantitative sides of this DT to RM.

Temporal tensions

A third tension that can be distinguished from the interview data is that of the temporal tensions that MMs have to deal with in the DT towards RM. Time is a scarce resource in hospitals, due to the high demand for healthcare and the shortage of healthcare personnel. Given the MMs' responsibility for planning and resource allocation, this is a recurring issue they talked about. In relation to the DT to RM, the following quote is illustrating for the MMs' experience: *"The* [RM] *app can alleviate work pressure, but initially, it will create more work pressure. […] That's the case with everything that is new. Initially it costs time."* (P15). Thus, RM takes time before it saves time, as, for instance, nurses need to adjust to working with and explaining the RM app to patients. This is a difficult choice the MMs are facing; choosing between immediate time costs, which on the long term has the potential to save time, or choosing not to invest their time into RM at this point, costing them time on the long run. This essentially is a long-term/short-term duality, since the two are interdependent; one cannot have future benefits of RM without the initial time costs. Where it gets difficult - or even paradoxical - is when both short-term and long-term objectives need to be addressed simultaneously (Stoltzfus et al., 2011; Karhu & Ritala, 2020), which is exactly the task that the MMs face in their consideration to invest time into the DT to RM. This long-term/short-term duality expresses itself in the following forms of tensions that the participants indicated.

Another contradiction that MMs encounter, is related to the transfer of monitoring tasks to the HMT. While the participants overall recognize the potential benefits, they talked about challenges and considerations when implementing RM in a specialized department. Because, several monitoring tasks require too specialized knowledge to transfer them to the more generic HMT. One participant explained that they tried delegating a specialized monitoring task to the HMT in a RM pilot, to save time at their own department. However, in practice, the HMT had too many questions that they could not answer themselves and felt like they were only passing on messages from the patient to the department and vice versa. This resulted in the department's nurses still spending time – or even more time – on these monitoring tasks. Thus, they decided to take back the monitoring task. This contradiction illustrates how the attempt to save time through delegation resulted in inefficiencies, hindering the desired outcome of RM.

In addition to the adaptation to RM taking time from the nurses, the nurses are also involved in the development of innovations such as RM. That is one dilemma the MMs frequently discuss: they want to address shortages in staff by promoting developments and

innovations, but this requires them to slow down and take time—time they do not have, as they need the nurses for patient care. One department manager explained:

> And what's particularly challenging, is that I can't really afford to have them spend time on such development, on innovations. They're actually crucial in patient care, and that immediately creates a dilemma. Personally, I find it quite difficult because I recognize its importance. Everyone sees the significance now. But we don't really know how to engage without incurring significant costs. (P9)

Another dimension of this temporal tension is the dilemma having to make an either-or choice between different change initiatives. Because changes take time, not everything can be done all at once and it is up to the MM to decide what to prioritize. Sometimes, this results in choosing other, more low-key developments over the development and expansion of RM:

> I think there's other low-hanging fruit that we can easily address. […] We could gain more space by focusing on smaller improvements rather than tackling a large project. So, the question is, what's the gain when there's so much low-hanging fruit we can pick to enhance efficiency and streamline healthcare processes? (P3)

Moreover, this temporal tension pertains to finding the right timing when it comes to the transformation to RM. This part relates to the tension of aligning with doctors, since the MMs explained how they wait for the right moment to convince doctors about transferring specific tasks to the home monitoring team. But also the other way around, in which the MM had to postpone the doctor's wish to accelerate the DT to RM, since they did not have the time necessary to invest in this DT at that moment.

Tensional knot

The results above illustrate how the hospital MMs are 'entangled' in the management of different tensions of the DT towards RM. These tensions, however, cannot be seen as isolated from each other, as they interact with each other and are interwoven within the hospital's socio-technical system. This is illustrated in a 'tensional knot' (Figure 2), which shows how these different tensions are interrelated.

First of all, the tensions underlying *aligning with doctors* interact with the balancing between quality and quantity, as doctors' involvement is needed for the further development of RM's quality. Moreover, doctors prevent tasks which might be too specialized to unjustly be delegated to the HMT, safeguarding the quality of the monitoring tasks performed. In addition, as explained, the alignment with doctors on RM can be time consuming for the MMs initially taking up more time and delaying the transformation process.

Second off, the tensions of *balancing between quality and quantity* interacts with the alignment with doctors, since doctors need to be assured that RM will not compromise care quality, in order for them to find proper alignment with the MM on the DT to RM. Moreover, as mentioned, the MMs deploy a long-term vision in dealing with these tensions, since the realization of long-term qualitative gains of the RM transformation initially take time. However, such time investments collide with the short-term time constraints that the MMs have to deal with.

Lastly, the *temporal tensions* interact with the tension of aligning with doctors, since appropriate timing in aligning with doctors on RM is important for the further course of the DT. Moreover, as described earlier on, it takes time for qualitative gains to be able to be expressed quantitatively. The long-term/short-term duality may thus impact the balancing act of qualitative and quantitative gains.

Overall, the interactions between these tensions underpin the complex position of the MM in the DT to RM, in which they find themselves in the center of the tensional knot, trying to navigate each dimension and their intersections. This tensional knot highlights the necessity of using a sociotechnical lens in studying the DT to RM, since it becomes evident that the context of tensions in which the MMs operate define the further onset of the DT (Hanelt et al., 2020), and RM cannot be seen as isolated from those tensions. Moreover, the impact that the introduction of RM has on the sociotechnical system of the hospital is highlighted by the emergence of the vast amount of different types of tensions between different actors and work practices. Thus, summarizing, the exact shape and course of the DT towards RM cannot be defined in advance, and cannot be generalized for other cases, since it is the result of the context that it is developed in (Berg, 1999). The ongoing interplay of balancing the different tensions in the DT to RM underscores the complexity of the MMs role in the DT to RM within the hospital's sociotechnical system, emphasizing the need for a holistic and nuanced approach to DT in healthcare.

Figure 2

Tensional Knot of the MM in the DT to RM (Based on: Moschko et al., 2023).
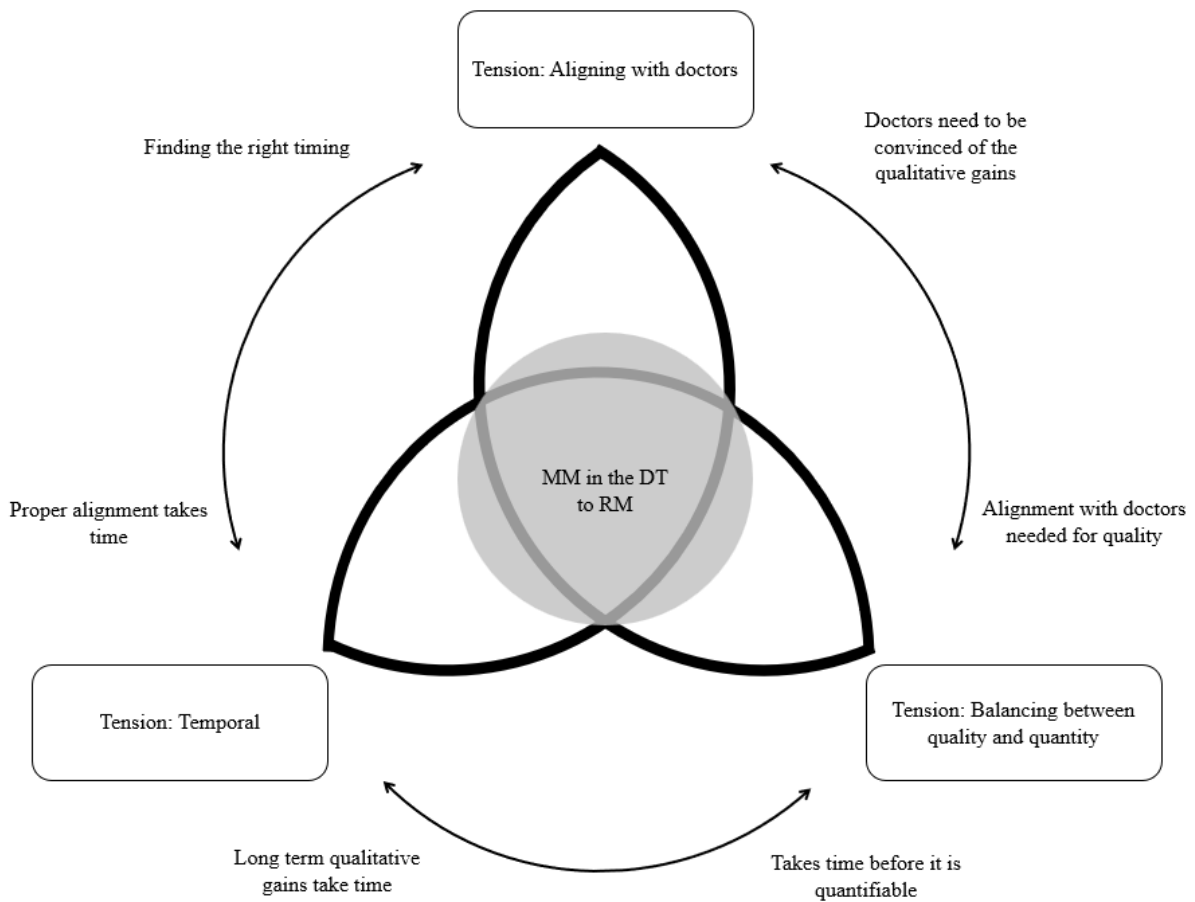
Conclusions and discussion

The aim of this study was to contribute to our understanding of middle managers and their perceptions and role in hospital digital transformation towards remote monitoring, and while doing so, recognize the possibles tensions and paradoxes they experience. This was done by studying the following research question: '*What are possible tensions and paradoxes that hospital middle managers experience within the digital transformation towards remote monitoring?*', supplemented by the sub-questions: '*How do they perceive this digital transformation towards remote monitoring?,* and: '*What role do they take on within this digital transformation?*'.

In managing the DT to RM, the MMs have to work with three different, but interwoven tensional fields. First off, the tension of aligning with doctors. This pertains the difficult relationship they have with the doctors, as they are higher in the hospital's hierarchy, and often

are difficult to align with, since they are positioned in separate partnerships and are often reluctant to digital change. While the MMs are driven to make the DT succeed, they need the collaboration of the doctors to realize this. The tension is about trying to convince the doctors to move along, while they are not really in the hierarchical position to do so. The second tension is about the balancing between quantitative and qualitative gains, which underlies the paradox of performing (Lüscher & Lewis, 2008). Middle managers face the challenge of balancing the qualitative improvements in healthcare through remote monitoring with the financial constraints and income loss associated with its use. Lastly, the temporal tension: balancing the initial time investments that are required against the eventual time-saving benefits. Moreover, they need to find the right moment for RM integration aligned with staffing capacities and operational readiness. These three tensions are interrelated and visualized in the 'tensional knot' (Figure 2), which highlights the complex position that the MMs find themselves in during the DT to RM. This study shows the importance of using a socio-technical lens (Berg, 1990), since this allows us to see how the DT to RM inherently reconfigures the socio-technical system of the hospital (e.g. shifting relations between doctors and MMs), generating tensions and paradoxes.

In spite of the tensions and paradoxes they encounter, the MMs' overall perceptions of the DT towards RM are positive. They acknowledge the necessity of RM for the future of healthcare, as it helps them to create capacity, both in the nursing wards due to shorter hospital stays and prevention of hospital admissions, as within the outpatient clinic, since patients need to visit the hospital less frequently. Overall, RM helps the MM to manage the growing shortages of healthcare personnel, while responding to the rising demand for care. This all contributes to their positive stance towards RM. However, the concerns and challenges surrounding RM and the DT in healthcare in general, such as it causing lack of personal touch in in the delivery of care, privacy- and security issues, and concerns about data accuracy (Serrano et al., 2023; Walker et al., 2019), were not discussed by the participants within the interviews. This can partially be explained by the fact that those studies focused on the viewpoints of healthcare professionals and patients. Nevertheless, it does raise questions whether the MMs are informed enough about the possible concerns and consequences of RM. Moreover, the positive perceptions of the MMs on RM, differ remarkably from the concerns that healthcare practitioners express in the study by Serrano and colleagues (2023). This may also partially explain the tensions that surface between MMs and doctors when aligning on RM, because they approach the DT to RM through different assumptions.

Concluding the second sub-question, the interview data shows how the MMs play a substantial and multifaceted role in the DT towards RM, despite initial doubts within the hospital about the significance of MM involvement in the DT towards RM. They act as facilitators, making sure all resources are allocated in a way that enables the DT. Through their coaching role, they empower their teams or departments, while as change ambassadors they drive innovation and facilitate communication. Lastly, in their bridging role, they connect different parties within the hospital, making sure that practical implications are compatible with strategic objectives. Through continuously synthesizing these four roles, MMs try to facilitate the DT to RM. This confirms the important role of MMs within organizational changes (Giauque, 2015; Kokshagina, 2021; Birken et al., 2012), and points out that MMs have unjustly been overlooked in research on healthcare innovation implementation (Birken et al., 2012; Gjellebæk et al., 2020).

Theoretical implications

With the development of the tensional knot of MMs in the DT to RM (Figure 2), this study makes a theoretical contribution to different scientific fields. First, to the field that studies MMs in healthcare innovation implementation (e.g., Birken et al., 2012; Gutberg & Berta, 2017; Gjellebæk et al., 2020). The tensional knot illustrates the complexity of the MMs' position in the implementation of innovations, thereby providing a theoretical basis for further research on the tensions and paradoxes that healthcare MMs might face in the implementation of other innovations. Moreover, this study's findings build further on the existing theory on organizational paradoxes (e.g., Putnam et al., 2016; Stoltzfus et al., 2011) by providing a practical case example of how such tensions manifest in a real-world setting of a hospital DT to RM. Additionally, this study's insights can sensitize researchers studying both RM as well as DTs in general, of the tensions and paradoxes that may surface for different actors as a result of the inherently disruptive nature that digital technologies hold (Vial, 2019; Binci et al., 2021).

Furthermore, this study contributed to the development of our understanding of the MM's perspective within DTs, following up on Nadkarni and Prügl's (2020) call for action for more research on the topic to fill that gap in knowledge. Moreover, this study also responded to the call for more empirical insights about telemedicine adoption (Binci, 2021), by studying the case of the DT to RM, with a focus on the MMs' perspectives and roles within it.

Practical and policy implications

With the challenges that the Dutch healthcare sector is facing, due to a decreasing amount of healthcare personnel and a rise in demand for healthcare, the necessity of finding different ways of delivering care outside of the hospital was apparent throughout this research, as illustrated in the introduction, as well as by the participants in the interviews. Agreements amongst medical actors and policy makers in society are made to accelerate the expansion of hybrid care possibilities (IZA, 2022), for which the DT to RM in hospitals is necessary. However, healthcare providers believe that the set goal of making 70% of healthcare provision hybrid by 2026 will not be possible, and only 50% will be feasible (RIVM, 2024).

This study has contributed to our understanding of how such a gap between policy ambitions and practical reality can exist, since it highlights the complexities surrounding the DT to RM in practice. This is done through the use of a socio-technical lens, which considers both the social and technical aspects of the transformation. By examining the perspectives of MMs in a top-clinical hospital, this research reveals the intricate web of tensions and paradoxes that arise during the DT to RM. This exemplifies how practical reality is much more complex than is often reflected in policy concerning DTs and the expansion of hybrid healthcare. Thus, actors shaping policies must attempt to recognize the socio-technical nature of DT to RM, to understand how its onset may deviate per case in practice. This can help in setting more realistic policy objectives, better attuned to practical reality.

Moreover, within policy or the translation of it in the healthcare organization itself, other actors than those primarily concerned with RM development should be taken into account, since they are also affected by and influence the onset of the DT. On a hospital level, this means that actors who determine the hospital's objectives and course of the DT to RM are advised to consider that – given the socio-technical context of the hospital – actors who do not primarily work with RM in their day-to-day practice can still be affected by its implementation as it causes a shift in the entire socio-technical system. Conversely, these organizational actors may also (indirectly) shape or impact the DT to RM. This is illustrated with the MMs within this study. By having a more integral scope, the DT to RM can be managed more effectively, ensuring that efforts and resources are not wasted, and ultimately leading to a better informed, realistic approach to the DT to RM in practice.

Limitations

In addition to the contributions of this research for theory and practice, reflections are also in place on the limitations of this research. I gained access to the hospital through a member of the hospital's Board of Directors. This person is a hierarchical superior to the interview participants. While the participants' anonymity was emphasized at the onset of the interviews, this might have (unconsciously) affected their answers and statements about RM and the DT in general, in a desire to match the hospital's discourse. This could partially explain the predominant positive attitude of the MMs toward the hospital's DT to RM.

Another limitation of this study is that it was conducted by a single researcher. This makes the study more susceptible for bias. For instance, the researcher's individual perspectives and preconceptions about RM might have influenced the way data was collected, analyzed, and interpreted. Additionally, the absence of other researchers means that the findings lack the benefit of multiple viewpoints. While efforts were made to mitigate possible biases through using a systematic method for data analysis (i.e., the Gioia method) and providing visual insight into this process (Figure 1), the influence of a single-researcher perspective may still form a constraint on the study's overall objectivity.

Future research

First of all, future research could take into account the positions of the doctors, (more) nurses and the home monitoring team as well. These other actors within the hospital may shed a different light on the DT, hold other perspectives on RM, and may encounter similar or additional tensions and paradoxes within their work. This can help to gain a more comprehensive understanding of the impact of the DT to RM hospital's socio-technical system, responding to the call for more empirical knowledge about RM and its adoption (Binci, 2021).

Additionally, an interesting avenue would be to conduct a similar case study MMs from a different hospital or healthcare organization, to explore whether similar or additional tensions and paradoxes emerge. This way the model of the tensional knot can be tested and developed further. Lastly, future research could focus more on the strategies that MMs employ to deal with tensions and paradoxes in their work, and the effect that those tensions and paradoxes might have on them.

With future research building further on this study's insights and its unravelling of the paradoxes and tensions surrounding the DT to RM for MMs, there is potential for a smoother

and more effective transition to RM in healthcare, ultimately offering crucial insights that can help the DT within healthcare, keeping care accessible and sustainable in the future.

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Appendix A

Topic guide interview

Introductie	o Introductie thesis: Onderzoek naar digitale transformatie naar hybride zorg (m.b.v. Luscii app (thuismonitoring)) en de rol en percepties van de midden manager. o Zoals in het formulier aangegeven kan je ten alle tijden stoppen en hoef je vragen niet te beantwoorden. Vertrouwelijkheid en anonimiteit van de antwoorden. o Interview duurt ongeveer 45 minuten. o Ik start nu de opname, akkoord?
Algemeen	o Kun je jezelf kort voorstellen en je rol in het ziekenhuis beschrijven? o Achtergrond? o Waar is jouw afdeling/team verantwoordelijk voor?

Ervaring thuismonitoring (met Luscii app)	o Jullie werken met de Luscii app voor thuismonitoring. Voor welke zorgfuncties zetten jullie dit in? Hoe werken jullie hiermee in de praktijk?
	o Hoe is dit proces in zijn werk gegaan? Welke stappen hebben jullie genomen om thuismonitoring te implementeren binnen jullie afdeling/team?
	    o Hoe werd dit gecommuniceerd?
	    o Van wie kwam het?
	    o Weet je nog waarom het werd geïntroduceerd?
	    o Hoe kijkt jouw afdeling/team hier tegenaan? Hoe werd het ontvangen?
	    o Ging het goed? Waren er obstakels?
	    o …
	o Wat voor uitwerking heeft het gebruik van thuismonitoring in de praktijk? Voor de mensen in jouw team of afdeling? En voor jou zelf?

Perceptie thuismonitoring	o Wat vind je van thuismonitoring? En de Luscii app? o Welke voordelen of kansen zijn volgens jou verbonden aan thuismonitoring? o Maakt de app ook haar potentie waar? De beloftes zoals *verlichting van werkdruk, lagere administratieve lasten, meer autonomie voor de patiënt, kostenbesparing…* o Wat zijn volgens jou randvoorwaarden voor (implementatie van) effectieve thuismonitoring? o Wat is niet behulpzaam of welke problemen lopen jullie tegenaan? Welke specifieke uitdagingen of zorgen associeer je met thuismonitoring? o
Rol in transitie naar hybride zorgpaden	o Hoe zie jij jouw rol als team/afdelings hoofd? o Wat vraagt/vroeg de transitie naar het gebruik van thuismonitoring en de Luscii app van jou als team/afdelings manager?

	o Hoe heb jij je opgesteld richting je team/afdeling? o Wat ging daarin goed? o Tegen dingen aan gelopen? o Wat zou behulpzaam zijn geweest? Wat heb je gemist? Heb je je gesteund gevoeld?

In de praktijk	o In deze transitie, hoe verhoud jij je tot je afdeling/team?
	o En tot afdelingshoofd?
	o En tot andere afdelingen/teams? En de artsen/medische staf?
	o Welke rol zie jij weggelegd voor jouw eigen team/afdeling in de transitie naar thuismonitoring?
	o Welke rol zie jij weggelegd voor anderen (bijvoorbeeld bestuur, programmateam digitale transformatie, team/afdelingshoofd..) in het faciliteren van deze transitie?
	o Heb je gemerkt dat het management andere dingen wil dan de werkvloer?
	o En zijn er verzoeken van de werkvloer die in strijd zijn met de top?
	o Zijn er andere tegenstrijdigheden rondom thuismonitoring?
	    o Hoe ga je daarmee om?
	    o Wat doet dat met je?

Afsluitend	o Heb je nog andere opmerkingen, suggesties of inzichten die je zou willen delen met betrekking tot thuismonitoring in het ziekenhuis? o Is er iets wat we niet hebben besproken, maar waarvan je denkt dat het belangrijk is om te vermelden? o Bedankt voor deelname en waardevolle input.