Preventing pressure ulcers in the ErasmusMC

A case study about system innovations in healthcare

Simon ter Laak

TU Delft

ErasmusMC

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by

Simon ter Laak

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Student Name	Student Number
Simon ter Laak	5424569

First supervisor:	Dr. I. (Irene) Grossmann
Second supervisor:	Dr. J.A. (Jan Anne) Annema
External supervisor:	Dr. M.J.H.A (Marieke) Kruip
Chair:	Dr. J.A. (Jan Anne) Annema
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TU Delft

Preface

Dear reader,

Before you lies the master thesis “Preventing pressure ulcers in the ErasmusMC: A case study about system innovations in healthcare”. The purpose of writing this thesis was to complete the requirements for graduating from the Complex Systems Engineering and Management Master’s programme at the Delft University of Technology in the Netherlands. I conducted this research from February until October 2023 at the ErasmusMC and the TU Delft.

For me, this was the first time doing research in a hospital and using the case study method. Performing the case study according to the principles of Yin gave me experience and skills in qualitative research that I did not possess. Shadowing operational staff, interviewing medical personnel, being part of the nursing team, and getting to work at the department of Kwaliteit and Patiëntenzorg gave me so much insight into the healthcare environment and was such a wonderful experience. It has showed me the hard working and servitude side of medical personnel in the ErasmusMC. I was surprised by the openness of the hospital and the collaboration of the operational and strategical staff during my research. Without the access and openness that the ErasmusMC created for me, the data in this case study would have been not as extensive and rich as it is right now.

I would like to thank my supervisors at the TU Delft, Dr. Irene Grossmann and Dr. Jan Anne Annema, for their guidance and support in writing my thesis. You were the perfect couple for conducting a qualitative study in a healthcare setting and helped me to overcome the challenges that occurred whilst writing my thesis. Especially, I would like to thank Dr. Irene Grossmann, for her door always being open for my questions and her close help and feedback in applying the systems thinking approach in a healthcare setting. I would also like to thank my supervisor at the ErasmusMC, Dr. Marieke Kruip, for taking the time in her busy schedule to provide help and feedback, opening all the right doors in the hospital for me to collect all my data, and providing me with full time access to a working space in her department.

I want to thank my family and friends for providing me with help and supporting me throughout the intense process of writing a thesis. I particularly want to thank Wiet Kalf for helping me during the tough times when I got completely stuck and providing me with the support to get through these moments. And finally, I want to thank you, my reader, for taking an interest in reading or studying this thesis.

Simon ter Laak
Delft, October 2023

Summary

A pressure ulcer (PU) is defined as localised damage to the skin and/or underlying tissue, as a result of pressure or pressure in combination with shear. Despite the fact that pressure ulcers have received a lot of attention recently in hospitals and long-term care homes, they still form a major issue. The ErasmusMC is one of the hospitals with concerns regarding pressure ulcerations. Currently, there is a need to know why the implementation of measures for the improvement of preventing pressure ulcers resulted in disappointing results in the hospital. In a literature review, it was found that the concept of systems thinking and the application of this concept is lacking in the selected studies. Therefore, the research question of this thesis was: *Why are the current measures for the prevention of pressure ulcers not working as expected and intended in the ErasmusMC hospital?* In addition, the focus was laid on how to make the current measures for the prevention of pressure ulcers work as expected and intended at the ErasmusMC hospital.

A case study approach with a single-case (holistic) design was chosen. From the concept of systems thinking (the dynamic interaction, synchronisation, and integration of people, processes, and technology), the multi-level perspective of Geels was applied to this case study. With the use of the six common sources and the four principles of data collection of Yin, 22 recorded and summarised semi-structured interviews, 4 informal interviews, several observational moments whilst accompanying operational staff or participating in meetings, and countless informal conversations were collected. Furthermore, PowerPoint presentations, documents, and dashboard results of the measurement of pressure ulcer prevalence in the ErasmusMC were collected.

Following from the quote of Mcnabb et al. about complex systems, the examples of system elements in healthcare by Komashie et al., and the visual representation of the socio-technical system for modern car-based transportation by Geels, a first visual representation of the socio-technical system for preventing pressure ulcers in the ErasmusMC was drafted. Here, 10 system elements of the socio-technical system were displayed with the current measures for the prevention of pressure ulcers as the artefact(s) of the system. For the specification of the drafted visual representation of the socio-technical system, a literature review was done about the policy regarding pressure ulcers in the Netherlands. The selected literature identified various theoretical reasons for the measures to prevent pressure ulcers from not working as expected and intended:

- Inadequate repositioning and specialised treatment for patients with limited activity, along with poor distribution of information on pressure ulcer prevention, contribute to these measures' ineffectiveness.
- The organisational culture and quality management of nosocomial pressure ulcers might be potential factors, with a strong emphasis on institutional-level pressure ulcer management as a critical component.
- Inconsistent hospital coding systems and classification hinder the use of data for pressure ulcer prevention and quality care indicators.
- The importance of considering the use of standard mattresses in interventions, measuring the impact of nursing care activities, and establishing strong nursing leadership for pressure ulcer improvement projects.
- The challenges of engaging various stakeholder groups in implementing pressure injury clinical practice guidelines and recommend strategies like building reciprocal relationships and practical support.
- The development of a combination of interventions, methods, and programs, with a focus on addressing personal, cultural, and institutional factors, providing organisational support, and understanding nurses' adoption behaviour.

- A lack of nutritional guidelines, knowledge, skills, and resources can hinder pressure ulcer prevention measures.
- The importance of feedback, participatory learning, and nurses' satisfaction and autonomy in improving compliance with pressure ulcer prevention measures.
- The need for choosing measurable parameters that all teams can monitor to stay focused on the common goal of preventing pressure ulcers.

Next to the literature review, the multi-level perspective (MLP) of Geels was explained. The MLP of Geels for understanding system innovations involves three analytical and heuristic levels: The meso-level which is characterised by socio-technical regimes, the micro-level which comprises technological niches, and the macro-level which is represented by the socio-technical landscape. The concept of socio-technical regimes is described as a set of rules governing technological practices, production processes, product characteristics, and various elements in institutions and infrastructures. Technological niches are considered as spaces for radical innovations, where learning processes occur on different levels and facilitate the creation of social networks that promote new ideas. The socio-technical landscape refers to external factors that influence socio-technical development, although actors cannot directly change or control these landscape elements. These concepts are interrelated in a nested hierarchy. Regimes exist in landscapes, and niches operate in regimes.

When applying the dynamic multi-level perspective on system innovations to the situation of preventing pressure ulcers in the ErasmusMC, it was found that the landscape developments represented the urgency of the policymakers of the hospital to lower the occurrence of pressure ulcers, the technological niches were the measures (or system innovations) created for preventing pressure ulcers, and the socio-technical regime could be described as the socio-technical system for preventing pressure ulcers in the ErasmusMC. Combining the hypothesis of the multi-level perspective and the findings of the theoretical reasons in the literature review, it was stated that a nested hierarchy was missing.

In the case study, the researcher was initially assigned to the hospital's Kwaliteit & Patiëntenzorg department. Upon starting, the researcher received a hospital card, that granted access to move freely in the hospital as an employee. Additionally, the researcher was provided with a hospital account, which enabled him to contact respondents via email, schedule meetings, and locate respondents in the hospital easily. To blend in and establish trust with hospital personnel, the researcher was given a nursing outfit consisting of white pants and a white jacket with the hospital's logo. This attire also allowed the researcher to participate in and observe activities on hospital departments. However, it was strictly prohibited for the researcher to engage in any patient-related activities. His role was solely to observe and ask questions to medical personnel, and they were not allowed to provide hands-on patient care or intervention when needed.

From the analysis of the qualitative and the drafted visual representation drafted the 10 system elements were filled with the information gathered in the case study. A final visual representation was made of the socio-technical system for preventing pressure ulcers in the ErasmusMC that is represented in Figure 6.1. The figure showed interconnections between the system elements with the dotted lines. The system elements regulations and policies and organisational structure was interconnected through communication. Next to this, regulations and policies was interconnected with processes through the implementation of the prevention measures. People and culture was interconnected through the gathered opinions about the prevention measures of pressure ulcers. Also, regulations and policies and current measures were interconnected through the policy steps taken for the current measures. Regulations and policies and culture were interconnected through doubts about the measures. And last, regulations and policies, organisational structure, and tasks wer interconnected through the responsibility amongst managers and nurses regarding the prevention of pressure ulcers. The identified interconnections between the system elements were used as the key leverage points in the next chapter.

The MLP of Geels acknowledges that while processes at different levels can align and create opportunities for regime change, the actual connections and linkages between these processes are established by actors. Actor involvement introduces non-linearity to diffusion, characterized by accelerations and slowdowns, driven by shifts in perceptions, moods, and strategic interactions. These shifts are observ-

able through detailed analysis of micro-activities in local practices.

The observational notes and the socio-technical system for preventing pressure ulcers in the ErasmusMC, highlighted actor-related patterns as proposed by Geels: firm-related patterns, user- and culture-related patterns, and policy-related patterns. Additionally, this research identifies another actor-related pattern in the observational notes and the analysis of the socio-technical system: the information-related patterns.

The study resulted in the development of a practical socio-technical system for preventing pressure ulcers in the ErasmusMC, with 10 system elements based on qualitative data. Key leverage points in this system were identified as communication, implementation strategy, attitude and managers, and responsibility. To address issues in these key leverage points, recommendations were made:

1. Improve communication by implementing chain consultations between departments and removing one management layer to enhance horizontal and vertical communication.
2. Enhance the implementation strategy by hiring an implementation coach, implementing a coherent approach, improving the visibility of quality advisers for nurses, and creating a strategy for implementing the bundle of measures.
3. Foster trust in managers and establish a facilitating role among managers to positively influence the attitudes and responsibilities of operational staff and managers.

Addressing these key leverage points is essential for aligning the measures for preventing pressure ulcers with the socio-technical system at the hospital. This alignment can enhance system resilience and contribute to the creation of a nested hierarchy in the socio-technical system.

By using the mutli-level perspective theory of Geels and applying it to a healthcare setting, this thesis showed why the current measures for preventing pressure ulcers are not working as expected and intended in the ErasmusMC. This research made a contribution to the generic actor-related patterns found in the dynamic multi-level perspective on system innovations by introducing the information-related patterns. It is shown that this new pattern can be described by the crucial role of information and the flow of information in an organisation for the accelerations and slowing down in diffusion and breakthrough of new technologies.

Several suggestions for further research were made in this research:

- Understanding the impact of ”in-between” activities of nurses: It is crucial to assess the impact of the ”in-between” activities of nurses to establish a clear definition of nursing tasks.
- Thorough implementation plans: Effective implementation plans are essential for addressing reasons for irregular patient repositioning.
- Organisational support for initiatives: The focus should be on identifying the type of organisational support needed and how to apply it to optimize the implementation of specific initiatives.
- Researching staff’s sense of responsibility: Exploring the sense of responsibility among operational staff towards hospital resources is both interesting and potentially necessary.
- Nursing ownership and organisational support: Nursing ownership requires strong organisational support and leadership from managers and medical personnel to achieve purpose and motivation amongst nurses.
- Application of the multi-level perspective: Further research should apply the multi-level perspective theory in different healthcare settings to validate its applicability.
- Expanding information-related pattern research: Future research should explore additional trends within the information-related pattern beyond data, actor behaviour, and information loss in organisational layers. It should also investigate whether these trends hold when applied as an actor-related pattern.

Last, the application of the multi-level perspective of Geels in a healthcare setting, the new information-related patterns, and the findings in the analysis of the socio-technical system for the prevention of pressure ulcers could be generalised to the population and become close to the same extent of generalisability as statistical studies when done correctly and as adequate as possible.

Contents

Nomenclature

Abbreviations

Abbreviation	Definition
CoSEM	Complex Systems Engineering and Management
IAD	Incontinence-Associated Dermatitis
ICU	Intensive care unit
MLP	Multi-level perspective
Nosocomial	Acquired or occurring in a hospital
NPUAP	National Pressure Ulcer Advisory Panel
NSO	Nurse-sensitive outcomes
PDCA	Plan, Do, Check, Act
PI	Pressure injury
PU	Pressure ulcer
Viscoelastic foam	Memory foam consisting of polyurethane and additional chemicals to increase viscosity and density

1

Introduction

According to Bansal et al. [2] “decubitus ulcers are a worldwide health care concern affecting tens of thousands of patients and costing over a billion dollars a year”. Several words have been used to characterise pressure-induced wounds, including decubitus ulcer, pressure sore, and bedsore. In modern terms, these sores are frequently referred to as pressure ulcers. Interestingly, the Latin word decubitus, which means ‘to lie down,’ does not correctly characterise these ulcers because they can develop in any position when there is sustained pressure. In addition, new terminology standards were established by the National Pressure Ulcer Advisory Panel (NPUAP) in 2016 and the preferred term was changed to “pressure injury” to more accurately describe all types of tissue damage brought on by pressure, including the period before skin collapse. Here, pressure ulcer will be used “because it is still the most widely used and accepted terminology” [3].

The latest edition of the International Guideline for ‘Prevention and Treatment of Pressure Ulcers/Injuries’ defines a pressure ulcer/injury (PU/PI) as “localised damage to the skin and/or underlying tissue, as a result of pressure or pressure in combination with shear [4]. Kottner et al. [5] describe that “a pressure ulcer involves damage to the soft tissues of the skin including epithelial, dermal, and subcutaneous tissues, such as fat or muscle. Pressure ulcers are caused by structures (bones, cartilages, tendon) and external stiff support surfaces (e.g., mattresses or seats), or contact with medical and other devices (e.g., common objects “lost” in the bed such as a mobile phone)”. The most common locations in adults are over the bony prominences of the sacral and hip regions, though the lower extremities are affected in ≤25% of cases [3]. Although less often considered, pressure ulcers also occur amongst neonatal and pediatric patients, “which are most common over the occiput in these populations” [6]).

Even though pressure ulcers have received a lot of attention recently in hospitals and long-term care homes, they are still a major concern. According to Mervis and Philips [3] “in the United States alone, pressure ulcers affect ≤ 3 million adults annually and result in a diminished quality of life, high costs for the individual and health care system, and significantly increased morbidity and mortality”. In a systematic literature review about the cost and treatment of pressure ulcers, Demarré et al. [7] conclude that even though “the cost to provide pressure ulcer prevention to patients at risk can importantly impact health care services’ budgets, the costs to treat a severe pressure ulcer were found to be substantially higher”. The incidence of pressure ulcers can be at least 50% lower through prevention, which is also less expensive both economically and in terms of human suffering [8]. Patients at risk of developing pressure ulcers can be identified with the availability of risk assessment tools and by targeting preventive measures to these patients, the cost of prevention can be further reduced. Thus, it seems the prevention of pressure ulcers is important and is less costly both economically for hospitals, nursing homes, and other healthcare institutions, and in terms of human suffering.

There are numerous support systems, such as pillows, mattresses, and beds, available for the prevention of pressure ulcers [9]. Also, innovations such as changes in materials, care routines and feeding have been applied to prevent pressure ulcers. Despite these innovations, and the existing support systems for the treatment of pressure ulcers, it remains a persistent concern in care institutions. In

research of Moore et al. [10] about the prevalence of pressure ulcer in Europe, it was reported that the prevalence of pressure ulcers in the Netherlands was the highest (27.2%; n=17,494 participants). The ErasmusMC is one of the hospitals with concerns regarding pressure ulcerations. They too, experienced disappointing improvements after implementation of measures. Therefore, there is a need to know why the implementation of these measures did not improve the prevention of pressure ulcers as expected in the hospital.

"Difficulties in solving problems often stem from the fact that they do not occur in isolation, but rather in relation to each other" [11]. However, in healthcare organisations these problems often are studied in isolation [12]. This pitfall may be true as well for the prevention of pressure ulcers in hospitals. A systematic, holistic approach to dealing with the problems associated with care delivery is missing, which could result in disjointed solutions that do not solve the issue as intended and create new, unintended problems. Thus, a systematic, holistic approach is needed to identify the relations between the problems occurring in the prevention of pressure ulcers in the ErasmusMC.

1.1 Relation with the Complex Systems Engineering and Management program

In the master programme of Complex Systems Engineering and Management (CoSEM), innovations in complex socio-technical environments are researched. In addition, a CoSEM engineer is designing an intervention with the purpose of changing some processes in the socio-technical system and not with the purpose to design the system itself. CoSEM students are educated to apply the concept of systems thinking. The dynamic synchronisation, interaction, and integration of people, processes, and technology are at the core of systems thinking. First, the concept of systems thinking in healthcare will be explained since this research will focus on the ErasmusMC.

Trbovich [11] states that "healthcare is a complex system that involves high risk to patients, clinicians, manufacturers, and other stakeholders" where the exponential growth in medical technology over the last 50 years has greatly added to the complexity of healthcare. Hence, the National Academy of Engineering and Institute of Medicine recommended the extensive use of systems thinking to enhance healthcare delivery in a joint report published in 2005 [13]. In the research of Trbovich [11] it is found that "by gaining an understanding of the dynamics among people, processes, and technology, systems thinking aids in recognising how to intervene (e.g., focusing on changes to device design, clinician training, and/or clinical practice) in the system successfully". Furthermore, systems thinking can help identify the critical relationships and connections that are often missed or undervalued which are pivotal to a successful implementation effort.

In the last 30 years, the continuing development and application of systems thinking has created an unprecedented growth in fields as diverse as engineering, ecology, and economics [14]. Similar advantages from systems thinking can be found in the provision of healthcare. The existing problem of the prevention of pressure ulcers in the ErasmusMC creates a perfect opportunity for a CoSEM engineer to apply the concept of systems thinking in healthcare. Through thorough understanding of all social and technical elements involved in the existing problem, improvements in the existing system can be formulated.

1.2 Research structure

In the following chapter, the research approach and the sub questions are going to be presented. In chapter 3, the methods that are used in the process of selecting the articles for the literature review, the core concepts found, and the knowledge gap of the selected articles will be discussed. In chapter 4, the research methods and a research flow diagram will be given. Chapter 5 shows the theoretical and/or conceptual reasons from a multi-level perspective of the measures for preventing pressure ulcers in the ErasmusMC not working as expected and intended. The actor related patterns of the current measures in the case study at the ErasmusMC are researched in chapter 6. Next, chapter 7 gives an overview of the key leverage points that become visible from the use of the multi-level perspective for the improvement of the prevention of pressure ulcers in the ErasmusMC. Then, a discussion is displayed in chapter

8. In chapter 9, a conclusion is given and the main research question is answered. Finally, chapter 10 will give recommendations for the ErasmusMC regarding the measures for preventing pressure ulcers based on this research.

2

Research approach and sub-questions

The previous chapter showed that a systematic, holistic approach is needed to identify the relations between the problems occurring in the prevention of pressure ulcers in the ErasmusMC. From the concept of systems thinking (the dynamic interaction, synchronisation, and integration of people, processes, and technology), the following research question of this thesis is drafted:

Why are the current measures for the prevention of pressure ulcers not working as expected and intended in the ErasmusMC hospital?

Besides, this research will focus on how to make the current measures for the prevention of pressure ulcers work as expected and intended at the ErasmusMC hospital. This chapter will elaborate on the selection of the research approach, and the drafting of sub-questions to the main research question.

2.1. Research approach

Selecting a research approach supports the development of a logical order of the research activities that will lead to answering the main research question and reach the objectives set in this thesis. Cresswell [15] describes three types of research designs:

- **Qualitative research:** a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem.
- **Quantitative research:** a means for testing objective theories by examining the relationship amongst variables.
- **Mixed method research:** an approach to inquiry that combines or associates both qualitative and quantitative forms. Failure of consistent care delivery as loss of information.

In these research designs, there are multiple approaches available for conducting research. For this thesis, a case study approach is chosen. When “how” or “why” questions are being asked, when the investigator has limited control over the course of events, and when the focus is on a current phenomenon in some real-life setting, case studies are typically the favoured approach [16]. The main question is a “how” question, the researcher has limited control over the course of events in the hospital, and this research is conducted in the real-life setting of the hospital. Thus, a case study is a fitting choice as the research approach for this thesis.

2.1.1. Case study

Yin [16] defines the case study as a research approach as follows:

1. *A case study is an empirical enquiry that*
    - investigates a contemporary phenomenon in its real-life context, especially when
    - the boundaries between phenomenon and context are not clearly evident.

2. *The case study inquiry*

    - copes with the technically distinctive situation in which there will be many more variables of interest then data points, and as one result
    - relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result
    - benefits from prior development of theoretical propositions to guide data collection and analysis.

The case study as a research approach is a comprehensive research strategy which covers “the logic of design, data collection techniques, and specific approaches to data analysis” [16].

Looking back at the research designs described by Cresswell [15], the case study as a research approach should not be confused with the qualitative research design. According to Yin [16] case studies can be based on any mix of quantitative and qualitative evidence where direct, detailed evidence do not need to be included as sources of evidence. However, it is expected that mostly qualitative methods will be used to get an in-depth look in the ErasmusMC.

Even though the case study approach is a distinctive form of empirical inquiry, researchers have expressed some concerns about this method. The first concern would be the lack of rigour. Here, the investigator of the case study has been sloppy, did not follow “the systematic procedures, or allowed equivocal evidence or biased views to influence the directions of the findings and conclusions” (Yin). The second concern is that case studies do not provide the basis for scientific generalisation of the study. A third concern is that case studies take too long and result in big, unreadable documents. However, Yin [16] allays these concerns about the case study. Still, the major lesson learnt from these concerns is that good case studies are still difficult to do. It is crucial to keep these concerns in mind whilst conducting the case study, so that they can be avoided or recognised.

Four tests will be used for the establishment of the quality of this case study (Yin):

- Construct validity.
- Internal validity.
- External validity.
- Reliability.

Furthermore, it is mentioned in the introduction of this thesis that a systematic, holistic approach to identify the relations between the problems occurring in the prevention of pressure ulcers in the ErasmusMC is missing. Yin [16] describes four types of case designs: single-case (holistic) designs (Type 1), single-case (embedded) designs (Type 2), multiple-case (holistic) designs (Type 3), and multiple-case (embedded) designs (Type 4). Together with the focus on the prevention of pressure ulcers in the ErasmusMC, and the missing of a systematic holistic approach, this case study will have a single-case (holistic) design.

2.1.2. System innovations

In the knowledge gap it is determined that the dynamic interaction, synchronisation, and integration of people, processes, and technology in the prevention of pressure ulcers is missing. Except for the paper of Staines et al [17], where a Breakthrough Collaborative uses a “multi modal improvement approach combined with measurement and feedback”. This paper shows promising results towards the dynamic interaction, synchronisation, and integration between people, processes, and technology in the prevention of pressure ulcers. Most of the selected studies showed some type of innovation regarding the prevention of pressure ulcers. These are promising new technologies but many of these new technologies are often not taken up. A paper on processes and patterns in transitions and system innovations by Geels [18], shows that this is “partly related to economic reasons, but also to social, cultural, infrastructural and regulative reasons”. The main reason that is given, is that existing systems are stable and not easy to change. They are ‘locked in’ at multiple dimensions.

The paper of Geels [18] displays “transitions at the level of societal functions such as transportation, communication, housing, energy supply, feeding”. These societal functions consist of socio-technical systems. These systems are formed by a cluster of various elements, including “technology, regulation, user practices and markets, cultural meaning, infrastructure, maintenance networks, and supply networks” [18]. An example of a socio-technical system for land-based transportation is given in Figure 3.1. As a hospital, the ErasmusMC could be considered a societal function. Here, the prevention of pressure ulcers is a socio-technical system, which consists of a cluster of elements. Geels [18] describes a transition as “a shift from one socio-technical system to another, i.e., a system innovation. System innovations are co-evolution processes, which involve technological changes, as well as changes in other elements.”

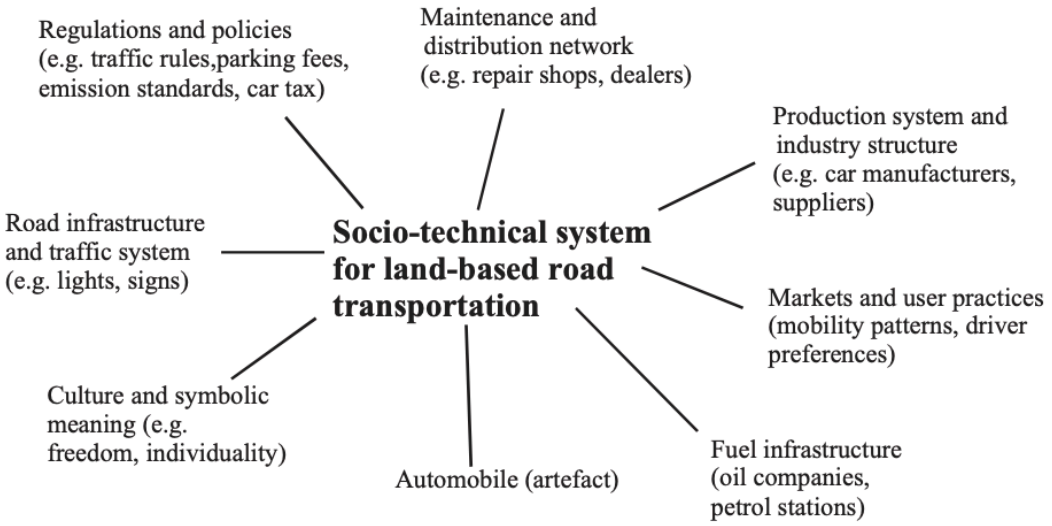

Figure 2.1: Socio-technical system for modern car-based transportation [18]

According to Geels [18] the emphasis on inter linkages between elements and co-evolutionary processes is an important insight from the systems of innovation approach(es). However, the focus of the systems of innovation approach is on the functioning of systems rather than the change of systems. Inspired by the systems innovation approach of Geels, this research will focus on the functioning of the socio-technical system of preventing pressure ulcers in the ErasmusMC.

2.2. Sub-questions

Now that the single-case design and the systems innovations of Geels are chosen as the research approach, the sub-questions can be drafted.

“Systems thinking consists of looking at the whole instead of the parts” [19]. This makes the ErasmusMC learn how parts in the organisation interact instead of how these parts interact independently. To do so, the existing measures that are in place in the system of preventing pressure ulcers in the ErasmusMC must be identified. This will be done by looking at it from a multi-level perspective (MLP). MLP has a focus on technology-in-context and emphasises co-evolution of technology and society [18]. Therefore, the following sub-question is drafted:

- **SQ1:** *What are theoretical or conceptual reasons from a multi-level perspective for the measures not working as expected and intended at the ErasmusMC?*

“Socio-technical systems are complex and consist of linkages between several elements. Patterns can be found by making different cross sections, focusing on relationships between two or more elements” [18]. The MLP could be defined as a process approach. Even though processes at different levels can converge and create opportunities for a regime change, actors always need to make the actual linkages. Therefore, more detailed actor-related patterns are needed to fill in the MLP. Geels [18] describes

that “the increasing support and involvement of actors is important to get the bandwagon going and stimulate diffusion and breakthrough. The involvement of actors makes diffusion a non-linear process with accelerations and slowing down. This is the result of sometimes rapid shifts in perceptions, moods and strategic interactions.” In this case study, these shifts can be analysed in detail by looking at micro-activities regarding the prevention of pressure ulcers in the hospital. Thus, the following sub-question is drafted:

- **SQ2:** *What are the actor-related patterns of the current measures for the prevention of pressure ulcers in the ErasmusMC?*

To incorporate systems innovations approach regarding the prevention of pressure ulcers in the ErasmusMC, it is important to identify possible key leverage points. Leverage points are “places that are most effective in resolving problems” [11]. It is important to identify these key leverage points to build resilience in the system. This is done by concentrating on conditions under which the ErasmusMC works and “by proactively establishing defences to avert errors or mitigate their negative effects” [11]. Hence, the following sub-question is drafted:

- **SQ3:** *What key leverage points become visible from the multi-level perspective for the improvement of the prevention of pressure ulcers in the ErasmusMC?*

“To reap its benefits, systems thinking must become an integral part of the practices within a healthcare organisation” [11]. Building a secure environment in which all stakeholders may learn about the unintended consequences of their collective activities and challenge their assumptions is the ultimate goal of a systems-thinking approach. in the ErasmusMC, it is essential to develop a willingness to learn and shift mental modes with the selected socio-technical systems model. With these drafted sub-questions, the main question of this research can be answered.

3

Literature review

The introduction showed that there is a need for a systems science approach that can contribute to better prevention strategies, and can help identify the relations between the problems occurring in the prevention of pressure ulcers in the ErasmusMC. This is needed to find out why the implementation of various measures did not improve the prevention of pressure ulcers as expected in the hospital. This chapter will provide a literature review to identify knowledge gaps regarding this topic. After identifying the knowledge gaps, the research methods will be chosen.

3.1. Process of the literature review

Before conducting and presenting the literature review, the process of the literature review will be given. First, the search strategies and selection of the literature will be described. Second, an overview of the inclusion- and exclusion criteria will be given. Last, an overview of the selected articles resulting from the literature review will be displayed.

3.1.1. Search strategies and selection of literature

The search for literature will be done in three different databases (see Figure 2.1): Cochrane, PubMed, and Scopus. The Cochrane library is used because in health care it is the leading journal and database for systematic literature review. The Pubmed database is used since it contains literature on bio medicine and health fields, and related disciplines such as behavioural sciences, bio engineering, chemical sciences, and life sciences. Scopus is used because it is the largest abstract and citation database of peer-reviewed literature in the fields of science, technology, medicine, social sciences and arts, and humanities.

The keywords used were “Preventing”, “Pressure”, “Ulcers”. These keywords should be mentioned in the abstract or titles because these keywords describe the prevention of pressure ulcers. The Boolean operator AND is used to narrow the search in the databases, and to link the concepts together.

3.1.2. Inclusion- and exclusion criteria

With the search strategy described in the previous section, a total of 1381 references were found in the three selected databases. Therefore, down scoping was needed to narrow the number of references down. First, the literature review is limited to publications from 2013 to 2023. This is done to include modern literature, and present innovations regarding preventing pressure ulcers occurring in the past 10 years. Second, the literature review is limited to the keyword hospitals in abstracts or titles since this study focuses on the ErasmusMC. Third, only English studies were included in the literature review. Last, a manual selection was done. Here, only studies focusing on methods used to prevent pressure ulcers were selected.

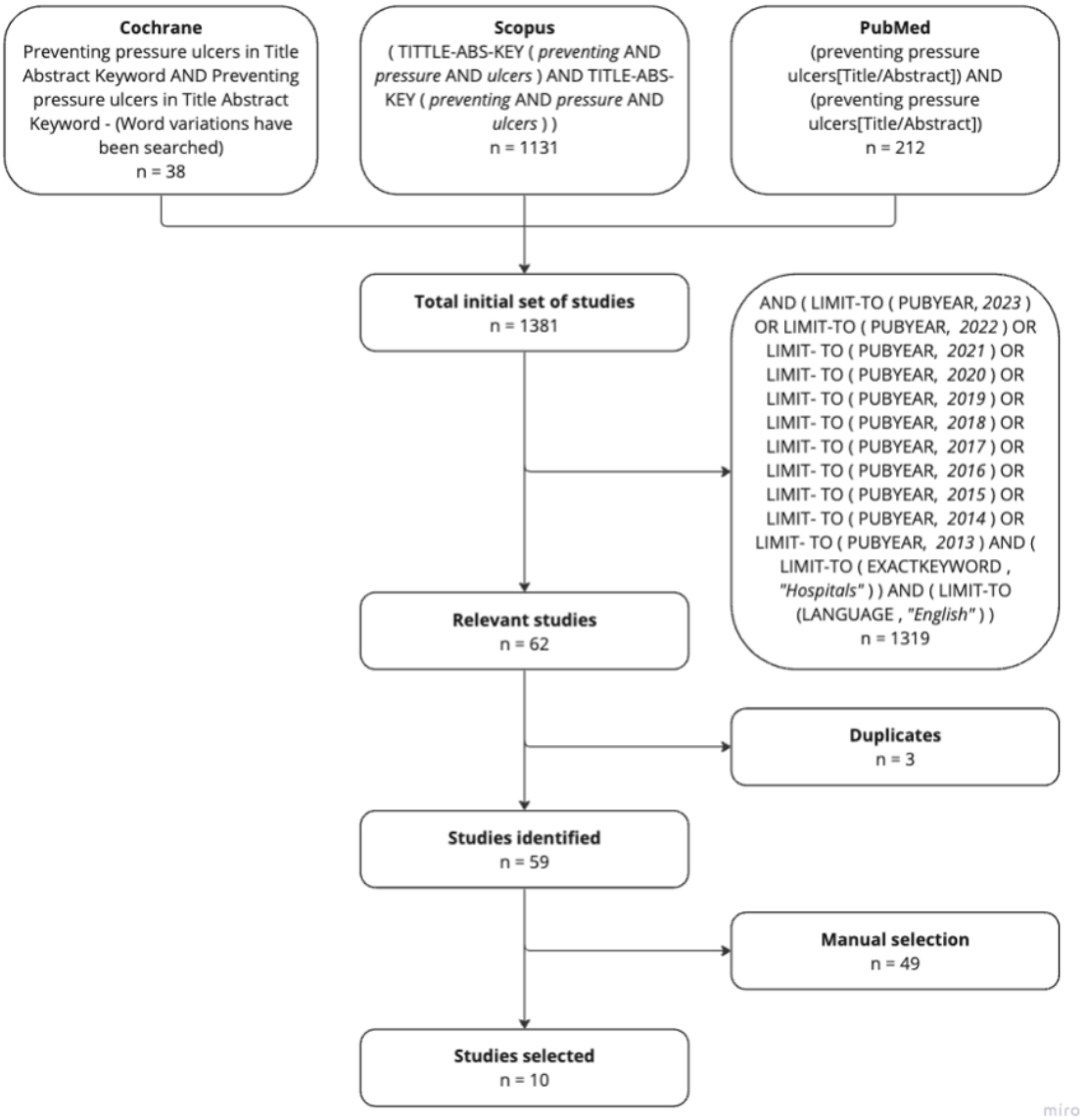

Figure 3.1: Search process of literature review

3.1.3. Overview literature review

An overview of the selected studies for the literature review is given in Table 2.1. Here, the authors are given, the year of publication is displayed, and interesting findings in the selected studies for the knowledge gap are shown.

Table 3.1: Overview of selected studies for literature review

Author(s)	Year	Systems thinking: Are people, processes, or technology involved?	Interesting findings for knowledge gap
Blenman and Marks-Maran [20]	2017	People and processes	• Collaboration between patients, carers and health and social care professionals

Table 3.1: Overview of selected studies for literature review

Author(s)	Year	Systems thinking: Are people, processes, or technology involved?	Interesting findings for knowledge gap
Bååth et al. [21]	2014	Technology	• Heel protection/floating heels and sliding sheets • Individual-planned repositioning • People with PU should all have pressure-reducing preventive interventions to prevent the development of more PUs
Nherera et al. [22]	2021	Technology	• Hospital-acquired pressure injuries (HAPIs) • Patient-wearable sensors should be considered as a cost-effective alternative to standard care in the prevention of HAPIs
Staines et al. [17]	2021	People, processes, and technology	• Systematic risk assessment, use of a prevention bundle, education through e-learning, measurement and feedback, patient engagement and promotion of a safety culture • Compliance with the use of the risk assessment, bundle application and patient involvement aspects
McInnes et al. [23]	2018	Technology	• Special support surfaces (including beds, mattresses and cushions) engagement and promotion of a safety culture • Unclear if any particular type of low- or high-tech support surface is more effective at healing pressure ulcers than standard support surfaces

Table 3.1: Overview of selected studies for literature review

Author(s)	Year	Systems thinking: Are people, processes, or technology involved?	Interesting findings for knowledge gap
Zhang et al. [24]	2015	People and technology	• Several studies have suggested that massage therapy may help to prevent PUs • No studies eligible for inclusion, therefore unclear
Stephens et al. [25]	2022	Technology	• Specialist cushions and surfaces are interventions for at risk from prolonged sitting • No evidence that supports or refutes the role of pressure redistributing static chairs in the prevention or management of Pus. However, priority and need to explore further
Shi et al. [26]	2020	Technology	• Alternating pressure (active) air surfaces are widely used • May reduce pressure ulcer risk compared with foam surfaces and reactive gel surfaces • May be more likely to develop new pressure ulcers over 14 days • Probably more cost-effective than reactive foam surfaces
Wang and Gong [27]	2017	Processes	• Hospital-acquired pressure ulcers signals low quality of care • Failure of consistent care delivery as loss of information • May be more likely to develop new pressure ulcers over 14 days • Optimising care plans, improving adherence to best practices, reinforcing effective team communication, and customising event report feedback

Table 3.1: Overview of selected studies for literature review

Author(s)	Year	Systems thinking: Are people, processes, or technology involved?	Interesting findings for knowledge gap
Seo and Roh [28]	2020	People and processes	• Nurses require the necessary knowledge, behaviours, and attitudes regarding preventing pressure ulcers • Pressure ulcer prevention training, regardless of whether it utilises team-based or lecture-based learning, is useful for enhancing nurses' pressure ulcer prevention knowledge, behaviours, and attitudes • May be more likely to develop new pressure ulcers over 14 days

3.2. Analysis

Before showing the analysis of the literature review, some core concepts in the literature that apply to the Dutch healthcare system will be discussed. First, all of the literature found on pressure ulcers show that the elderly are at highest risk and the incidence of pressure ulcers amongst the elderly patients is the highest. Next to this, the entire healthcare sector is facing staff shortages that are expected to grow [29]. Together with ageing amongst the Dutch population, this adds to the pressure on health budgets, notably in long-term care [30]. Therefore, cost-effectiveness in innovations in healthcare is often needed. With these core concepts displayed, the studies found in the literature review can be analysed.

3.2.1. Selected studies

All of the selected studies show, despite numerous reports and policy documents that have been published, that pressure ulcer prevention remains an ongoing challenge in healthcare. Also, the studies focused on innovations, education, or current measures on the prevention of pressure ulcers. For example, the study of Seo and Roh [28] showed that "pressure ulcer prevention training, regardless of whether it utilises team-based or lecture-based learning, is useful for enhancing nurses' pressure ulcer prevention knowledge, behaviours, and attitudes". In another example, McInnes et al. [23] discussed the differences between high-tech support surfaces against low-tech support surface for the prevention of pressure ulcers. A third example is a patient wearable sensor that was found to be effective both against pressure ulcers in hospitals and economically attractive for the hospital [22]. It can be concluded that the selected studies in the literature review have a common focus on the prevention of pressure ulcers by applying innovations, education, or cost-effective measures.

3.2.2. Knowledge gap

First, it must be noted that some of the studies with innovations such as massage therapy [24] and pressure redistributing static chair [25] could not find evidence that supports or refutes the innovation, and further research is needed. This could be seen as a limitation to the effectiveness in some of the innovations of the prevention of pressure ulcers. However, most of the studies showed significant results and can be used as a valid starting point. All of the studies showed a fit with the concept of systems thinking in the form of the involvement of people, processes, or technology. An example of the involvement of people is the study Blenman and Marks-Maran [20] which argued that the patient

and carer involvement should be at the core of any pressure ulcer strategy. Here, it was concluded that "empowering patients and involving them in the fight against pressure ulcers may help to redress the balance and have a far greater impact on pressure ulcer prevention than current intervention practices". [11]. An example of the involvement of technology is the study of Shi et al. [26] where it was argued that active, air-filled surfaces may reduce the risk of pressure ulcers developing when compared to foam surfaces and gel surfaces. A final example of the involvement of processes is the study of Staines et al. [17] where systematic risk assessment, use of a prevention bundle, education through e-learning, measurement and feedback, patient engagement and promotion of a safety were used to reduce pressure ulcer occurrence.

Looking at the examples given above, the knowledge gap can be identified. Systems thinking centres on the dynamic interaction, synchronisation, and integration of people, processes, and technology [31]. With the exception of the study of Staines et al. [17], the studies show that the focus is specific on one or two aspects of people, processes, and technology. The studies do not focus on the relation between those aspects or on the dynamic interaction, synchronisation, and integration. The dynamic interaction, synchronisation, and integration of people, processes, and technology for applying innovations, education, or cost-effective measures regarding the prevention of pressure ulcers, is missing in the studies found in the literature review.

4

Research methods

The previous chapter showed the knowledge gap found in the selected literature. The focus on the dynamic interaction, synchronisation, and integration of people, processes, and technology was missing. The concept of systems thinking and the application of this concept was lacking in the selected literature. This chapter will look at the research methods belonging to the chosen approach that are needed to answer the drafted sub-questions. First, the data that is needed to answer each sub-question is discussed. Second, the appropriate research methods for data gathering are researched. Third, the appropriate tools for analysing the data are chosen. And last, the flow of the research will be shown in a research flow diagram.

4.1. Data gathering, data sources, and data requirements

The single-case design is selected as the research method for this thesis. In research of Yin [16] it is found that “good case studies benefit from having multiple sources of evidence”. Yin [16] gives six common sources of evidence are listed, which can be used in any combination, and depending on what is relevant and available for this case study:

1. Direct observations (e.g., human actions or a physical environment)
2. Interviews (e.g., open-ended conversations with key participants)
3. Archival records (e.g., student records)
4. Documents (e.g., newspaper articles, letters and e-mails, reports)
5. Participant-observation (e.g., being identified as a researcher but also filling a real-life role in the scene being studied)
6. Physical artefacts (e.g., computer downloads of employees’ work)

Next to these six common sources of evidence, it was mentioned earlier that case studies can be based on any mix of quantitative and qualitative evidence where direct, detailed evidence does not need to be included as a source of evidence. Here, non-numeric data may be considered as qualitative data, whereas numeric data may be considered as quantitative data.

4.1.1. Four principles of data collection

According to Yin, “the benefits from these six sources of evidence can be maximised if you follow four principles of data collection” [16]. The four principles of data collection are:

- **Principle 1:** Use Multiple Sources of Evidence.
- **Principle 2:** Create a Case Study Database.
- **Principle 3:** Maintain a Chain of Evidence.
- **Principle 4:** Exercise Care When Using Data From Social Media Sources.

The four principles will be elaborated and applied to the case study at the ErasmusMC.

Multiple sources of evidence

Yin describes the collection of data using multiple sources of evidence in the following way: “A major rationale for using multiple sources of evidence in case study research relates to the basic motive for doing a case study in the first place: to do an in-depth study of a phenomenon in its real-world context. Being both in-depth and contextual — a context that potentially includes events over a period of time — means collecting a variety of relevant data and hence relying on multiple sources” [16]. Next to this, multiple evidence sources simply offer different measurements of the same phenomenon. Every case study researcher should be knowledgeable in a range of data gathering procedures, regardless of how they acquired their experience, to enable them to use a number of sources of evidence in their case studies. An important benefit of case study research would have been lost without such a variety of sources.

For the case study in the ErasmusMC, the following multiple data sources have been used:

- Semi-structured interviews.
- Direct observations on different departments in the hospital.
- Documents regarding the prevention of pressure ulcers (presentations, guidelines, dashboards).
- Participant-observations in the role of a non-functional nurse in the hospital.
- Physical artefacts (such as a new AI dashboard).

These data sources where all done in the ErasmusMC with the focus on the measures for the prevention of pressure ulcers. Therefore, this case study is an in-depth study of a phenomenon (measures for preventing pressure ulcers) in a real-world context (the ErasmusMC).

Case study database

The second principle of case studies stands for organising and documenting the collected data. Yin describes that the documentation of the collected data of case study researchers consists of two separate collections [16]:

1. The data or evidentiary base and
2. The researcher’s report, whether in article, report, book, oral, or visual form.

This report represents the collection of the case study and therefore the second collection mentioned by Yin. However, the first collection is done in the servers of the TU Delft. Here, the transcripts and summary’s of the interviews, the notes from participant-observations, collected documents, and observational notes are stored in the Microsoft OneDrive of the TU Delft to protect the participants of the research and secure the data as good as possible. For the analysis of the data, the qualitative tool atlas.ti is used in the servers of the TU Delft.

Maintain Chain of Evidence

The third principle of case studies is to maintain a chain of evidence. This increases the construct validity of the collected information in a case study. According to Yin, this principle is “to allow the reader of the case study to follow the derivation of any evidence from initial research questions to ultimate case study findings. Moreover, the reader should be able to trace the steps in either direction (from findings back to initial research questions or from questions to findings)” [16].

To ensure a chain of evidence in the case study at the ErasmusMC, several tools and methods have been used. A logbook was drafted and kept to log the activity’s, interviews, and appointments during the case study. As mentioned in the previous subsection, a database was crafted to store and order the collected data in the case study. The qualitative tool Atlas.ti will be used to present results and citations from the collected data. Due to privacy reasons, the logbook and parts of the collected data will not be published in the appendix of this report. The chapters presented in this report will be the derivation of any evidence from initial research questions to ultimate case study findings to follow for the reader.

Data from social media sources

The fourth (and last) principle is to establish care when using data from social media sources. When using social media as a secondary source for the collection of any of the six types of data collection described at the beginning of this chapter, such as the retrieval of a document, remotely observing an event, or doing an interview online, great caution needs to be exercised. Yin describes four cautions for this principle [16]:

- The first caution is to set some limits.
- A second caution deals with your willingness to cross-check the sources you use and the information you derive from them.
- A third caution deals with your use of such sites as Facebook, Twitter, YouTube, and individual blogs.
- A final reminder is to inquire about the permission needed to use the materials from these sites, especially audio or video recordings, in your case study.

In this case study, the use of social media was limited due to the interactive role the researcher had in the ErasmusMC. Only two interviews were conducted online and one meeting was followed online, both with the use of Microsoft Teams. Only the last point of caution was relevant for this case study. During the observation of patients with pressure ulcers occurrence, pictures were taken by medical personnel for observation. The researcher only had the permission to see this material, but not receive or store this information.

Now that it is clear what common sources of evidence can be used in the single case design and how the benefits from these six sources of evidence can be maximised by following the four principles of data collection, the data gathering, data sources, and data requirements for sub- questions 1, 2, and 3 can be defined.

4.1.2. Sub-question 1

For this sub-question, various socio-technical systems must be searched and the most fitting socio technical system to this case study must be selected. Therefore, desk research will be done on the various socio-technical systems existing and by using advice of the supervisors of this thesis. Next to this, a modelling approach will be chosen for the implementation of the socio-technical system in the ErasmusMC. The data gathering will be done by conducting a small literature review on the various socio-technical systems that exist. Next, together with the help of the supervisors, a modelling approach is chosen for the implementation of the socio-technical system for the improvement of the prevention of pressure ulcers. The data sources for the literature review will be Scopus, Pubmed, and Cochrane. For choosing the modelling approach, the data sources will be the selected supervisors of this thesis, and other experts in the faculty of Technology, Policy, and Management of the TU Delft.

4.1.3. Sub-questions 2 and 3

For sub-questions 2 and 3, the six common sources of evidence will be used for the gathering of data. The direct observations will be focused on human actions, physical environments, and the real-world events happening in the ErasmusMC. The data will be collected by taking field notes whilst using the researchers own five senses so that a narrative can be created based on what is seen, heard, or sensed in the hospital.

The open-ended interviews could offer richer and more extensive material than the data gathered from surveys. These open-ended interviews could reveal how the participants of the case study construct reality and think about certain situations in the hospital and should not be used to just provide answers to specific questions set out by the researcher. The construction of reality of the participants could provide important insights into the case. The archival records consist of information that is stored in existing channels. For example, in electronic records, libraries, and old-fashioned (paper) files. If these archival records exist in the hospital, these could be useful to the case study. If there are documents existing in the ErasmusMC such as letters, e-mails, and reports, these could also be useful to the case study. The same goes for physical artefacts such as computer downloads of employees' work. If they are available in the case study, they will be used.

Last, the participant-observation as a data gathering method will be used in the ErasmusMC. The researcher is identified as a researcher among the participants of the case study but will also fulfil a real-life role in the scene being studied. A pro of this method is that second-hand conversations, and actions happening in real-time can be documented by the researcher. A con of this method is that participants might change their behaviour knowing that the researcher is there to observe their behaviour.

The sources of these two sub-questions will be the doctors, nurses and other personnel involved in the ErasmusMC. There are various data requirements. For the interviews, the questions need to be scientifically underpinned. Next to this, the data collected in the ErasmusMC has to be ethically approved by the TU Delft, and formally approved by the supervisors at the ErasmusMC. Last, the researcher should try to act as independently as possible. Meaning that the researcher will try to avoid biases that could corrupt data collection in the case study.

4.2. Data analysis

Analysing data in case studies does not have “routine procedures that may exist with other research methods” [16]. However, there are prepackaged computer software programs that can support the analysis of big amounts of narrative texts. With the missing of an automated algorithm for analysing narrative data, it is up to the researcher to define the codes that are used and the procedures for “logically piecing together the coded evidence into broader themes” [16]. Analysing the gathered data could be done by systematically organising the collected data into hierarchical relationships, matrices, or other arrays. An example of such an array would be a word table, that is organised by some rows and columns of interest and presents narrative data in the cells of the table. Yin [16] defines several analytic techniques for these and other arrays, where three are of interest to the single-case design: pattern matching, explanation building, and time series analysis. The research question of this study has not started with any predicted pattern or is based on a time-series analysis. Instead, the main research question is more open-ended because socio-technical modelling in healthcare has little to no earlier corresponding research. Therefore, an explanation building technique is chosen.

For making word tables, and drafting interview questions Microsoft Word and Microsoft Excel are needed. Also, these tools will be needed to document the outcomes of six common sources of evidence and the literature review that has to be conducted. For analysing the qualitative data, Atlas.ti is going to be used. This is a prepackaged computer software program for qualitative researchers that are working with very rich text-based information, where a deep level of analysis on small or large volumes of data can be done.

4.3. Research Flow Diagram

Now that the data gathering, data sources, and data requirements are determined for answering the sub-questions, a research flow diagram can be made. A research flow diagram is a visual representation of the design of this research. This visual representation of the structure and logical process flow of this thesis contains the following aspects:

- A break down of the research design into the main phases.
- The sub-questions representing the main phases.
- The research methods.
- The sub deliverables of the sub-questions.

The research flow diagram for this thesis is displayed in Figure 4.1. Next to this, an overview of the planning of this thesis by means of a time schedule is presented as a Gantt chart in Appendix A.

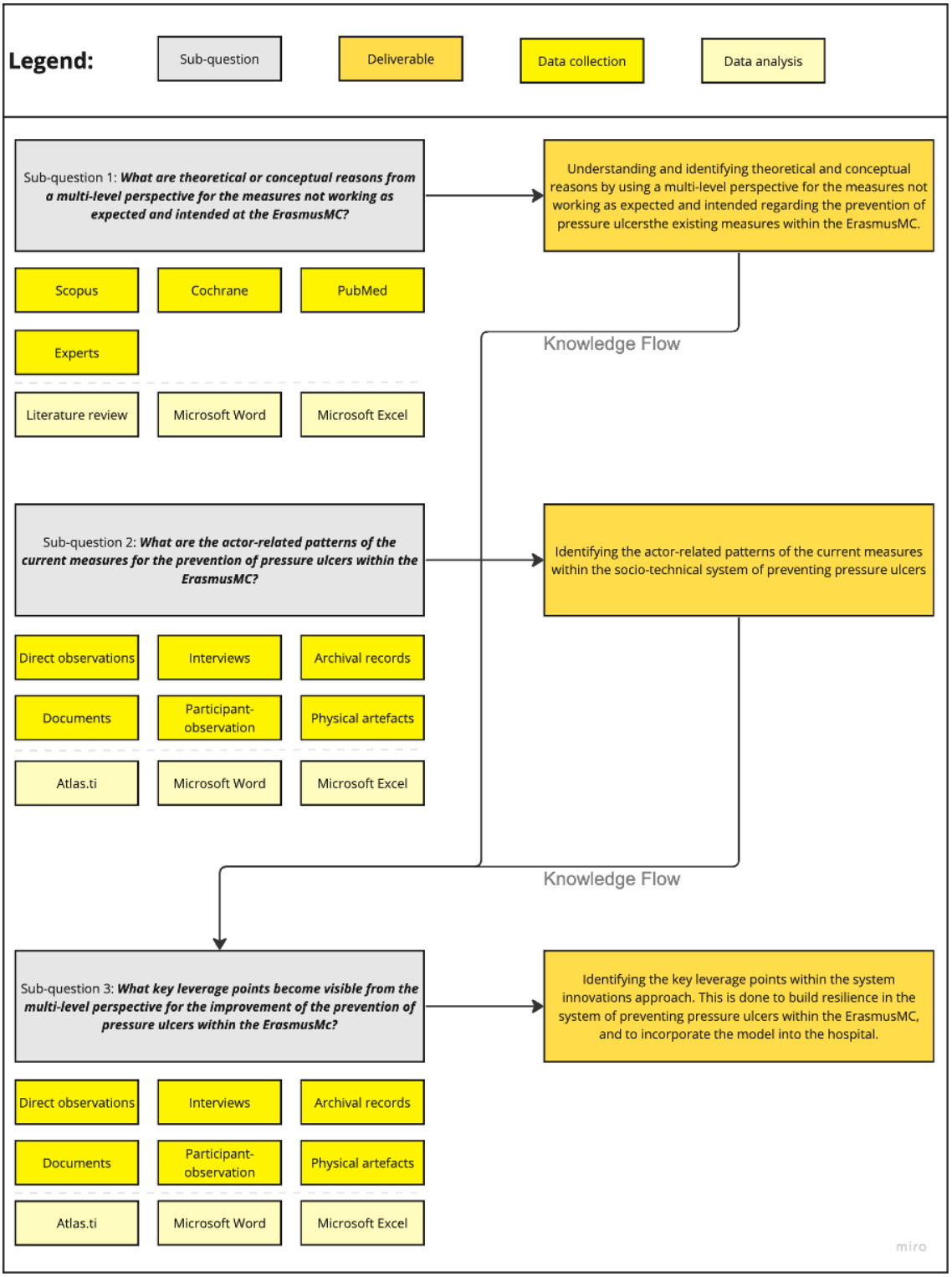

Figure 4.1: Research Flow Diagram

5

Applying the multi-level perspective

In Figure 3.1, an example of a socio-technical system for land-based transportation is given. The preventive measures for pressure ulcers In the ErasmusMC will be used as a socio-technical system that consists of a cluster of elements. In this chapter, the knowledge base for socio-technical modelling of prevention measures is explored through a literature review and defining the conceptual model a literature review will be done to show the theoretical and/or conceptual reasons from a multi-level perspective for the measures not working as expected and intended at the ErasmusMC hospital.

5.1. Socio-technical system for preventing pressure ulcers

To find the theoretical or conceptual reasons from a multi-level perspective, the starting point in answering this sub-question will be the socio-technical system for modern car-based transportation given in Figure 3.1 [18]. The reason for using this visual representation of a socio-technical system is simple and described in the research of Mcnabb et al. [32]: "'Systems thinking' is often recommended in healthcare to support quality and safety activities but a shared understanding of this concept and purposeful guidance on its application are limited." Meaning that the earlier applied concept of systems thinking (the dynamic interaction, synchronisation, and integration of people, processes, and technology) is a new concept in healthcare. A visual representation of a socio-technical system (for example the socio-technical system of a hospital) is missing in the literature. Therefore, a theoretical framework for the socio-technical system for preventing pressure ulcers in the ErasmusMC is drafted from the visual representation of the socio-technical system for modern car-based transportation displayed in Figure 3.1.

"Complex systems consist of many dynamic interactions between people, tasks, technology, environments (physical, social and cultural), organisational structures and external factors" [32]. Next to this, the research of Mcnab et al. [32] shows that the various components of care systems can be intricately interconnected with other elements of the system. As a result, changes made in one aspect can lead to unexpected consequences in other areas, with relationships between causes and effects that are not straightforward. The way these components interact gives rise to unforeseeable shifts in the conditions of the system, such as patient demand, staff capacity, available resources, and organisational constraints. This can also lead to conflicts between goals, such as the ongoing tension between the need for efficiency and the need for thoroughness. To succeed in this dynamic, people often find themselves adjusting to these evolving conditions and conflicts. These adjustments, however, are typically reactive measures taken in response to immediate circumstances rather than being carefully planned in advance.

Mcnabb et al. [32] state that "despite the complexity of healthcare systems, we often appear to treat problems and issues in simple, linear terms. In simple systems (eg, setting your alarm clock to wake you up) and many complicated systems (eg, a car assembly production line) 'cause and effect' are often linked in a predictable or linear manner. This contrasts sharply with the complexity, dynamism and uncertainty associated with much of healthcare practice." The most obvious example would be the

prevention measures being drafted and used in the ErasmusMC hospital. The 'cause and effect' would be to lower the occurrence of pressure ulcers by implementing prevention measures. Unexpectedly, this is not the result.

In the research of Komashie et al. [33] examples of system elements in healthcare are given. It is considered that five major elements generically describe a system. These elements are explained as follows [33]:

1. **Resources:** in the general sense, resources are the elements of the system that use or support processes in transforming entities or delivering results for entities. This would include financial resources, human resources and materials
2. **Processes:** these are the elements of the system that involve designed steps necessary to facilitate the achievement of specific goals for entities.
3. **Data/Information:** these are the elements of the system that represent the source of the knowledge necessary to ensure effective interaction between various system elements vertically and horizontally.
4. **Entities:** these are the elements of the system that go through the processes using data and information and consuming and often competing for resources.
5. **Environment:** this defines the boundary of the system and involves elements outside of the system and/or its elements but with which the system may interact.

The researchers state that these elements are not based on empirical research. However, the researchers suggest that "the role they play in healthcare systems is self-evident and could be reasonably employed at this early stage of this research" [33]. To give a visual representation of these five elements, the research gives an example of a GP practice, an emergency department and a hospital setting in Figure 5.1.

System elements	GP practices	Emergency care	Hospital care
Resources	**People**: GPs, nurses, practice managers and receptionists	**People**: A&E doctors, nurses, receptionists and consultants	**People**: managers, doctors and nurses
	Equipment: blood pressure gauge and stethoscope	**Equipment**: Blood pressure gauge, Stethoscope and ECG	**Equipment**: various medical devices
	Facilities: reception and consultation rooms	**Facilities**: beds	**Facilities**: wards, beds
Data/Information	Appointment schedule, referral letters, patient records and test results	Referral letters, patient records, test results and discharge letters	Referral letters, patient records, test results and discharge letters
Processes	Appointment booking, diagnosis, treatment, immunisation and referral	Triage, minor treatment, major treatment, resuscitation and referral	Scheduling, diagnosis, treatment and referral
Entities	general patients and patients in special needs	walk-in patient, GP-referred patient and ambulance patient	in-patient and out-patient
Environment	Homes, referral agencies	GP, Ambulance, support services	GP, A&E, Homes,

Figure 5.1: Examples of system elements in healthcare systems [33]

Together with the quote of Mcnabb et al. about complex systems, the examples of system elements in healthcare by Komashie et al., and the visual representation in Figure 3.1, a first visual representation of the socio-technical system for preventing pressure ulcers in the ErasmusMC is drafted in Figure 5.2.

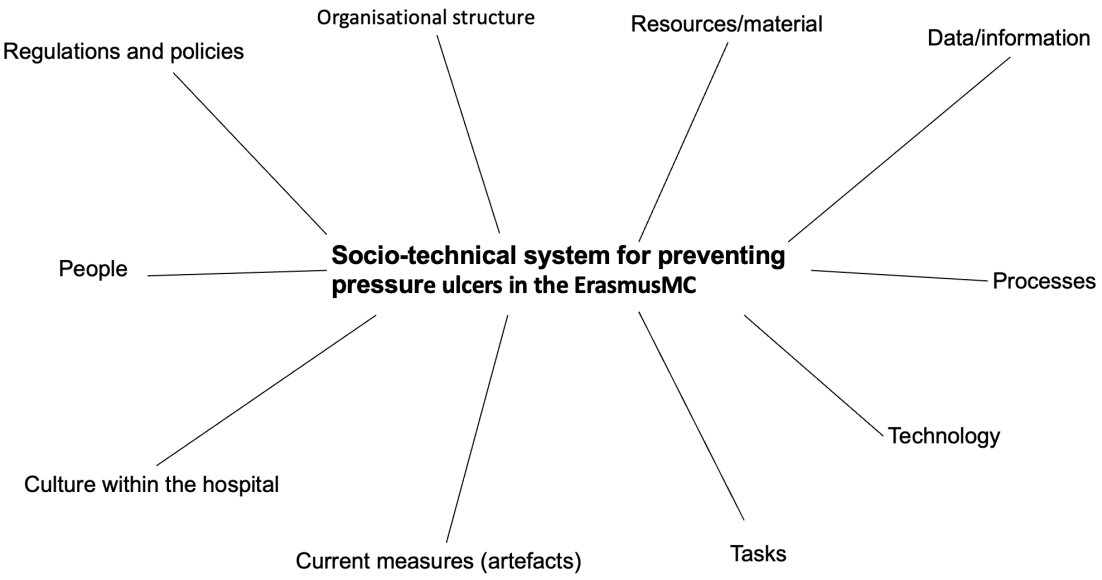

Figure 5.2: Socio-technical system for preventing pressure ulcers in the ErasmusMC

5.2. Literature review

The visual representation of the socio-technical system for preventing pressure ulcers in the ErasmusMC in Figure 5.2 shows 10 drafted system elements of the socio-technical system with the current measures for the prevention of pressure ulcers as the artefact(s) of the system. As mentioned before, the study of Mcnab et al. states that the various components of care systems can be intricately interconnected with other elements of the system. With the result that changes made in one aspect can lead to unexpected consequences in other areas, with relationships between causes and effects that are not straightforward. The current measures for preventing pressure ulcers in the ErasmusMC are the responsibility of the policymakers of the hospital. Therefore, to specify the drafted visual representation of the socio-technical system, a literature review will be done about the policy regarding pressure ulcers in the Netherlands.

5.3. Process of the literature review

The process of the literature review is the same as presented in section 2.1. The search strategies and selection of the literature are described, an overview of the inclusion- and exclusion criteria is given, and an overview of the selected articles resulting from the literature review is displayed.

5.3.1. Search strategies and selection of literature

Also, the search for literature is done in the same three different databases: Cochrane, PubMed, and Scopus. The keywords used are “Pressure”, “Ulcers”, “Policy”, and “Netherlands”. It is expected that the number of academic papers found in this literature search is not going to be extensive. Therefore, the search for these for key words will be done in all texts. The Boolean operator AND is used to narrow the search in the databases, and to link the concepts together.

5.3.2. Inclusion- and exclusion criteria

With the search strategy described in the previous section, a total of 980 references were found in the three selected databases. As can be seen in Figure 5.3, 907 references were found in Scopus. Therefore, down scoping is needed to narrow the number of references down. First, the search in Scopus is limited to mentioning the keywords in the abstract or titles. Second, the reviews found in the Cochrane library are excluded since no studies involved policy regarding pressure ulcers in the Netherlands. Third, duplicates were removed from the relevant studies. Last, a manual selection was done. Here, studies that focused on elderly homes or nursing homes were left out, and studies focusing on

policy in Dutch hospitals or healthcare regarding pressure ulcers were selected.

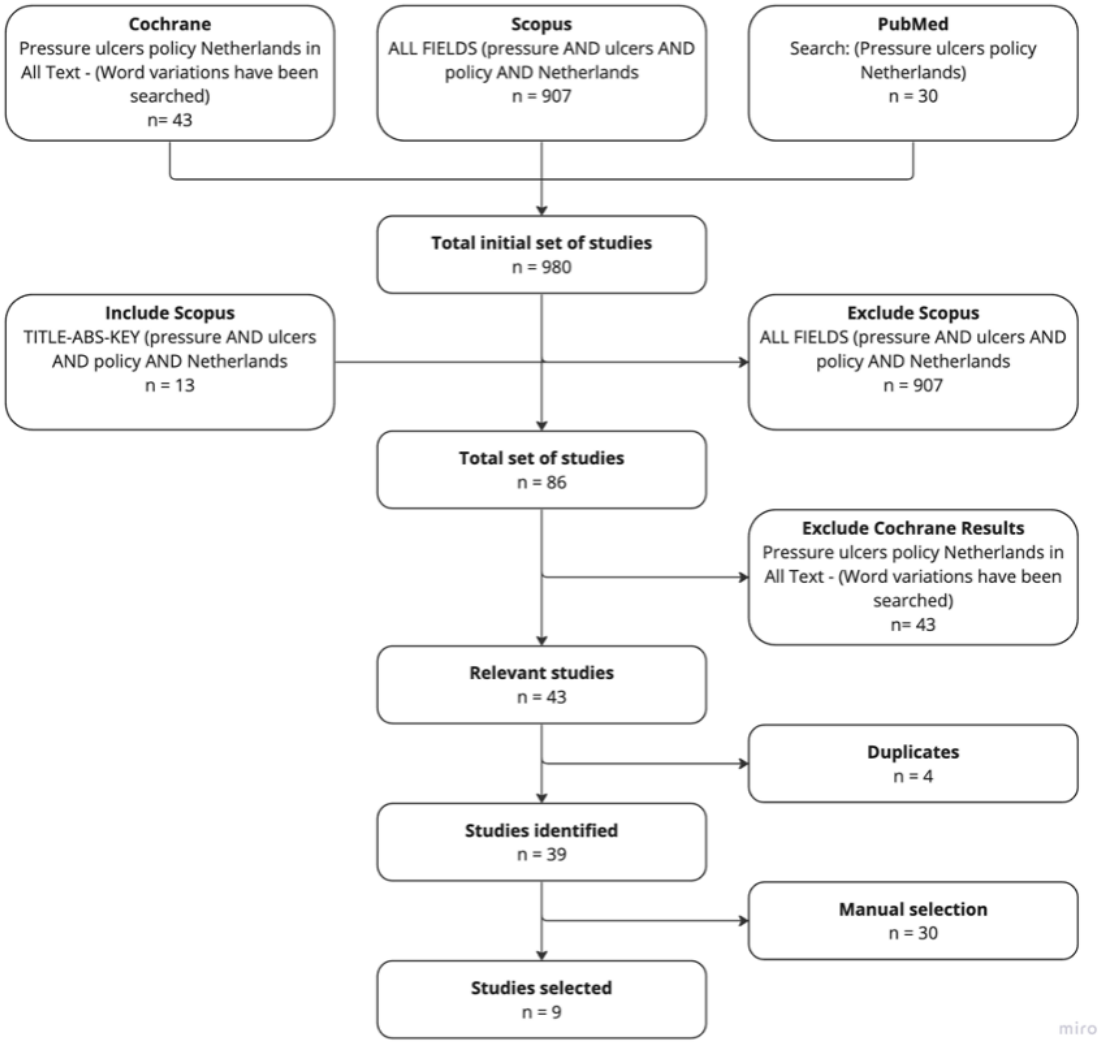

Figure 5.3: Search process of policy literature review

5.3.3. Overview literature review

An overview of the selected studies for the literature review is given in Table 5.1. Here, the authors are given, the year of publication is displayed, the goal of each study is projected, and interesting findings in the selected studies about policies regarding pressure ulcers in the Netherlands are shown.

Table 5.1: Overview of selected studies for policy literature review

Author(s)	Year	Goal of the study	Interesting findings about policy regarding pressure ulcers in the Netherlands
Amir et al. [34]	2011	Patient characteristics, pressure ulcer (PU) prevention strategies and the structural quality indicators	• Differences in patient characteristics, improved structural quality indicators and a slight improvement in PU prevention can partly explain the decline in PU prevalence at Dutch general hospitals.
Bosch et al. [35]	2011	Policy reform in health care is discussed in terms of changing organisational culture, creating practice teams, and organisational quality management.	• No relation found to organisational culture, team climate, or preventive quality management at the ward level. • Different designs and research methods could be more informative in studying relations between these complex factors and outcomes in a more meaningful way. • People with PU should all have pressure-reducing preventive interventions to prevent the development of more PUs
Crunden et al. [36]	2022	Recording and reporting of PUs between organisations, regions, and countries	• Low frequency of reporting results in no overview of devices which have been implicated in medical device-related pressure ulcers. As a result, improvement in care safety and device design is based on local knowledge rather than a robust evidence-based policy. • Resulting in the fact that improvement in care safety and device design is based on local knowledge rather than a robust evidence-based policy.

Table 5.1: Overview of selected studies for policy literature review

Author(s)	Year	Goal of the study	Interesting findings about policy regarding pressure ulcers in the Netherlands
De Laat et al. [37]	2005	Effects of a new policy on the efficiency of pressure ulcer care	• Implementation of a hospital guideline for pressure ulcer care combined with the introduction of viscoelastic foam mattresses. • The number of pressure ulcer patients in hospital can successfully be reduced with general measures such as the introduction of adequate mattresses and guidelines for prevention and treatment.
Gillespie et al. [38]	2021	Evaluation of the quality and applicability of the recommendations in pressure injury prevention and treatment clinical practice guidelines	• Four high quality clinical practice guidelines are available and could be implemented in daily practice. • Levels of evidence upon which many of the recommendations in the guidelines are founded remain low. • There is a compelling need to generate rigorous, trial-based evidence in key areas of pressure injury management such as risk assessment methods, repositioning, and skin care. • The values and preferences of consumers need to be considered in the process of guideline development.

Table 5.1: Overview of selected studies for policy literature review

Author(s)	Year	Goal of the study	Interesting findings about policy regarding pressure ulcers in the Netherlands
Halfens et al. [39]	2001	The effect of participating health care institutions was investigated at different levels in the institutions	• Developing or updating the prevention and treatment protocol and educating the (enrolled) nurses. • A nurse specialist or a nurse paying special attention to pressure ulcers in some institutions. • National prevalence study was a positive experience with most institutions planning or implementing activities to improve the prevention and treatment of pressure ulcers.
Meijers et al. [40]	2008	Investigating the influence of using nutritional guidelines in daily practice on the actual nutritional care that PU (prone) patients receive, and exploring barrier.	• Using a nutritional guideline in PU care contributes to the amount of nutritional screening conducted in daily practice and to the content and extent of the assessment. • Most important barrier to implementing nutritional support was lack of knowledge and skills, followed by lack of resources.

Table 5.1: Overview of selected studies for policy literature review

Author(s)	Year	Goal of the study	Interesting findings about policy regarding pressure ulcers in the Netherlands
Stalpers et al. [41]	2017	Identifying nurses' barriers and facilitators to monitoring of nurse-sensitive outcomes (NSOs), and to explore influential nurse characteristics and work environment factors.	• The NSOs are defined as those outcomes that are relevant, based on nurses' scope and domain of practice, and for which there is empirical evidence linking nursing inputs and interventions to the outcome. • Greater understanding of barriers and facilitators enables health care organisations to provide future tailored interventions aimed at optimally integrating NSOs into daily nursing practice. • Enhancing nursing knowledge, behaviour and attitude towards the necessity of NSO monitoring is one way to increase nurses' understanding of NSOs and NSO monitoring.
Strating et al. [42]	2011	Investigate the differences between Quality-improvement collaboratives (QICs) with respect to type of topic, type of targets, measures (systems) are also reflected in the degree of effectiveness,	• The effectiveness of a QIC is associated with the efforts of programme managers to create conditions that provide insight into which changes in processes of care and in patient outcomes have been made. • Creating measurability and formulating challenging and achievable targets is one of the crucial tasks for programme managers of QICs.

5.4. Analysis

Before showing the analysis of the selected studies, one core concept is found in the selected studies. Due to the scarce research into policy regarding pressure ulcers, the years of selected research vary between 2001 and 2022. Therefore, more research in hospitals in the Netherlands into policy regarding pressure ulcers is needed.

5.4.1. Selected studies

The selected studies showed that the policy regarding the measures taken to prevent and treat pressure ulcers vary greatly or is missing in healthcare institutions in the Netherlands. For example, the study of De Laat et al. showed that “several factors appear play a role: lack of knowledge about these guidelines and lack of accompanying skills of nurses, vagueness about responsibilities for the management of pressure ulcers, and the fact that pressure ulcers are seldom viewed as a priority in health care institutions” [37]. A second example is given in the research of Meijers et al., where it is stated that “research on guidelines and guideline implementation indicates that the use of guidelines is not always reflected in the actual care that patients receive” [40]. The relevance for this policy is described by the study of Bosch et al., where it is given that “preventing pressure ulcers requires concerted action on the part of health care professionals” [35]. Here, it is shown that with an increasing demand for transparency in issues concerning patient safety, for policy makers it is important to “identify factors that may contribute to low prevalence figures” [35]. It can be concluded that the selected studies have a shared conclusion on the lack of policy regarding the prevention of pressure ulcers in healthcare in the Netherlands, and that there is a need for policy.

5.4.2. Analysis into the policy of preventing pressure ulcers

In the research of Amir et al. it is found that in the period of 2005-2008 (in comparison with the period of 2001-2004) more special beds/mattresses and special cushions in wheelchairs were used, as well as slightly better prevention strategies. “In this same period, more institutions had information leaflets, prevention guidelines, a PU committee and a PU-wound care nurse at the ward level’ [34]. The researches also found evidence that despite this evidence, there is still room for improvement. Less than half of the patients with limited activity were regularly repositioned and provided with special treatment for the prevention of dehydration and malnutrition. Despite nearly all of the institutions having information leaflets on PU prevention, less than a quarter of participants received this information.

The research of Bosch et al. is the first study in the Netherlands that researches organisational culture, teamwork, and quality management for nosocomial pressure ulcers. The researchers find that these factors “have all been argued to potentially contribute to the improvement of patient care. However, the present results show only the quality of pressure ulcer management at institutional level to strongly contribute to preventive quality management at ward level” [35]. In contempt of the assumptions of the researchers, a significant link to the prevalence of nosocomial pressure ulcers was not detected and further research is needed to know how these variables can be meaningfully measured.

The study of Crunden et al. describes pressure ulcers as “one of the indicators of quality of nursing care” [36]. Next to this, it is explained that even though reporting pressure ulcers an established practice, processes vary across healthcare systems. Policies and clinical guidelines’ main goal is to advance standardized practice and raise the standard of patient care. The researchers also found that the ability to use data for PU prevention and to compile indicators of care quality is constrained by inconsistent hospital coding systems and classification. “This was despite the instruction of most of the reviewed policies to use the international guidelines published by NPUAP, EPUAP and PPPIA as an underpinning document for PU categorisation, prevention, and management” [36].

In the research of De Laat et al. the implementation of a new pressure ulcer policy was investigated. A particular hospital policy for treating pressure ulcers was created. A network of contact nurses (one on each ward) was formed by a pressure ulcer consultant. The nurse consultant taught this contact nurse, who then delivered the new policy during a staff meeting or clinical lesson. Additionally, the presence of the rule was published in various hospital media (newspaper, intranet) when it was formally introduced. Also, each hospital bed frame had a mattress made of pressure-relieving viscoelastic foam of the highest quality.The researchers found that “despite the time and energy spent on education and training of the nurses, the change in care behaviour was not significant when the use of the new standard mattresses was not taken into account” [37]. The replacement of the new mattresses is the key component of the intervention. Next to this, the researchers found that nursing care is “difficult to measure because there are a lot of ‘in-between’ activities”. For example, occasionally helping patients change positions if a nurse notices them in an uncomfortable posture. Another example is encouraging relatives to get the patient out of bed during visiting hours and taking him or her for a short walk (if permitted). The

researchers determine that perhaps the impact of this increased focus on pressure ulcer avoidance is greater than thought. Last, it is stated that every nurse should be aware of the guideline of turning patients at high risk for pressure ulcers, which is an unquestionable element of providing basic nursing care and prevents pressure ulcers. The researchers found that “only 10 percent of the patients were treated according to the guideline. It is recommended to ensure strong nursing leadership in future pressure ulcer improvement projects” [37].

The research of Gillespie et al. focuses on pressure injury clinical practice guidelines, which are “used to standardise care and guide health professionals decision making in the management of medical conditions” [38]. For the prevention and treatment of pressure injuries, different measures are advised by pressure injury clinical practice guidelines. Tools for risk assessment, pressure-relieving equipment such specialised air mattresses, wedges, booties, and chair cushions, proper skin care, a healthy diet, and patient education are some of these. An important remark of the research is that clinical practice guidelines are more implementable when they address “patient and stakeholder needs and preferences and include information to support patient involvement in decision making. Further, having patients and carers involved in crafting plain language statements increases applicability and may broaden the target audience” [38]. However, locating and actively involving different stakeholder groups requires a lot of work. The need for continual training and assistance, a lack of clarity regarding the role of patients, and how to incorporate patient experiences are major obstacles to include stakeholder groups in the development process. Other difficulties include the isolation that patient representatives experience, being a patient representative, and having trouble understanding the terminology used in medicine. The researchers propose “ building reciprocal relationships (e.g., multiple stakeholders in small panels), practical support (e.g., meeting logistics), and reassessment and feedback” to achieve successful engagement of stakeholders [38].

In the study of Halfens et al. it is stated that “there are ‘no magic bullets’ to improve professional practice in general, but that ‘the combination of information transfer and learning through social influence or management support can be effective, and so can reminders or feedback’.” A combination of interventions, methods and programs should be developed for the improvement of professional practice. Next to this, the study of Halfens et al. shows that innovation adoption behaviour among nurses is not highly developed.

It is explained that most studies regarding the behaviour of innovation adoption “are more or less based on a personal or interpersonal theory, such as the innovation–decision process model developed by Rogers” [43]. Here, the innovation–decision process is defined as the process through which an individual (or other decision-making unit) passes from:

1. First knowledge of an innovation.
2. Forming an attitude toward the innovation.
3. A decision to adopt or reject.
4. Implementation of the new idea.
5. Confirmation of this decision.

Halfens et al. states that “this innovation–decision process is a complex process, which can be positively or negatively influenced by several factors, for instance, personal, cultural, and institutional factors” [39]. Lastly, organisational support is very important for realising implementation, and characteristics of the innovation itself can also influence the process. This means that the innovation obtains its value only by its interaction with the context.

The research of Meijers et al. focused on comparing the daily practices of organisations with and without a nutritional guideline adopted in PU care in order to identify any discrepancies in patient nutritional care for patients with PU and potential impediments to patient nutritional assistance. The findings demonstrate that screening is performed noticeably more frequently in daily practice in settings with nutritional guidelines. “So having a nutritional guideline in PU care contributes to the amount and frequency of screening performed in daily practice” [40]. Also, it was found that “the most important barrier to implementing nutritional support in both groups was lack of knowledge and skills, followed by lack

of resources" [40].

Stalpers et al. studied the identification of "nurses' barriers and facilitators to monitoring of nurse-sensitive outcomes (NSOs) in intensive care units (ICUs), and to explore influential nurse characteristics and work environment factors" [41]. Lack of time, inadequacy of measurement tools, and workload are perceived as various barriers that nurses experience. The study suggest that "a wide spectrum of barriers, including barriers related to knowledge, attitude and behaviour should be assessed in order to realise the widespread behavioural change in health care" [41]. One factor contributing to the lack of NSO screening is nurses' ignorance of the necessity for NSO screening in their line of work. The most often mentioned facilitators in this study, more education and clearer policies, should promote NSO knowledge in ICUs and, ideally, improve screening levels. These knowledge-related barriers are very simple to overcome. Previous research examining the screening procedures used by healthcare professionals have underlined the value of continuous education. Other factors identified as potentially contributing to inadequate monitoring of NSOs were those related to nurses' attitudes, in addition to barriers related to behaviour and knowledge. As a result of their abstract nature, attitude-related barriers are more challenging to overcome than knowledge-related ones, and altering a nurse's attitude frequently requires a longer period of time than altering his or her degree of knowledge on NSOs. Although attitude-related obstacles may be more difficult to overcome than other obstacles, they have a significant effect on therapeutic outcomes. This study stresses the need for future NSO compliance improvement interventions to be customised to and concentrated on prospectively identified impediments, such as fostering favourable attitudes regarding NSOs. This could be accomplished through feedback and participatory learning. Last, the study identified "a potential link between nurses' satisfaction with clinical autonomy and nurses' perceived barriers. This is important, because satisfaction with work environments is relevant in relation to nursing processes. Additionally, autonomy has been directly linked to both nurse outcomes (turnover, job satisfaction) as well as patient outcomes (patient safety, mortality) "[41].

Strating et al. found that "improvements in processes of care are to be achieved by Plan–Do–Study–Act cycles: step wise changes to care practices guided by measured results for which appropriate measures and usable data-collection tools should be available" [42]. Choosing a set of measurements that all teams will register allows teams to learn from one another and keeps teams focused on the joint target, even though the Breakthrough philosophy encourages teams to define local goals and report on local indicators. It is critical to investigate the extent to which collaborative organisers are successful in establishing measurability because efficacy depends on both the interventions implemented and the manner in which changes are monitored.

The analysis of the literature shows that there are many reasons as to why the measures for preventing pressure ulcers are not working as intended and expected in a hospital setting in the Netherlands. Next, the analysis needs to be linked to the multi level perspective theory.

5.5. The multi-level perspective and the ErasmusMC

To see what the theoretical or conceptual reasons from a multi-level perspective for the measures not working as expected and intended at the ErasmusMC are, the theory of the multi-level perspective (MLP) will be elaborated first.

5.5.1. The multi-level perspective

According to Geels "the MLP distinguishes three analytical and heuristic levels to understand system innovations"[18]: the meso-level, the micro-level, and the macro-level. The meso-level is formed by socio-technical regimes, the micro-level is formed by technological niches, and the macro-level is formed by the socio-technical landscape. These three characteristics will be explained.

Socio-technical regimes

In the research of Kemp and Rip the socio-technical regimes are describes as a sociological set of 'rules'; "A technological regime is the rule-set or grammar embedded in a complex of engineering practices, production process technologies, product characteristics, skills and procedures, ways of handling

relevant artefacts and persons, ways of defining problems; all of them embedded in institutions and infrastructures" [44]. Next to this, several social groups actively contribute to the creation and upkeep of socio-technical systems. Due to the coordination and alignment of social group activities, there is interdependence and linkage between subsystems.socio-technical regimes are responsible for the stability of socio-technical systems by directing and coordinating the actions of pertinent actor groups. Because of the dynamic nature of this stability, innovation still happens, but it does so incrementally, giving rise to "technical trajectories" and path dependencies.

Technological niches

Geels describes technological niches as "the locus for radical innovations" [18]. Because they offer spaces for learning processes, niches are crucial. Learning processes take place on a variety of levels and give room to create the social networks that promote innovations.

Socio-technical landscape

The socio-technical landscape "refers to aspects of the wider exogenous environment, which affect socio-technical development" [18]. Also, it is important to know that actors cannot directly alter the landscape and are not able to do so.

Nested hierarchy

The three levels offer various levels of coordination and structuration of activities in local practices, according to (socio)logic. As a result of relationship between the three concepts, which can be described as a nested hierarchy, regimes are embedded in landscapes and niches in regimes. The work done in niches is frequently focused on the issues with existing regimes. Actors support the niche in the hopes that novelties would one day be incorporated into the system or possibly take its place. The current regime is deeply ingrained in many areas (e.g., institutionally, organisationally, economically, and culturally), making this difficult. According to Geels "radical novelties often have a mismatch with the existing regime and do not easily break through. Nevertheless, niches are crucial for system innovations, because they provide the seeds for change" [18].

System innovations

According to Geels "the key point is that system innovations come about through the interplay between dynamics at multiple levels" [18]. In transitions, several phases can be established. Geels describes these phases as follows [18]:

- In the first phase, novelties emerge in niches in the context of existing regime and landscape developments.
- In the second phase the novelty is used in small market niches, which provide resources for technical specialisation.
- The third phase is characterised by a breakthrough of the new technology, wide diffusion and competition with the established regime.
- In the fourth phase the new technology replaces the old regime, which is accompanied by changes on wider dimensions of the socio-technical regime.

Figure 5.4 gives an overview of the phases that are distinguished in transitions. Last, Geels states that "an important aspect of the MLP is to do away with simple causality in system innovations. There is no simple 'cause' or driver. Instead, there are processes at multiple dimensions and levels simultaneously. System innovations come about when these processes link up and reinforce each other ('circular causality')" [18].

The multi-level perspective and the ErasmusMC

Looking at Figure 5.4, the dynamic multi-level perspective on system innovations could be applied to the situation of preventing pressure ulcers in the ErasmusMC. The landscape developments represent the urgency of the policymakers of the hospital to lower the occurrence of pressure ulcers in the ErasmusMC. The technological niches are the measures (or system innovations) created for preventing pressure ulcers in the hospital. The socio-technical regime can be described as the socio-technical system for preventing pressure ulcers in the ErasmusMC drafted in Figure 5.2. With the application of the dynamic multi-level perspective on system innovations on the prevention of pressure ulcers in the ErasmusMC, the next step is to draw the theoretical and/or conceptual reasons from a multi-level perspective for the measures not working as expected and intended in the ErasmusMC.

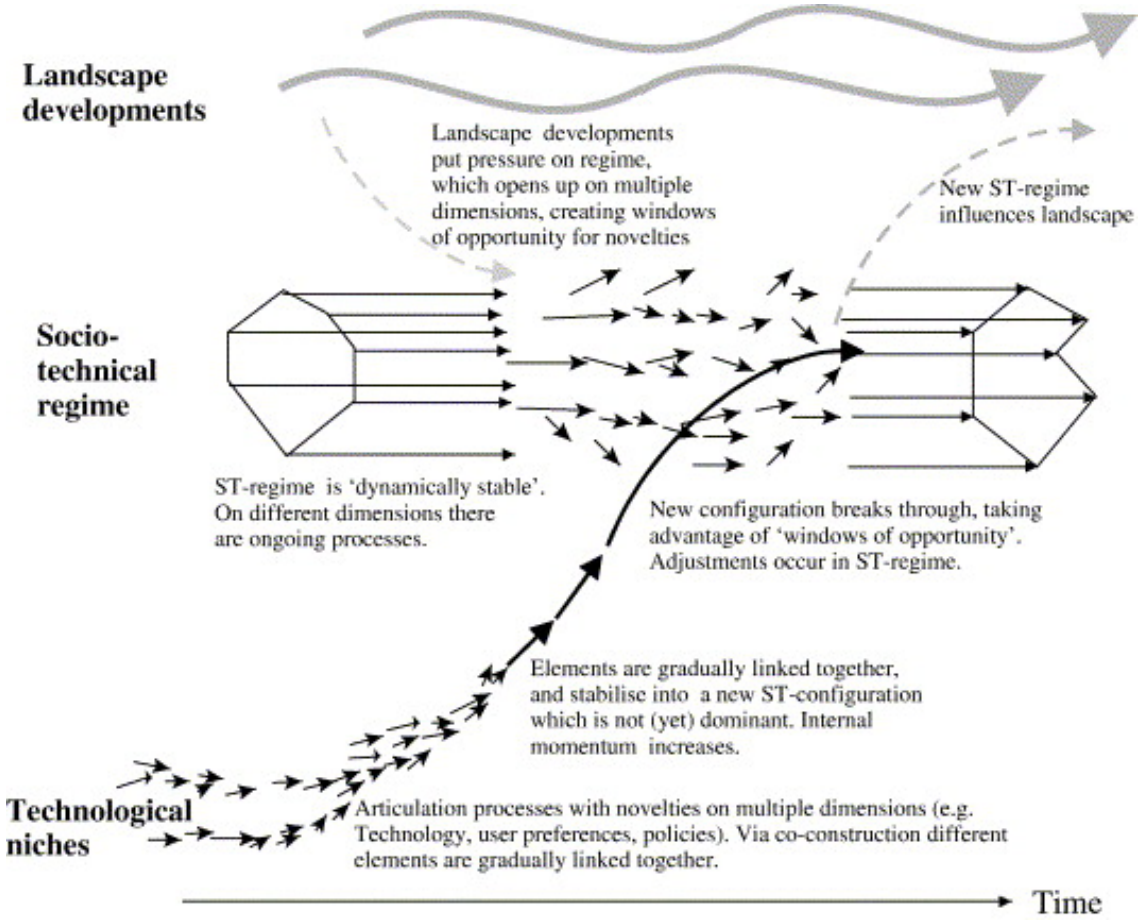

Figure 5.4: A dynamic multi-level perspective on system innovations [45]

5.5.2. Reasons from the literature review

Together with the analysis of the selected studies about policies regarding pressure ulcers in the Netherlands and the explanation of the multi-level perspective, the theoretical and/or conceptual reasons can be drawn.

The selected literature provide theoretical reasons for the measures for preventing pressure ulcers not working as expected and intended. The study of Amir et al. shows that less than half of the patients with limited activity were regularly repositioned and provided with special treatment for the prevention of dehydration and malnutrition. Also, despite nearly all of the institutions having information leaflets on PU prevention, less than a quarter of participants received this information. Therefore, not regularly repositioning and providing special treatment for the prevention of dehydration and malnutrition, and the information distribution among participants/patients are theoretical reasons for the measures for preventing pressure ulcers not working as expected and intended.

Bosch et al. gives that it might be possible that organisational culture, teamwork, and quality management for nosocomial pressure ulcers might be potential reasons but further research is needed on how to meaningfully measure these variables. However,the researchers state that “the present results show only the quality of pressure ulcer management at institutional level to strongly contribute to preventive quality management at ward level” [35]. Thus, the lack of quality of pressure ulcer management at institutional level is a theoretical reason for the measures for preventing pressure ulcers not working as expected and intended.

The research of Crunden et al. finds that the ability to use data for PU prevention and to compile indicators of care quality is constrained by inconsistent hospital coding systems and classification. Hence,

inconsistent hospital coding systems and classification to use data for PU prevention and to compile indicators of care quality are theoretical reasons for the measures for preventing pressure ulcers not working as expected and intended.

The study of de Laat et al. found that “despite the time and energy spent on education and training of the nurses, the change in care behaviour was not significant when the use of the new standard mattresses was not taken into account” [37].Next to this, the researchers found that the ‘in-between’ activities (occasionally helping patients change positions if a nurse notices them in an uncomfortable posture or encouraging relatives to get the patient out of bed during visiting hours and taking him or her for a short walk (if permitted)) of nursing care is difficult to measure but that the impact of this increased focus on pressure ulcer avoidance is greater than thought. Moreover, the researchers recommend strong nursing leadership for pressure ulcer improvement projects. So, not focusing on seeing the replacement of mattresses as a key component of an intervention, not looking at the impact of the ‘in-between’ activities of nurses, and not creating strong nursing leadership are theoretical reasons for the measures for preventing pressure ulcers not working as expected and intended.

Gillespie et al. states that locating and actively involving different stakeholder groups for the implementability of pressure injury clinical practice guidelines can often require a lot of work. Building on the description of major obstacles to include stakeholder groups in the development process, the researchers propose “building reciprocal relationships (e.g., multiple stakeholders in small panels), practical support (e.g., meeting logistics), and reassessment and feedback” to achieve successful engagement of stakeholders [38]. Accordingly, missing successful engagement of stakeholders to implement pressure injury clinical practice guidelines is a theoretical reason for the measures for preventing pressure ulcers not working as expected and intended.

The study of Halfens et al. finds that a combination of interventions, methods and programs should be developed for the improvement of professional practice. Besides, Halfens et al. shows that innovation adoption behaviour among nurses is not highly developed. Also, the researchers find that the innovation–decision process can be positively or negatively influenced by several factors, for instance, personal, cultural, and institutional factors. Organisational support is very important for realising implementation. Characteristics of the innovation itself can also influence the process. Therefore, not focusing on personal, cultural, and institutional factors, not giving enough organisational support, and not focusing adoption behaviour of nurses are theoretical reasons for the measures for preventing pressure ulcers not working as expected and intended.

The research of Meijers et al. shows that a nutritional guideline in PU care contributes to the amount and frequency of screening performed in daily practice. Along with this, the most important barrier to implementing nutritional support was lack of knowledge and skills, followed by lack of resources. Thus, missing a nutritional guideline, and lack of knowledge, skills, and resources are theoretical reasons for the measures for preventing pressure ulcers not working as expected and intended.

Stalpers et al. find that feedback and participatory learning are means to customise and concentrate the need for future NSO compliance improvement. Next to this, the research identifies “a potential link between nurses’ satisfaction with clinical autonomy and nurses’ perceived barriers”. Consequently, not having feedback and participatory learning amongst nurses, and not focusing on nurses’ satisfaction and autonomy are theoretical reasons for the measures for preventing pressure ulcers not working as expected and intended.

Last, the study of Strating et al. shows that it is critical to investigate the extent to which collaborative organisers are successful in establishing measurability because efficacy depends on both the interventions implemented and the manner in which changes are monitored. Therefore, not choosing a set of measurements that all teams can register to learn from another and keep focused on the joint target (preventing pressure ulcers) are theoretical reasons for the measures for preventing pressure ulcers not working as expected and intended.

5.6. Theoretical and/or conceptual reasons from a multi-level perspective

With the theoretical reasons of the measures for preventing pressure ulcers not working as expected and intended drawn from the selected literature, the conceptual reasons from a multi-level perspective can be defined.

Together with the socio-technical regime, technological regime, and the socio-technical landscape applied to the situation at the ErasmusMC and the theoretical reasons drawn from the selected literature, the nested hierarchy can be used to draw the conceptual reasons from a multi-level perspective. The nested hierarchy is the relationship between the three concepts (The urgency of the policymakers of the hospital to lower the occurrence of pressure ulcers in the ErasmusMC, the measures created for preventing pressure ulcers in the hospital, and the socio-technical system for preventing pressure ulcers in the ErasmusMC) which results in regimes that are embedded in landscapes and niches in regimes. The work done in niches is frequently focused on the issues with existing regimes. Examples are missing successful stakeholders engagement and the lack of quality of pressure ulcer management at institutional level. Actors support the niche in the hopes that novelties would one day be incorporated into the system or possibly take its place. The current regime is deeply ingrained in many areas (e.g., institutionally, organisationally, economically, and culturally), making this difficult. Here, examples of reasons drawn from the literature are not focusing on personal, cultural, and institutional factors, not giving enough organisational support, not focusing on seeing the replacement of mattresses as a key component of an intervention, and not looking at the impact of the ‘in-between’ activities of nurses. According to Geels “radical novelties often have a mismatch with the existing regime and do not easily break through. Nevertheless, niches are crucial for system innovations, because they provide the seeds for change” [18].

Combining the theoretical reasons of the measures for the prevention of pressure ulcers not working as expected and intended and the multi-level perspective of Geels, a nested hierarchy is missing. Hence, to create a nested a hierarchy, the focus must be placed on the mismatch between the measures created for preventing pressure ulcers in the hospital and the socio-technical system for preventing pressure ulcers in the ErasmusMC.

6

Actor-related patterns of the current measures

In this section, the case study regarding the measures for preventing pressure ulcers in the ErasmusMC is presented. Also, an analysis of the collected data is conducted to answer the second research question: *What are the actor-related patterns of the current measures for the prevention of pressure ulcers in the ErasmusMC?*

6.1. The case study

At the beginning of the case study, the researcher was assigned to the department of Kwaliteit & Patientenzorg in the ErasmusMC. On the first day, the researcher received an ErasmusMC card to move in the hospital (as an employee). Together with the card, the researcher received an ErasmusMC account where the researcher could access the ErasmusMC systems. This made it easier to approach respondents via email, set meetings, and look up locations of respondents in the hospital. Next to this, the researcher received the right to wear a nursing outfit (white pants and a white jacket with the ErasmusMC logo on it). The nursing outfit was intended to blend in amongst other nurses, to make the researcher more approachable and trustworthy for hospital personnel, and to create the opportunity to participate and observe on departments in the hospital. It was forbidden for the researcher to participate in any activities involving the patients in the ErasmusMC. This meant that when asked or whilst observing, the researcher could not give a helping hand or intervene when care was needed or given to patients. The researcher was only there to observe or ask questions to medical personnel.

The researcher drafted a logbook in Microsoft Excel, crafted a database in the OneDrive environment, and made room for observational notes in Microsoft Word. Furthermore, the researcher drafted interview questions for the semi-structured interviews as can be seen in Appendix B. These questions could vary amongst respondents according to what type of information was needed for the case study. An example of a variation to the drafted interview questions is given in Appendix C. To protect the privacy of the respondents and to make the respondents feel comfortable to share information without the chance of tracing the shared information in the interviews back to the respondents, an informed consent form was drafted and handed to every respondent. The two variants (Dutch and English) of this form can be seen in Appendix D and Appendix E. The personal information of the researcher (and supervisor) is marked black for privacy reasons. In the informed consent form, it can be seen that the interviews were recorded and a summary of every interview was made. Only when the respondents received the summary of the interview and gave explicit consent, the interview could be used for the textual analysis in Atlas.ti.

6.1.1. Data collection

With an ErasmusMC card, an account, and the white nursing clothes that were provided for the researcher by the ErasmusMC hospital, the case study could begin. On the first day of the case study, the researcher had no idea where his workplace would be in the hospital and he found a place in the

library where he could start preparing interview questions and start creating a database for the case study. Next to this, he emailed employees that were recommended by educational staff involved in the prevention of pressure ulcers in the ErasmusMC. On the second day, the researcher had an appointment with an employee of the Kwaliteit & Patientenzorg department in the ErasmusMC. This was the first semi-structured interview in which the researcher could ask questions about the measures for the prevention of pressure ulcers in the ErasmusMC. At the end of the interview, the researcher asked who he should interview in the hospital that was involved or a part of the measures for preventing pressure ulcers. This was a question that the researcher would ask every participant of the interviews, so that the researcher did not miss the opportunity to interview every key player involved in the topic.

6.1.2. Sample size

Next to interviewing medical personnel, the researcher took observational notes, field notes, and conducted informal conversations and interviews whilst accompanying operational staff in the ErasmusMC hospital. In a span of 5 weeks in the hospital, the researcher managed to conduct 22 recorded and summarised semi-structured interviews, 4 informal interviews, several observational moments whilst accompanying operational staff or participating in meetings, and countless informal conversations. Also, the researcher collected PowerPoint presentations, documents, and dashboard results of the measurement of pressure ulcer prevalence in the ErasmusMC.

The sample size of the collected data was determined by who the researcher could speak whilst accompanying operational staff and the respondence of the selected respondents via e-mail. When it was difficult to reach out to respondents, the researcher sent another (or multiple) reminders via e-mail or tried to get an interview with the respondent through respondents on the same department (or managers). Overall, the respondents (and employees in general) were open and not afraid to share information regarding the measures for the prevention of pressure ulcers. A reason could be that the researcher reminded every respondent at the beginning of the interview that the collected data would not be shared with the hospital, would be stored in the TU Delft, and that the respondents could explicitly give their permission to use the collected data in this research (Appendix D & Appendix E).

Despite the overall positive attitude of respondents regarding information sharing, there was one respondent that was not willing to share information regarding the measures for the prevention of pressure ulcers. This respondent questioned the method of data collection and storing the collected data in the TU Delft. All data regarding the interview with this respondent has been deleted and removed from the case study. For the researcher, this was the only unpleasant experience during the data collection in the ErasmusMC.

The operational staff in the case study is divers and located throughout the whole hospital. The personnel consists of doctors, nurses, logistics staff, policy makers, quality staff (kwaliteitsmedewerkers), IT staff, legal staff, professors, PhD staff, and managers. In some of these functions, there are various roles that have to be elaborated for the purpose of clarification in the case study. The first function which is explained, is the function of nurses. There are several types of nurses in the ErasmusMC:

- Verpleegkundigen (nurses)
- Seniorverpleegkundigen (senior nurses)
- Regieverpleegkundigen (similar to a nursing manager)
- Aandachtsvelders (specialist nurses)

These four types (or roles) of nurses will be elaborated on.

Nurses

These are nurses working in various departments in the hospital. Hinno et al. define “nursing activities as tasks performed by nurses that require their professional knowledge and skills” [46]. The researcher experienced that it is expected of the nurses to know and implement the various measures for the prevention of pressure ulcers based on their professional knowledge and skills.

Senior nurses

A senior nurse has some years of experience working as a nurse and is assigned extra duties and responsibilities in a team of nurses.

Regieverpleegkundigen
This is a new (and developing) role in the ErasmusMC. A 'regieverpleegkundige' is a nurse with extra responsibilities in the nursing team and a point of contact for the nurses. The nurse is responsible for various quality topics in the department the nurse is working in. It is a type of leadership role amongst nursing staff.

Specialist nurses
The specialist nurses are nurses in nursing teams that focus on certain topics in nursing care. This role has been revived in the ErasmusMC. One of the topics that these specialist nurses focus on is pressure ulcers. The specialist nurses function as experts and advocates of their topic. These nurses have to get schooled, receive all current information and numbers, prepare and give education in their nursing teams, measure the prevalence of pressure ulcers, share these results with the department (nursing staff and managers), reflect these results, and come up with initiatives to reduce the number of pressure ulcer occurrence on their own departments.

The second function that is explained, is the function of managers. There are 2 types of managers led by one director:

- Zorgmanagers (care managers)
- Sectormanagers (sector managers)
- Themadirecteuren (theme directors)

These three type of managers will be elaborate on.

Care managers
The 'zorgmanagers' are the managers of the various departments in the ErasmusMC. These managers are responsible for everything that happens in a department. Examples of responsibilities are the number of available beds for patients, to plan the roster of nurses and other medical personnel, various medical topics (such as pressure ulcers), and availability of materials in the department. The researcher experienced these managers to be extremely busy and focusing on many tasks.

Sector managers
The 'sectormanagers' are one layer above the zorgmanagers in the organisation. The zorgmanagers report to the sectormanagers and the sectormanagers report to the theme director. The sectormanagers responsible for multiple departments.

Theme directors
The ErasmusMC is divided into 9 themes. These themes cover all the care that is given in the hospital. The theme directors are the directors of these themes. The themadirecteuren are responsible all the departments in a theme.

Wondconsulenten (wound consultants)
There is one function that is important to highlight. This is the wound consultants. The wound consultants are nurses that have a specialisation in the care of wounds. These are all types of wounds and also pressure ulcers. The wound consultants are involved when there are serious wounds on a patient. They advice, monitor, and take care of these wounds. The wound consultants will always be there if a pressure ulcer is detected on a patient. These nurses also organise lectures (klinische lessen) and congresses regarding how to take care of pressure ulcers and how to prevent pressure ulcers. These nurses are valuable to the measures for preventing pressure ulcers in the ErasmusMC.

Now that the sample size and the sample population has been determined and described, the various roles are subdivided into two groups: the operational staff and the strategic staff. This is done for the privacy of the respondents (so that the respondents are not traceable) and to subdivide the roles into professional terms.

6.1.3. Observational notes
Now that the sample size of the case study has been discussed, some of the observational notes of interest will be described.

Prevention measures

The researcher observed various different measures regarding the prevention of pressure ulcers in the ErasmusMC. First, the prevention measures that the nurses use or are expected to use. The nurses have to:

- check the patient's skin for starting pressure ulcers or pressure ulcers;
- apply the right settings on the bed;
- make the patient reposition (wisselligging) every 4 hours;
- inform the patient and the patient's family about the occurrence of pressure ulcers and what can be done against it (repositioning, come out of bed and walk around);
- apply barrier creme on sensitive areas of the patients (mainly on the heels and the tail bone);
- keep the heels of the patient off the matress (by adding a cushion under the calves of the patient);
- have to check the weight and nutrition status of the patient.

The researcher observed the application of these measures first hand on multiple departments in the hospital where he accompanied operational staff. The researcher noticed that these measures were applied sometimes, sometimes not, and rarely all at once. Checking the skin for pressure ulcers was done at the intake of a patient. At an informal conversation, the researcher noticed that the procedure of checking the skin is often done roughly by the nurses. The heels and tail bone were often checked, but other parts of the body were not thoroughly checked. Next to this, the researcher noticed that the settings on the bed were often right, but sometimes they were not. The settings should be set on the right air circulation through the matress and the degrees in which the bed (and the patient) is standing. For example, the semi-Fowler settings were needed for some of the patients. "Semi-Fowler position is a position in which the individual lies on their back on a bed with the head of the bed elevated at 30-45 degrees" [47]. The researcher detected that repositioning the patients every four hours was not done often. Whilst accompanying operational staff and checking randomly if patients were repositioned and if this was documented, almost every time the patient was not repositioned in four hours. This was often not documented, which meant that there was also not a record of the last time the patient was repositioned. Also, in an informal conversation it came forward that there is a difference in the day and night shift of nurses concerning repositioning of patients and documenting these repositionings. If the repositioning of a patient is done during the day and this is recorded but there is no documentation of the patient being repositioned during the night, then the following day shift (of nurses) does not know if the patient has been turned consequently or not. Whilst observing, the researcher observed that informing family and close ones was often done and even when nurses entered the room, relatives would start the conversation on what had been done regarding the prevention of pressure ulcers. Another observation of the researcher was the application of barrier creme. In some occasions this was done properly, in other occasions not, and also it was missing in some of the rooms of patients. For keeping the heels off the matress, the researcher detected that this was often done. However, sometimes nurses had forgotten to put a cushion below the calves. Also, the patients were active in bed which meant that the patients would move of the cushion positioned below the calves where the heels were free. Checking the weight and nutrition status were not observed by the researcher. Only during the prevalentiemeting which will be discussed further on.

New mattresses

During the case study, the ErasmusMC was in the middle of implementing new mattresses. These were the Accumax (for standard use) and the Accella mattresses (for patients with higher risk of pressure ulcers and for high risk patients). The hospital experienced with the previous mattresses that patients experienced these as not comfortable and the risk of pressure ulcers was increased whilst using this matress. The researcher observed the implementation of this matress. This was a big operation, since all the mattresses in the hospital had to be replaced over a course of one week. The hospital thought of a system to show which bed had a certain type of matress. For the Accumax mattresses, a blue cover on the backside of the frame of the bed is designed. The replacement of the mattresses was received as a success in the hospital. However, the researcher observed that some of the beds that had an Accumax matress did not have a blue cover on the frame of the bed. The assembling of the frame and adding the right matress to the frame was done in the logistic department of the hospital. Here, there was also a washing street where the mattresses were washed and cleaned. There were

two washing streets where two beds (frame and matress together) could be washed. Because of the implementation of the new mattresses, the frame and the matress had to be washed separately. This meant that there was only one washing street with two lanes where only one bed could be washed at a time. The researcher noticed that the throughput time in the washing street was increased by two (since only one bed instead of two beds at a time could be washed).

Materials

One of the things that the researcher heard in several informal (and formal) conversations and interviews, is the missing of materials in departments. An example is the 'anti decubitus zitkussen' (pressure relief cushions) in the ErasmusMC. It was expected that many departments would have these cushions in the rooms of the patients. However, the researcher often observed (whilst accompanying operational staff) that these cushions were missing. In informal conversations, it came forward that there is really not an explanation into how these cushions get lost in the hospital. Another example of missing materials were the use of specialised slippers against pressure ulcers. These slippers should have been available but were nowhere to be found in the hospital.

Stuurgroep decubitus

Another observational note of interest is that the researcher had the possibility to join a meeting of the 'stuurgroep decubitus'. The stuurgroep decubitus was founded by the board of Directors of the ErasmusMC. This group consists of owners of processes (proceseigenaren) about pressure ulcers. The group members all have an own expertise and can provide input into the policy steps that are needed regarding the measures for the prevention of pressure ulcers. A board of Directors member monitors the process of this task force and reports its progress to the supervisory Board of the ErasmusMC. The main goal of the group is to minimise the number of pressure ulcer occurrence at the ErasmusMC. If this happens, the group will go on without monitoring and eventually the group will be dissolved. The first steps of the group was to ensure safety amongst the patients in the ErasmusMC regarding pressure ulcers, and then brain storm about the measures for the prevention of pressure ulcers from different scientific perspectives and roles in the hospital. The researcher attended a short meeting (approximately 25 minutes) where the final steps were discussed for implementing the new mattresses in the hospital. The meeting could be described as a final check amongst all group members. The implementation was briefly discussed and it was asked if there were any more questions or remarks on the plans. There were only positive reactions and excitement on how the implementation would go. The researcher noticed in the meeting (and other documentation) that along the way of ordering the new mattresses, a slight problem was detected. Namely, that the Accumax matress was too soft to reanimate patients on. Therefore, over 80 percent of all operational staff had to be trained on how to resuscitate a patient on this new matress. This is done by applying a board underneath the patient and then start reanimating. It meant that all crash carts needed a board and the staff had to be trained on a short notice before the implementation of the mattresses could take place. A crash cart is a set of trays on wheels used in hospitals for transportation and dispensing of emergency medication/equipment to potentially save someone's life. Thus, the implementation of the mattresses was delayed for some time.

Beds training for key-users

With the implementation of the new mattresses, the hospital staff (operational and strategic) could attend a refreshment course on how to use the bed properly with the new mattresses. This training was organised by the supplier of the new mattresses. A training or clinical lesson is not mandatory, since it is the hospital's policy to make these things optional for hospital staff and not mandatory. The researcher could also attend a training. It was observed that there were a total of six people at this training which occurred at the end of a working day (around 4 pm). The researcher noticed that the bed had a lot of useful functions and automated processes which the representative of the matress supplier explained and showed. It was an interactive training and it was possible to ask questions during the training. Next to this, the researcher noticed that the operational staff that attended the meeting was not aware of the full functionality of the bed. Even some of the basic functions were a surprise and the operational staff indicated that some of these functions were never used but were helpful and would make a lot of physical work (such as turning patients or adjusting patients in the right position) easier. Here, the researcher experienced that the new mattresses were a lot more comfortable and that the frame of the bed had a lot of functions designed to help operational staff. Despite the usefulness of these

functions on the bed, the researcher observed that these functions were not used when accompanying operational personnel in the ErasmusMC.

Measurement of pressure ulcer prevalence (prevalentiemeting)
The final day of the case study in the ErasmusMC, the researcher could attend the measurement of pressure ulcer prevalence amongst several departments in the hospital. The measurement of pressure ulcer prevalence was a single moment (out of four yearly moments) in the hospital where various indicators regarding the prevention of pressure ulcers where measured amongst patients and patient rooms on the departments. The measurements were done by the specialist nurses of pressure ulcers. Also, this was a moment to train staff to get certified to do these measurements in the future. This was done by pairing a trainee with someone who was certified and together they would perform the measurements. At the start of the day, there was a meeting where the specialist nurses where provided an IPad with a checklist. This checklist consists of all the measurements that had to be checked. Then, the specialist nurses were sent towards their own department where they could take the measurements. The researcher observed and carried one of the IPads to fill in the observed measurements by the specialist nurses. First, the patients were told that the specialist nurses where here to perform a measurement on the measures for the prevention of pressure ulcers. Then, the specialist nurses would ask if the patient was willing to participate and if the patient gave permission to use personal information for learning purposes. Almost every patient agreed to this, except one patient who was to sick to answer and could therefore not give consent. When the patient gave consent, the specialist nurse checked the bed of the patient:

- Which type of matress is used (Accumax or Accella Therapy)?
- Is the bed it in semi-Fowler position?
- Is the frame of the bed set to the right settings regarding air circulation?
- Are there any errors or alarms on the bed going off?

Then, it was checked if the patient was lying down correctly:

- Are the heels laying free?
- Does the patient lay on its back of sideways?
- Is there a cushion placed under the patient's calves?

Next, the patients were physically checked for the occurrence of pressure ulcers:

- How does the tail bone of the patient look?
- How do the heels of the patient look?
- Does the patient have IAD?
- How do the ears and nose of the patient look?
- Are there any other remarks on the patient's skin?

The patients were also asked how they felt, if they were mobile and could move around or if they were bound to bed or a chair, and if they were informed about pressure ulcers. Finally, there was a check for materials in the room:

- Are there extra pillows in the room?
- Is barrier creme supplied to the room and is it used?
- Is there a wisselliggingsklok (a clock to check at what time patients are repositioned) in the room?
- Are there informational folders in the room?

After everything was checked, the specialist nurses thanked the patient and left. The researcher noticed that the specialist nurses where caring with the patients and the patients where happy to see the specialist nurses and were obedient towards the specialist nurses. Also, the specialist nurses checked the patients for incontinence-associated dermatitis (IAD's). An IAD occurs when the protective barrier created by your skin is damaged. Incontinence refers to the patient's inability of the body to control the release of urine or stool. The questions formulated above are not exactly all the questions of the questionnaire, but the questions that the researcher can remember and noted after accompanying the

specialist nurses during the measurement of pressure ulcer prevalence.

The results of the measurement of pressure ulcer prevalence were gathered and put into a dashboard. In this dashboard the outcomes of the measurement of pressure ulcer prevalence that day were shown. There were total results and results per department. Overall, the occurrence of pressure ulcers was lower than the performance of the last measurements 3 months earlier. Together with the day of measurements as a whole, this was received as a success amongst the specialist nurses. The researcher detected that the dashboard showed that there was still a significant amount of materials for preventing pressure ulcers missing in the rooms of patients.

These observational notes were some of the moments and observations the researcher experienced in the case study. These observations stood out of countless other encounters and observations on the operational and strategic level at the ErasmusMC. These observational notes give insight into the case study and provide as the base for the analysis of all the qualitative data that was gathered during the study in the ErasmusMC.

6.2. Analysis

As stated in chapter 4 of this research, the analysis of the open-ended interviews, informal conversations, and observational notes is done with the computer-assisted qualitative data analysis software package Atlas.ti. The software is used to code and categorise the large amount of gathered data. According to Yin, the “key to your understanding of the value of these packages are two words: assisted and tools. The software will not do the finished analysis on its own, but it may serve as an able assistant and reliable tool” [16]. At first, the researcher analysed the data and coded the data based on the experiences of the case study in the ErasmusMC. Atlas.ti locates the words and phrasing matching the codes in the textual data, counts the incidence or occurrence of the words or codes, and conducts Boolean searches to locate the multiple combinations of codes in the textual data files. Yin describes that this process can be done “iteratively, gradually building more complex combinations, groups of codes, and higher-order concepts” [16]. So next, the researcher used the theory of the multi-level perspective from chapter 5. Here, the landscape developments represent the urgency of the policymakers of the hospital to lower the occurrence of pressure ulcers in the ErasmusMC. The technological niches are the measures (or system innovations) created for preventing pressure ulcers in the hospital. The socio-technical regime can be described as the socio-technical system for preventing pressure ulcers in the ErasmusMC drafted in Figure 5.2. The system elements of the drafted socio-technical system were used to form groups of codes, and create higher-order concepts.

A second statement made in chapter 4 was the analytic strategy for this case study: explanation building. The goal of this strategy is to analyse the case study data by building an explanation about the case. Yin states that “the eventual explanation is likely to result from a series of iterations” [16]:

- Making an initial but tentative theoretical statement or explanatory proposition.
- Comparing the data from your case study against such a statement or proposition.
- Revising the earlier statement or proposition.
- Comparing other details of the case against the revision.
- If doing a multiple-case study, comparing the revision from the first case with the data from a second, third, or more cases, leading to further revisions.
- Repeating this process with the other cases as many times as needed.

The first three points can be seen as the three sub-questions that were drafted and answered in chapter 5 till 7. The fourth point will be answered in the discussion, conclusion, and recommendations of this research. Since this is a single-case study, the fifth and sixth point are not of importance for analysing the data.

Now that the analytic strategy and the analytic tools have been elaborated on, the analysis of the data will be conducted on the code groups created from the drafted socio-technical system for preventing

pressure ulcers in the ErasmusMC. Since the collection of the data was collected in Dutch, the quotations that are used will be written in Dutch. The coding list of textual data can be viewed in Appendix F.

6.2.1. Point of interest

Whilst coding the data in Atlas.ti, and creating higher-order concepts with the drafted socio-technical system, the researcher observed one general point of interest in coded textual data. Some of the initial codes could fit in multiple system elements of the socio-technical system (see Table F.1 in Appendix F). Therefore, it seems that the system elements of the socio-technical system of preventing pressure ulcers in the ErasmusMC are interconnected.

6.2.2. The socio-technical system of preventing pressure ulcers in the ErasmusMC

From the analysis of the qualitative data in this chapter and the visual representation drafted in Figure 5.2, the 10 system elements have been filled with the information gathered in this case study. Therefore, a final visual representation is made of the socio-technical system for preventing pressure ulcers in the ErasmusMC in Figure 6.1.

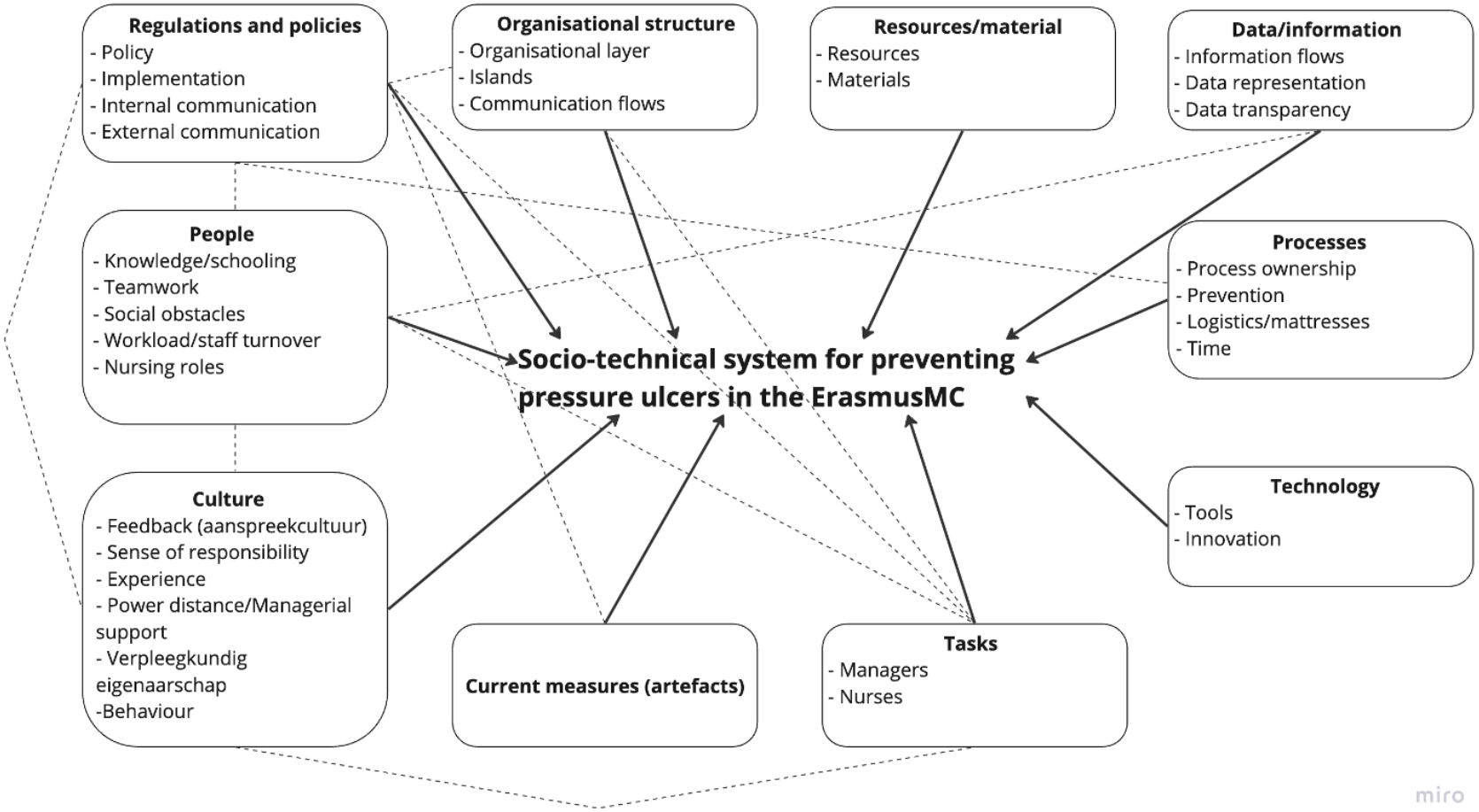

Figure 6.1: Socio-technical system of preventing pressure ulcers in the ErasmusMC

6.2.3. Current measures

The first system element of the socio-technical system of preventing pressure ulcers in the ErasmusMC are the current measures. The researcher collected many comments and opinions on the measures but will only display the current measures that are being applied on the various operational departments in the ErasmusMC. This will be done by showing quotations from the open-ended interviews, and summarising the measures below the quotations.

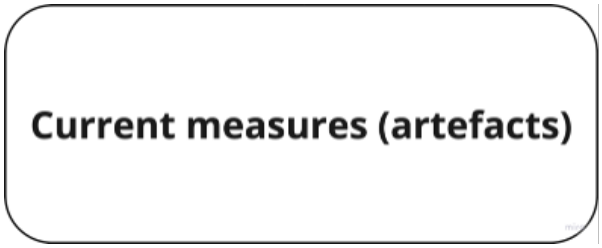

Figure 6.2: The current measures of the socio-technical system

“Wisselligging, uit bed, antidecubitusmatras en goede voeding zijn interventies die gebruikt kunnen worden.”
“Wel kwam naar voren dat eiwitten belangrijk zijn en ook vocht belangrijk is. Daarnaast ook kunnen uitschrijven wat de ziekte specifieke drinkvoeding moet zijn.”

- Repositioning of patient.
- Getting the patient out of bed.
- Anti pressure ulcer mattresses.
- Nutrition (proteins, fluids, and patient specific nutritional drinks).

“Een voorbeeld van een maatregel is het verhogen van het aantal kussens op de afdeling, maar ook klinische lessen geven of casusbesprekingen op de afdelingen. Ook het dagelijks benoemen bij de dag start op de afdelingen. Op deze manier wordt er veel aandacht voor decubitus gevraagd. Er was twee keer per jaar een prevalentiemeting binnen het ErasmusMC uitgevoerd door de wondconsulenten. Nu is dat anders. Dit wordt nu 4 keer per jaar gedaan binnen de afdeling door de eigen aandachtsvelders.”

- Higher number of pillows on the department.
- Providing clinical lessons.
- Discussing case studies of patients with pressure ulcers.
- Mentioning pressure ulcers at start of the day on the operational department.
- Measurement of pressure ulcer prevalence from 2 times to 4 times a year.

“Daarnaast afspraken gemaakt over hoe er gerapporteerd wordt over decubitus, ook afspraken gemaakt over een risicoscreening te maken op verschillende dagen. Er is ook een wond kit gemaakt voor decubitus zodat deze altijd voor handen is.”

- Risk screening on various days.
- A wound kit on every room for pressure ulcers.

“Hiernaast is ook de betrouwbaarheid van de metingen aangepast. Dit verschilde eerst per afdeling hoe elke meting gedaan werd. Nu is er een standaard wat betreft meten onder alle verpleegkundigen via de aandachtsvelders.”

- One measurement standard of pressure ulcers through specialist nurses.

“Met VAR, wondexpertise, aandachtsvelders en verpleegkundige over nagedacht wat helpt bij het goed administreren wat betreft decubitus. Hier is vastgesteld dat het verpleegkundig probleem wordt gebruikt met de klinische blik en dat verpleegkundigen daarnaast nog kunnen terugvallen op de Braden schaal.”

- Using the nursing diagnosis and the clinical view of the nurses for administrating pressure ulcers.

- Next to this, the Braden score can be used by nurses.

“Aan de hand van deze uitkomsten is besloten om compilatiebesprekingen te starten aan de hand van het kompas.”

- Complication discussions for pressure ulcer occurrences.

“De respondent denkt dat een dag uit roosteren niet de oplossing is om ruimte te creëren voor verpleegkundige, maar dat het gecombineerd kan worden op een rustig moment van de dag. Dus creatief met tijd omgaan is het doel.”

- Create and plan time (on quiet moments during a working day) for initiatives and possible solutions for the prevention of pressure ulcers.

“Ketenoverleg was vorig jaar september afgerond en er is nu besloten om met alle disciplines eens in de drie maanden te zitten. De IC is daar ook bij en er wordt gezien dat in sommige situaties dat daar al een begin kan zijn van een complicatie. Door het onder de aandacht te brengen worden er ervaringen gedeeld.”

- A chain consultation with all disciplines to discuss experiences and share information.

“De patiënt krijgt een folder met informatie over decubitus.”

- Give patients a folder with information regarding pressure ulcer prevention.

6.2.4. Culture

The second system element of the socio-technical system of preventing pressure ulcers in the ErasmusMC is culture. The research of Verbeke et al. shows that when “focusing specifically on the term ‘organisational culture,’ scholars reported 54 different definitions” [48]. Since culture is a subject of many disciplines, including anthropology, economics, finance, organisational behaviour, sociology, and strategy, the diverse viewpoints on it unavoidably define it through distinct lenses. So first, the definition of the organisational culture used in this study will be given. The research of Schein conceptualises organisational culture into three layers: basic assumptions, artefacts, and values and beliefs [49]. These three layers will be used to define the organisational culture in the ErasmusMC. From this perspective, various themes can be identified in this system element. These elements will be displayed and substantiated with quotations from the qualitative data.

Figure 6.3: The system element culture of the socio-technical system

Feedback (aanspreekcultuur)
In the context of culture, feedback is about confronting one another regarding performance.

- “Het decubitus probleem is volgens de respondent multifactorieel. Het aanspreken van verpleegkundigen onder elkaar op bepaalde zaken blijft hierbij ook achter.”
- “De norm onder de verpleegkundigen is heel erg verschillend. De aanspreek cultuur is hier ook lastig in. Als er namelijk geen algemene norm is, dan is het ook lastig om elkaar erop aan te spreken.”
- “Het is vaak vrijblijvend onder verpleegkundigen. Die vrijblijvendheid zorgt ervoor dat er vaak niet wordt aangesproken op gedrag op de werkvloer.”
- “Dit is vooral cultuur en gedrag binnen het team. Dit is het grootste probleem. De weerstand van het team tegen bepaalde maatregelen of het aanspreken op gedrag.”
- “Elkaar aanspreken moet gebeuren en dit gebeurt te weinig. Als je niet wordt aangesproken op de taken die je moet uitvoeren als verpleegkundige, dan is er ook weinig verantwoordelijkheidsgevoel.”

Sense of responsibility
- “De respondent vertelt dat bij rondvraag aan het team over materialen die kwijtraken er vaak oorzaken worden gegeven als werkdruk en tijd te kort, maar dat het eigenlijk ontbreekt aan een stukje verantwoordelijkheidsgevoel. De verantwoordelijkheid wordt niet altijd genomen wat betreft de materialen. Daarnaast is het ook lastig te verklaren waarom de spullen kwijtraken, maar het is jammer dat de spullen kwijtraken.”
- “De respondent vertelt dat als het inzicht er niet is bij de verpleegkundige wat voor een effect het kan hebben als bepaalde handelingen of preventiemaatregelen niet worden uitgevoerd, dat de verpleegkundige zich er niet verantwoordelijk voelt. Dit stukje inzicht kan cruciaal zijn voor het begrip en het veranderen in uitvoering en het verhelpen van de weerstand.”
- “De respondent geeft aan dat decubitus een multidisciplinair probleem is waar te makkelijk wordt gekeken naar de verpleegkundige. Ook de fysio, ergo, dokter en inkoop zijn verantwoordelijk.”

Experience
- “De respondent vertelt dat er verschil zit tussen ervaren en jonge verpleegkundige in de vorm van daadkracht en vertrouwen aan het bed van de patiënt. Een ervaren verpleegkundige durft door te zetten om de patiënt uit bed te krijgen ook als die niet wilt. Ook wisselligging wordt vaak vergeten en dit wordt vaak pas toegepast als de stuit al kapot is.”
- “Daarnaast worden verpleegkundigen ook vaak niet verantwoordelijk gemaakt voor bepaalde zorg rondom patiënten. De respondent geeft aan dat dit beter kan en dat er een vangnet ontbreekt voor nieuwe verpleegkundigen die de heftigheid van de complexe zorggevallen helpt verwerken. Het geven van verantwoordelijkheid en eigenaarschap op verpleegkundige onderwerpen zou veel helpen. Dit helpt ook echt de inhoud ingaan en geeft verdieping voor verpleegkundigen.”

Power distance/Managerial support
- “Er zullen altijd verpleegkundigen zijn die het stapje extra zetten, maar ook die het minimale willen doen. De respondent zegt dat het management hierbij een ondersteunende rol kan spelen. Wat accepteren we van elkaar als team en wat niet.”
- “De respondent geeft vaker aan te lopen tegen te weinig aanmeldingen voor de rol van aandachtsvelder. Dit ligt aan meerdere factoren. Eigen verantwoordelijkheidsgevoel van verpleegkundigen, maar ook de urgentie vanuit leidinggevenden (managers) van verpleegkundigen om te sturen op onderwerpen zoals decubitus. De respondent geeft een voorbeeld dat met mail correspondentie om afdelingen te betrekken er al meerdere deadlines en tijd overheen gaat om afdelingen mee te krijgen in meetmomenten of informatieverstrekking wat betreft decubitus. Hiernaast loopt de respondent aan tussen de verschillen onder de managers. Vaak is er koppigheid of ontkenning. Medische casuïstiek kan helpen om het gewenste effect te bereiken bij de managers zodat er urgentie ontstaat.”

- “De respondenten vertellen dat er geen tijd is vrijgegeven voor het werken aan decubitus. Dit is puur eigen tijd en ook als er iets tussendoor komt, dan gaat dat gewoon voor. De vraag wel neergelegd bij de manager. De respondenten geven aan dat de reactie was dat er geen geld is voor extra tijd vrijmaken en alleen voor materialen.”
- “Doordat verpleegkundigen (en anderen) het gevoel hebben dat er niets gedaan wordt met de meldingen die ze maken, maken ze ook geen meldingen meer bij hun managers. Bovendien weten sommigen niet waar ze een probleem moeten melden/aangeven. Volgens de respondent dient dit gedaan te worden bij de manager omdat deze persoon weet waar heen te gaan met het probleem.”
- “De respondent geeft aan dat het vertrouwen in managers op sommige afdelingen niet heel hoog is. In het leiderschap tussen afdelingen zitten veel verschillen. Verpleegkundigen hebben hart voor de patiënt én de zorg, alleen geven ze niet altijd aan als er problemen zijn of als bepaalde processen anders moeten. Ook reageren ze verbaasd als ze worden verteld dat zij met ideeën mogen komen voor het verbeteren van de kwaliteit en de zorg.”

Verpleegkundig eigenaarschap (nursing ownership)

- “De respondent geeft aan dat verandering in verpleegkundig eigenaarschap begint bij een cultuuromslag.”
- “De respondent geeft aan dat de verantwoordelijkheid op meerdere fronten bij de verpleegkundige gelegd moet worden. Nu is de pilot bezig met het dashboard waarin het risico op decubitus kan worden getoond. Er is een stijgende lijn in het verpleegkundige eigenaarschap en hoe verpleegkundigen hun rol invullen. De respondent geeft aan dat er toch wel een verschil in zit onder verpleegkundigen die er echt veel tijd en moeite in stoppen en ook verpleegkundigen die dat een stuk minder hebben.”
- “De respondent vindt decubitus een verpleegkundig item. De verpleegkundige staat aan bed en die is eigenaar van decubitus. De verpleegkundigen zijn allemaal hoger opgeleid en decubitus is onderdeel van die opleiding.”
- “Binnen het ziekenhuis is men ermee bezig om mensen eigenaarschap te laten voelen van het vak wat ze uitoefenen. Hiervoor is goed materiaal nodig en goede scholing, maar belangrijk is dat de verpleegkundige hier ook om durft te vragen als dit er niet is. Die cultuuromslag is cruciaal.”
- “Stimulatie door de goede dingen uit te vergoten en collega’s te belonen wanneer dingen goed gaan. Proactieve houding van de wondzorg consulenten dragen zeker bij aan het eigenaarschap.”
- “Het verpleegkundig eigenaarschap is iets wat van bovenaf in de organisatie vaak gezegd wordt. De respondent geeft aan dat er meerdere facetten onderliggend zijn. Diëtisten, fysiotherapeuten en artsen hebben hierin ook een verantwoordelijkheid in.”

Behaviour

- “Volgens de respondent is het gedrag verpleegkundig eigen en kunnen verpleegkundigen gemakkelijk aangeven wanneer er een probleem is. Na het signaleren van decubitus zetten verpleegkundigen niet de maatregelen in die ze zouden moeten inzetten.”
- “De bewustwording over dit onderwerp helpt al enorm bij het gedrag van verpleegkundigen.”

General cultural remarks

The following quotes indicate the hospital culture in general, but cannot be placed under one of the themes above.

- “Er is ook een soort moeheid in de organisatie, omdat er al heel veel geprobeerd is. De respondent vertelt dat er 3 jaar geleden vooral de focus lag op de productie. Zoveel als mogelijk patiënten op zoveel als mogelijk bedden. Dit is dus ook de cultuur binnen het ziekenhuis. Het systeem ondersteunt de verpleegkundigen en patiënten hierin dus niet als het alleen op productie focust.”
- “De respondent geeft aan dat in de algemeenheid een patiënt een advies van een dokter zwaarder weegt dan een advies van de verpleegkundige. De doctoren zijn zich soms niet bewust van de rol die hierin vervuld kan worden. Deze kaart kan vaker gespeeld worden. Juist om ook de verpleegkundige te ondersteunen.”

6.2.5. People

The third system element of the socio-technical system of preventing pressure ulcers in the ErasmusMC is people. The people in the ErasmusMC are the staff that is divided into the operational staff and strategic staff. Whilst analysing the data, various themes have been identified. Together with quotations from the qualitative data, these themes are shown.

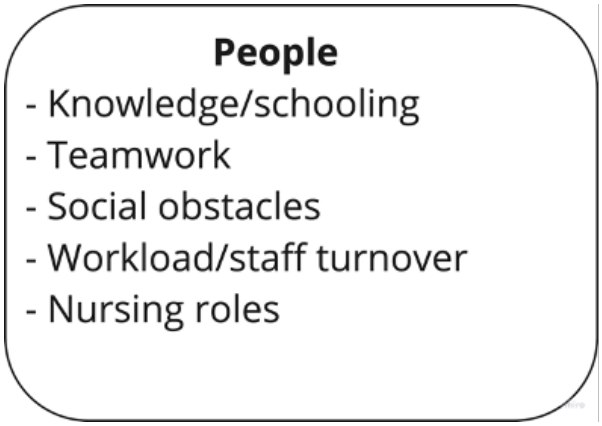

Figure 6.4: The system element people of the socio-technical system

Knowledge/schooling

- "De respondent geeft aan dat de basiskennis wat betreft decubitus er wel is bij verpleegkundigen, maar dat het de vraag blijft waarom dit dan niet wordt toegepast."
- "De aandacht voor de preventie van decubitus zou echt gefocust moeten zijn op kennis. Hier ligt ook het idee om als wondexpertise in te stappen op het moment als er een risico op decubitus wordt vastgesteld bij de patiënt. Hier kan dan worden vastgesteld wat de beste aanpak is om het verder te voorkomen. De respondent vertelt dat aandachtsvelders inmiddels voldoende kennis hebben, maar dat de overige verpleegkundigen nog wel wat te leren hebben. Ook de patiënt kan hier goed worden geïnformeerd. Dus kennis bij de patiënt en kennis bij de verpleegkundige."
- "Nu vooral bezig om er bovenop te blijven zitten en aandacht voor het onderwerp te creëren. Vaak komen er ook weinig mensen opdagen bij klinische lessen. Meestal maar 8 of 10 mensen op een team van 120 mensen."
- "Het belangrijkst is een stukje kennis over decubitus, de benodigdheden voor het behandelen en het voorkomen van decubitus. Ook is de kennis van de beschikbaarheid van tools binnen het ziekenhuis belangrijk. Het is onmogelijk om te verwachten dat een verpleegkundige van elk probleem bij een patiënt alle kennis heeft, dat is te veel om te onthouden."
- "Vroeger erg verwend geweest met Dolphin matrassen, hiermee was er nooit decubitus. Volgens de respondent ligt het een groot deel aan de matrassen, zeker ook een deel aan de kennis van de verpleegkundigen, maar de matrassen spelen een erg grote rol."
- "Het lesgeven over decubitus heeft volgens de respondent maar tijdelijk effect, terwijl verantwoordelijkheid geven voor decubitus aan de verpleegkundige en laten zien wat het voor effect heeft op het gehele verblijf en de kosten in het ziekenhuis beter zou werken."

Teamwork

- "De respondent vertelt dat vorig jaar is afgesproken dat op alle specialismes, dagbehandeling, cardiologie etc. de patiënt een folder krijgt met informatie over decubitus."
- "Het aanspreken van elkaar is een algemeen probleem en respondent heeft daar geen verklaring voor, de intentie van eenieder is om goed met elkaar te werken en respondent gelooft in deze goede samenwerking ook als je elkaar aanspreekt."
- "Dit komt mede door de angst om de patiënt te draaien dat er dan complicaties komen. Mensen zijn hier huiverig voor en dan moet je de mensen meenemen om het wel te doen en is dit niet mogelijk dan ontstaat er decubitus."

- “Bij de preventiemaatregelen worden volgens de respondenten voornamelijk de fysio, verpleegkundigen, wondconsulent, diëtisten etc. betrokken en de artsen zelf te weinig. De communicatie hiervoor komt eigenlijk altijd vanuit een observatie vanuit de verpleegkundige. Alleen de fysio kan het materiaal voor bijvoorbeeld speciale kussens of een stoel regelen, wat volgens de respondent eigenlijk een onnodige omweg is die makkelijker zou moeten kunnen. De arts wordt ook op de hoogte gesteld van de decubitus, dit lijkt volgens de respondent de artsen weinig te boeien/interesseren. Een verpleegkundige is hiermee een spin in het web, waardoor het erg belangrijk is dat de verpleegkundige ook daadwerkelijk de verantwoordelijkheid hiervoor voelt.”
- “Als laatste vertelt de respondent dat de motivatie voor het onderwerp lastig is. Er was een periode dat wondexpertise er helemaal klaar mee was. Weer tot leven gebracht door in gesprek te gaan met alle betrokkenen.”
- “Het belangrijkste hier is dat er een luisterend oor voor de verpleegkundige is. Een verpleegkundige moet eerst begeleid worden en de juiste tools krijgen. Managers zouden toegankelijk hiervoor moeten zijn en vertrouwen geven aan verpleegkundigen en het gevoel geven aan de verpleegkundige serieus genomen te worden. Hiernaast is het ook af en toe lastig om de grenzen aan te geven als verpleegkundige.”
- “Verpleegkundigen moeten problemen durven op te lossen en de ondersteuning te vragen die ze nodig hebben. Hiertegen over staat, dat de manager ook de ruimte moet geven voor een verpleegkundige om het eigenaarschap toe te eigenen. De verpleegkundige is de vakinhoudelijke expert en de manager wordt te vaak probleemeigenaar.”

Social obstacles

- “De respondent vertelt dat het wisselen van de patiënten echt heel belangrijk is. Dit gaat toch nog vaak mis, waar patiënten soms zelfs dagen achter elkaar in het bed ligt. Vaak wil de patiënt ook niet. Het is te pijnlijk of geen zin. In hoeverre ga je de discussie aan met de patiënt en hoeveel tijd wil je er als verpleegkundige in steken naast alle andere taken op een dag.”
- “De respondent geeft aan dat er een sociale barrière is. Bij oudere mensen gaat het meer om de tijd, het duurt lang om een oudere te wassen en te helpen waardoor niet alles meer wordt gecheckt omdat deze weer door naar de volgende moet.”

Workload/staff turnover

- “De zorg is intensief en kan niet met alleen 1 verpleegkundige. Veel doorloop van patiënten, waardoor de zorg uitdagend is. Hier kan het voorkomen dat bepaalde dingen worden vergeten tijdens de zorg en dan niet de volgende dag worden opgepakt. Wisselligging wordt dan vaak vergeten.”
- “De respondent geeft aan dat het probleem van verloop lastig is. Sommige afdelingen zijn erg groot met veel verschillende patiënten. Als verpleegkundige kan je van de een op de andere dag ook verantwoordelijk zijn voor andere patiënten.”
- “De respondent vertelt dat de functie van teammanager goed onder de loep wordt genomen. Deze verdrinken wel eens in het werk en eigenlijk moeten die bezig zijn met het ondersteunen van het team.”
- “Het verloop onder de verpleegkundigen is een remmende factor bij de kennisoverdracht wat betreft decubitus. Op de afdeling zitten veel acute zorg gevallen, waardoor het lastig wordt om dit ook aan te kaarten. Hierdoor is controleren op de huid van patiënten bijvoorbeeld soms lastiger, omdat andere zaken meer prioriteit hebben.”
- “Veel doorloop van patiënten, waardoor de zorg uitdagend is. Hier kan het voorkomen dat bepaalde dingen worden vergeten tijdens de zorg en dan niet de volgende dag worden opgepakt. Wisselligging wordt dan vaak vergeten.”
- “De instelling is nu ook lastig, doordat er gedacht wordt dat iemand toch binnen 2 jaar weg is. Dat maakt het moeizaam om maatwerk te leveren per verpleegkundige. Er wordt ook vaak niet meer omgekeken naar mensen die meelopen op de werkvloer, aangezien dit heel vaak gebeurt. Soms stellen mensen zich ook niet eens meer voor. Niet iedereen, maar dit gebeurt ook nog tijdens het meelopen van de respondent op afdelingen.”

Nursing roles

- “Aandachtsvelders zijn ook verpleegkundigen die andere verpleegkundigen kunnen aanspreken. Deze professionals moet je in hun kracht zetten. Die zijn verantwoordelijk voor onderwerpen zoals decubitus. Leidinggevenden zeggen nu dat deze aandachtsvelders hiervoor genoeg tijd krijgen, terwijl dit in de praktijk vaak nog niet helemaal zo is. Nu zoveel als mogelijk deze aandachtsvelders verantwoordelijk maken voor een eigen onderwerp en hier ook in ondersteunen.”
- “Aandachtsvelder zijn is eigenlijk erg uitgebreid. Zelf scholing volgen, meetings van wondzorgexpertise met alle nieuwe informatie, deze informatie doorspelen aan eigen afdeling, klinische lessen geven, verantwoordelijkheid afleggen aan managers, een decubitus en IAD week om aandacht te vragen, prevalentiemetingen, de resultaten delen van deze meting onder de afdeling en reflecteren op deze resultaten. Meedenken met wondexpertise vanuit de aandachtsvelders rol over nieuwe maatregelen en implementaties. De rol van aandachtsvelder is een verbinding tussen de afdeling en de manager.”
- “De respondent legt uit dat als aandachtsvelder wel een bepaalde motivatie er moet zijn om dingen te verbeteren op de werkvloer. Dit werkt als een drive om verbetering in teams door te kunnen zetten. Deze leveren namelijk vaak weerstand op verandering.”
- “De respondent vertelt dat de nieuwe rol van regieverpleegkundige een vreemde naam heeft. Wel goed dat de functie er komt. De respondent zet nog wel vraagtekens bij de invulling van de functie. In de regiefunctie zit niet alles. Er is 4 uur per week voor om extra taken uit te voeren naast het werk als verpleegkundige en ook aanspreekpunt te zijn. Het idee is een goed idee, maar met de invulling is de respondent het niet helemaal eens.”
- “De seniorverpleegkundige trekt de kar en verzameld de mensen die hierbij kunnen ondersteunen. Niet als politieagent fungeren, maar wat is er nodig om het werk goed te doen.”

6.2.6. Regulations and policies

The fourth system element of the socio-technical system of preventing pressure ulcers in the ErasmusMC is regulations and policy. During the analysis of the data, it was found that regulations were not mentioned. Therefore, the analysis will only concern policies. Together with quotations from the qualitative data, various themes are displayed.

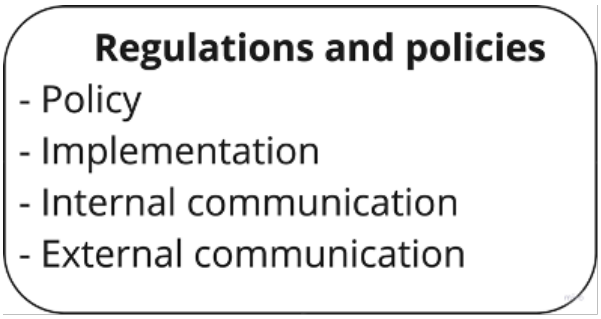

Figure 6.5: The system element regulations and policies of the socio-technical system

Policy

- “Iedereen is betrokken bij zo een cultuuromslag. Beginnend bij de raad van bestuur, de managers en de kwaliteitsadviseurs. De kwaliteitsadviseurs zijn te weinig zichtbaar. Deze zijn verantwoordelijk voor het beleid en de uitvoering hiervan. De beleidsadviseurs zouden meer in beeld moeten komen bij de verpleegkundigen. Dit is ook een van de oorzaken van het slechte invullen van de Waterlow score.”
- “De richtlijn van decubitus is nog niet heel breed wat betreft fysiotherapie en voeding. Dit vergt ook een nieuwe blik binnen het ErasmusMC.”
- “Er zijn richtlijnen en preventiemaatregelen, dus de respondent denkt niet dat de aandachtsvelder mist binnen decubitus. De respondent wijst op de strategie die mist. Dit komt doordat het schrijven van het beleid zo “hoog” en overkoepelend mogelijk in de organisatie wordt gedaan zodat het toepasbaar is voor alle afdelingen (omdat deze erg verschillen onderling). Hierdoor wordt

binnen elke afdeling een andere invulling gegeven aan het beleid en is dit ook afhankelijk van welk management en kwaliteitsteam er zit. Hierdoor is interpretatie van het beleid uiteenlopend op elke afdeling."

- "De respondent geeft aan dat er voor de verpleegkundige een beleid is vanuit de organisatie die ondersteunend is, maar dat dat hieruit ook de ruimte is voor de verpleegkundige om aan te geven wat anders of beter kan."
- "De respondent geeft aan dat de stuurgroep van decubitus zwaar "over the top" is en deze slaat volledig de plank mis doordat iemand van de raad van bestuur in de stuurgroep decubitus zit. Hier zouden verpleegkundigen in moeten zitten. Met een fysio en diëtist en dergelijke. Voor het bekend maken van het probleem (creëren van awareness) was het handig en voor de implementatie van de bedden ook, maar nu is het overbodig. De verpleegkundigen moeten meer de noodzaak zelf voelen en dan zal decubitus nooit meer zo groot escaleren als nu. De stuurgroep is een mooi voorbeeld van iedereen dit in het gat springt behalve de verpleegkundigen zelf. In een stuurgroep zouden de aandachtsvelders het voor het zeggen moeten hebben en de vergadering leiden, de rest van de inzittenden is faciliterend."
- "Er is een protocol voor decubitus maar op de OK hebben ze niets om decubitus te voorkomen. Bij de operatie letten ze hier niet extra op omdat ze zeggen dat de matras de beste is en daarom hoeven ze niets extra's te doen."
- "De respondent vertelt dat er uit het ketenoverleg naar voren was gekomen dat uit metingen op de afdeling er te veel focus lag op het behandelen van decubitus, maar niet op de preventie ervan. Hier kan de respondent zich niet in vinden, omdat dit eigenlijk niet de werkelijkheid weerspiegelde. Dit vindt de respondent interessant, aangezien er zoveel kleine dingen worden geprobeerd wat betreft decubitus, maar dit dan niet samenkomt in zo een overleg waar hogere disciplines bij zitten."
- "De respondent geeft aan dat de eerdere aanpak van 'top down' niet helemaal werkte en er nu meer op wordt ingespeeld op de 'bottom up' aanpak. Dus de focus leggen op de aandachtsvelders en die in hun kracht zetten is een goede ontwikkeling waar nog veel te halen is."

Implementation

- "De respondent vertelt dat de verpleegkundigen vooral last hadden dat de storingsmeldingen op het bed niet gemeld werden. Met de implementatie van de nieuwe bedden, komt er een storingssticker onder het display waardoor een storing snel gemeld kan worden. Deze kleine dingen maken toch een efficiëntie slag die wel nodig is."
- "De respondent geeft aan dat er acht hoofdoelstellingen zijn wat betreft het implementeren van de nieuwe bedden. Elke patiënt heeft het juiste matras en bed.Onder deze hoofddoelstellingen vallen dus projecten om deze te realiseren waarvan decubituspreventie er bijvoorbeeld een is."
- "Een implementatiecoach ontbreekt ook in het ziekenhuis die het implementatieproces van initiatieven kan waarborgen. Er is vaak nog een te groot gat tussen het beleid wat wordt gemaakt en de uitvoering hiervan. Hierin wordt ook niet iedereen bereikt. Dit komt ook doordat de organisatie zo groot is."
- "De respondent geeft ook aan dat het maatregelen pakket tegen decubitus nu ook erg streng en veel is. Dit kan te veel zijn om te implementeren en wordt puur gedreven om de cijfers maar te reduceren. De respondent zegt vooral te richten op welke maatregelen wel toegevoegd kunnen worden en welke niet. Centraal worden de maatregelen ziekenhuis breed bedacht, maar je moet wel kijken wat werkbaar is en de wondbehandelingsgroep moeten hierin aangeven wat werkbaar is en wat niet."
- "Implementaties van kleine veranderingen zijn mogelijk maar blijken opnieuw ook weer niet waterdicht te zijn (vinkje voor het invullen van de Waterlow score op maandag, en donderdag opnieuw maar dan staat het vinkje er van maandag nog)."
- "Maar met alles wat je moet implementeren ontstaat het probleem of je wel iedereen bereikt."
- "Volgens respondent is er voor het implementeren van maatregelen geen eenduidige manier, je moet verschillende interventies bedenken en bedenken in welke setting zit ik."
- "De respondent vertelt ook over de informatie wat betreft implementaties vaak slecht is. Vaak veranderen er dingen waarover niet wordt geïnformeerd. Een voorbeeld is de regieverpleegkundige.

De respondent heeft geen idee wat hiervan de bedoeling is en is ook niet op de hoogte gesteld. Ook rondom decubitus veranderen er dingen die dan pas later worden toegelicht. Twee weken geleden werd er aangegeven dat ineens personeel geschoold moest worden voor het implementatiemoment over een dag. Dit is te kort dag om goed te implementeren. Het gebeurt nog te vaak dat er dingen ad hoc worden gebracht waardoor initiatieven ook vaak stranden."

Communication: internal and external

- "Een voorbeeld hiervan is dat er al 5 jaar geen kussens in huis aanwezig zijn en dit wordt opgelost met dekbedden. Er is dan dus geen communicatiestroom naar boven en dat werkt niet helemaal. De respondent geeft aan dat de afstand tussen verpleegkundige en beleidsmaker lang heel groot was, maar tegenwoordig steeds kleiner wordt. De aandachtsvelders zijn zich hiervan wat meer bewust dan de verpleegkundigen."
- "Op afdelingsniveau wordt er volgens respondenten niet gespard over dit probleem. Er is volgens de respondent weinig contact met buiten de muren. Dit zou volgens de respondent wel kunnen helpen in het gezamenlijk oplossen van dit probleem. Wel wordt er volgens de respondent over gesproken in de adviesraad Erasmus breed."
- "Onderling tussen afdelingen moet er communicatie zijn zodat er geleerd wordt van elkander."
- "Hiernaast wordt er weinig geschakeld met andere ziekenhuizen. De respondent geeft aan dat er wel is ingespeeld op een artikel van een ziekenhuis in Deventer waar beweerd werd dat decubitus weg was. Hier kwam naar voren dat de hele wondzorg naar voren was gehaald. In het proces werd meteen ingestapt wanneer er een risico op decubitus was vastgesteld. Dit is bijvoorbeeld heel interessant voor het ErasmusMC. De voorkeur om naar andere ziekenhuizen te kijken zou liggen bij andere academische ziekenhuizen, doordat de complexiteit van patiënten vergelijkbaar is. De respondent geeft aan dat het risico op decubitus hierdoor al hoger is door de complexiteit van de patiënt."
- "Ook vertelt de respondent dat er wel gekeken is naar andere ziekenhuizen wat betreft strategieën en methodes. De aandachtsvelders zijn een concept overgenomen uit Maastricht. Hier zijn de cijfers ook lager wat betreft decubitus."
- "De cijfers uit verschillende medische centra zijn ook opgevraagd, maar dit is lastig te vergelijken want elk ziekenhuis is anders."
- "Wat betreft communicatie met andere ziekenhuizen zou het beter kunnen. Bij navraag binnen andere ziekenhuizen gaven veel ziekenhuizen aan decubitus niet te hebben of een richtlijn hiervoor. Het LUMC kon wel een richtlijn delen en dat wordt ook gedeeld. Andere ziekenhuizen zijn ook geïnteresseerd naar hoe het ErasmusMC ermee om zal gaan."

6.2.7. Organisational structure

The fifth system element of the socio-technical system of preventing pressure ulcers in the ErasmusMC is the organisational structure. Various themes are identified, and displayed with corresponding quotations from the qualitative data.

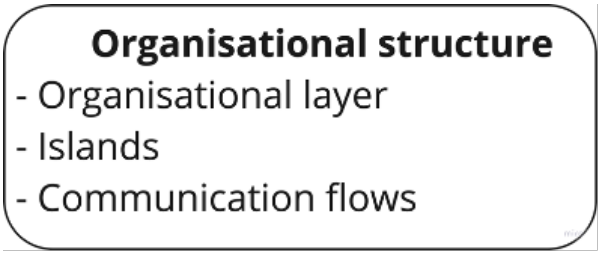

Figure 6.6: The system element organisational structure of the socio-technical system

Organisational layers

- "De respondenten geven ook aan dat het af en toe erg lastig is om mensen te bereiken binnen het ErasmusMC. De agenda's zitten vol of de telefoons worden niet opgenomen. Hoe hoger in de organisatie, hoe moeilijker iemand te bereiken is. Hier krijgen de respondenten het gevoel dat er een remmend effect is binnen projectwerk."

- “Hierbij is het vreemd dat de opdracht vanuit de top van de organisatie moet komen wat een afwachtende houding geeft in de verschillende lagen van de organisatie. De respondent geeft aan dat dit haaks staat op de regie die verpleegkundigen in de organisatie zouden moeten hebben.”
- “De respondent geeft aan dat de feedbackloop erg gelaagd is. Dit begint bij de aandachtsvelders die getraind zijn. De prevalentiemetingen vanuit decubitus worden gedaan door verpleegkundigen en worden begeleid vanuit kwaliteit en patiënt zorg en een onderzoeker. De resultaten worden besproken op directieniveau. Dit komt weer terug in het overleg met de thema directeur en de verschillende disciplines en vervolgens komt dat weer terecht bij de aandachtsvelders.Hierbij is het ook belangrijk dat op directieniveau ook de personen worden aangesproken op die waarborging.”
- “De respondent geeft aan dat het lang duurt voordat dingen geregeld kunnen worden vanwege de gelaagdheid binnen de organisatie. Ook iets kleins leren binnen het team van verpleegkundigen is lastig, aangezien niet iedereen in een keer bereikt kan worden. Initiatieven kunnen ook stuklopen door de gelaagdheid: een teammanager kan akkoord geven, maar een sectormanager kan dat niet geven door bijvoorbeeld financiële restrictie en dan stopt het.”
- “Daarnaast valt het de respondent op dat de managers het altijd erg druk hebben en van vergadering naar vergadering lopen. Het is dus ook lastig om tijd te vragen van de managers en er is vaak wrijving tussen personeel en management. Vooral met het afdelingshoofd is dit lastig. Daar gaan initiatieven ook vaak in verloren.”
- “De respondent vertelt dat het erg prettig is dat de themadirecteuren op een lijn zitten wat betreft de aanpak van decubitus. Dit gaat ook nog goed bij de sectormanagers, maar dit stokt dan bij de zorgmanagers. Die moeten de tijd inplannen en vrij maken, maar hebben de urgentie vanuit de thema directeuren dan niet ontvangen.”
- “De respondent vertelt dat het risico er is dat wat er bovenaan bedacht wordt, niet raakt wat er met de patiënt gebeurt aan bed.”
- “De respondent geeft aan dat de gelaagdheid in de organisatie wel lastig kan zijn. Het ziekenhuis is een grote organisatie en de prioriteitenlijst aan de top is anders. Hier kan decubitus bijvoorbeeld niet hoog op het lijstje staan, waardoor de noodzaak en prioriteit naar beneden het effect verliest.”
- “De respondent vertelt dat het wat betreft tijd en planning af en toe lastig is om met bepaalde dingen te wachten of uit te voeren. Soms moeten dingen veel te snel worden doorgevoerd vanuit hoger af. Hier liever de tijd voor nemen om iets te implementeren en juist in te passen per afdeling. Dit kan niet altijd binnen een maand of een aantal weken.”

Islands

- “Door de eilanden (verschillende afdelingen) binnen het ziekenhuis is het lastig om concrete afspraken te maken en keuzes te maken zodat facilitaire zaken duidelijk zijn en er een bepaald verwachtingsmanagement naar elkaar toe is. De respondent geeft aan dat dit nog niet helemaal goed verloopt, maar dat de weg hiernaartoe is ingezet.”
- “De respondent vertelt dat het aantal sectormanagers teruggebracht zijn van vijf naar twee, zodat het aantal eilandjes verminderd wordt. Deze zijn verantwoordelijk voor 12 teammanagers. Dit zorgt voor helderere communicatie en meer verdeling van de informatie onder de afdelingen. Deze kortere communicatiestromen helpen, alhoewel er binnen de grote organisatie gelaagdheid zal blijven. De teammanager kan de verpleegkundigen verantwoordelijk houden en de sectormanagers kunnen de teammanagers verantwoordelijk houden. De sectormanagers kunnen vervolgens de themadirecteur informeren over de stand van zaken over bepaalde onderwerpen zoals decubitus.”

Communication flows

- “Er is geen overleg over decubitus met de verschillende verdiepingen, dit zou wel bij kunnen dragen aan oplossingen maar overleggen om te overleggen heeft niet respondent voorkeur. Respondent gaat er van uit wanneer er op andere verdiepingen m.b.t. decubitus iemand het gouden ei heeft gevonden zij dat ook wel zouden willen horen.”
- “In het ziekenhuis is dit een raad van bestuur, themadirecteuren, sectormanagers en managers team waarbij je moet hopen dat ze elkaar goed informeren maar respondent heeft de ervaring dat dit niet altijd goed gaat en dan zijn ze ook nog eens heel verschillend in wat ze belangrijk vinden.

Sommige zitten op het geld andere op productie en weer anderen vinden mensen wel belangrijk wat lijkt dat er geen eenduidige visie is wat het niet makkelijk maakt en het zou zeker helpen als dit er wel is. Er zou ook wel een laag tussenuit kunnen wat de communicatielijnen korter maakt waardoor zaken sneller geregeld zullen worden."

- "De uitwisselbaarheid van bedden en matrassen tussen verschillende afdelingen is bijvoorbeeld lastig aangezien er uitzonderingen zijn tussen de IC en de Thorax waardoor het op tijd van neerzetten van de juiste bedden op patiëntenkamers moeilijk maakt. Het communiceren tussen de afdelingen blijft dit proces bemoeilijken."
- "De respondenten vertellen dat het praktische gedeelte een uitdaging zal zijn. Het is een groot ziekenhuis en de communicatie is langzaam. Vaak moeten de respondenten zichzelf remmen in hun enthousiasme, omdat het allemaal wat langzamer gaat dan verwacht. Communicatie is de voornaamste reden waardoor het langer duurt."
- "Een concreet voorbeeld is dat een teammanager aangaf dat de cijfers niet gedeeld werden. Terwijl juist de managers die cijfers horen te delen. De respondent verwondert zich over deze communicatiestroom. Ook vraagt de respondent zich af hoe de sectormanager en de teammanager zichzelf zien ten opzichte van de afdeling. Hoe kan de wisselwerking hiertussen zo optimaal als mogelijk zijn om de afdeling goed te laten functioneren? En hoe kunnen functies binnen het ziekenhuis elkaar het beste informeren? Soms wordt dat ook wel eens vergeten, bijvoorbeeld bij de kwaliteitsadviseurs."
- "De respondent vertelt dat het erg prettig is dat de themadirecteuren op een lijn zitten wat betreft de aanpak van decubitus. Dit gaat ook nog goed bij de sectormanagers, maar dit stokt dan bij de zorgmanagers. Die moeten de tijd inplannen en vrij maken, maar hebben de urgentie vanuit de thema directeuren dan niet ontvangen."

6.2.8. Resources/material

The sixth system element of the socio-technical system of preventing pressure ulcers in the ErasmusMC is the resources/material. The missing of materials is mentioned above in the observational notes. The quotations found in the qualitative data support this observation. Therefore, this system element is divided into two themes: resources and material.

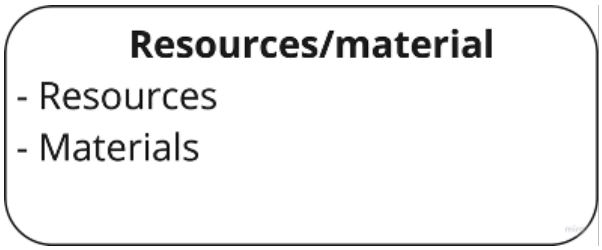

Figure 6.7: The system element of resources/material of the socio-technical system

Resources

- "De respondent geeft aan erg blij te zijn met de aandacht die er is voor decubitus en het budget wat ervoor is vrij gemaakt. De nieuwe matrassen die komen kunnen goed helpen bij tijd wegnemen van de patiënten om met decubitus bezig te zijn."
- "Ook vertelt de respondent over wat opvalt bij de verpleegkundigen. Concrete voorbeelden zijn het kwijtraken van de Myco's en het kwijtraken van polsbandjes."
- "Hiernaast is ook de traagheid van HiX en het optimale gebruik hiervan ook een struikelblok."
- "Het activiteitenplan rondom de patiënt zou hier bijgehouden moeten worden, maar niet iedereen houdt zich eraan. De middelen zijn er wel, maar niet iedereen gebruikt die middelen consistent."
- "Ook escape rooms voor informatieverspreiding, de wisselliggingsklok voor de houding wisselen van de patiënt en inzetten van de barrière crème zijn voorbeelden waarop afdelingen inzetten."
- "Het ErasmusMC schaft vaak de goedkoopste optie aan waardoor het uiteindelijk niet werkbaar is of juist op lange termijn duurder is. Bij HIX bijvoorbeeld werkt niet de uitgebreide versie, maar een oudere, waardoor opties die handig zijn voor verpleegkundige niet mogelijk zijn."

Material

- “De respondent geeft aan dat er zorgen zijn over de materialen. Zitkussens zijn verdwenen op elke afdelingen. AD-kussens ontbreken ook vaak op afdelingen.”
- “Ook is naar voren gekomen dat materialen kwijtraken zoals kussens. Deze worden dan niet aangevuld en verpleegkundigen gingen dus uit noodzaak bijvoorbeeld handdoeken gebruiken. Het aanvullen hiervan gaat niet makkelijk, want een kleine aanpassing sijpelt wel door in een hoop lagen van de organisatie.”
- “De respondent geeft aan dat er veel te doen is om de materialen. Het bestellen van antidecubitusmatrassen duurt lang of kan niet of het lukt niet en dan moet er uitgeweken worden naar andere oplossingen. Ook de zitkussens is een probleem. Heel veel materialen raken ook kwijt. Naast verspillingen heeft het invloed dat het er dan niet is op de momenten dat het nodig is. Als er zieken zijn bij facilitair dan kan het voorkomen dat de voorraden niet worden aangevuld. Dan moet er creatief worden geshopt bij andere afdelingen.”
- “Er is een tekort aan materiaal, op dit moment zijn we daar mee bezig. Bepaalde kussens zijn nodig voor patiënten die uit bed moeten komen maar terecht komen op een harde stoel. Door het ontbreken van speciale (AD kussens) heeft het geen zin om mensen uit bed te halen. Alle afdelingen zelf moeten actie ondernemen in plaats van dat alles centraal wordt opgepakt.”
- “Ook heeft het te maken met materialen. Alleen draaien lukt al bijna niet, dus betere materialen zoals kussens om beter te kunnen draaien zou ook een oplossing zijn. Hierdoor zou er makkelijker vaker gedraaid kunnen worden als een verpleegkundige alleen is.”
- “Een hulpmiddel tegen decubitus op de hielen waren avolonssloffen, een soort moonboots. Deze zijn helaas alleen voor de mensen op een bepaalde afdeling omdat ze te duur werden voor op alle afdelingen. Dit heeft het management besloten. Deze soort moonboots worden gemist omdat deze goed helpen tegen decubitus.”

6.2.9. Data/information

The seventh system element of the socio-technical system of preventing pressure ulcers in the ErasmusMC is data/information. The themes that are identified in the qualitative data are: information flows, data representation, and data transparency. These themes are elaborated on with matching quotations below.

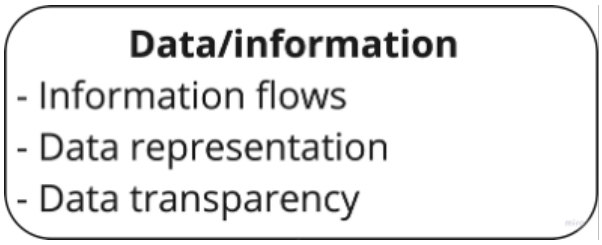

Figure 6.8: The system element of data/information of the socio-technical system

Information flows

- “De respondent vertelt dat het meten van de gegevens niet werd teruggegeven onder verpleegkundigen en dat het hier ook niet altijd even makkelijk gaat. Informatie komt vaak te hoog over, maar met de prevalentiemeting helpt bijvoorbeeld met het een op een terugkoppelen naar de aandachtsvelders. De informatie moet dus op de ladder van boven en naar beneden goed doorloopt. Momenten inplannen om de informatie te bespreken en toe te lichten helpen hierbij.”
- “Nu zijn het ook veel veranderingen in een keer in plaats van geleidelijke implementatie van de nieuwe maatregelen. Er is bijvoorbeeld nieuwe barrière crème ingevoerd. Die was er eigenlijk al en de werking ervan is anders. De informatieverspreiding loopt vaak niet soepel hierin.”
- “Met de nieuwe matrassen waarop iedereen getraind moet worden in reanimeren. De respondent geeft aan hier niet over geïnformeerd te zijn, maar alleen via een congres gehoord te hebben dat dit moest gaan gebeuren. De informatiestroom is vaak heel troebel. De respondent geeft als voorbeeld dat ze als aandachtsvelder zijn opgegeven als key user van de bedden, maar verder

geen informatie te hebben ontvangen. Dit is blijven liggen bij de manager. De respondent vertelt dat het frustrerend is dat telkens weer op hele korte termijnen zaken zoals trainingen naar voren worden geschoven. Dit maakt het lastig om voor te bereiden en in te plannen."

- "De respondent vertelt ook verbaasd te zijn dat de wondexpertise ook niet alles weet. Een voorbeeld zijn de nieuwe matrassen. Wondexpertise gaf aan dat dit nog lang zou duren en ineens werd het over 2 weken geïmplementeerd. De respondent verbaast zich over deze informatiestroom."
- "De respondent vertelt dat het gedrag van de verpleegkundige is de oorzaak wat niet gemakkelijk in een dag is opgelost, en ook niet met een tool. De respondent dat het makkelijker wordt gemaakt als informatie wat meer geautomatiseerd wordt, zoals bijvoorbeeld "let op verhoogde kans op decubitus bij patiënt..."."
- "Respondent voert geen extern overleg maar heeft wel keten overleg met verschillende verdiepingen wat erg goed is en als er commitment van de mensen is komt er veel informatie los. Voorbeeld uit een overleg is dat er glij zeilen gebruikt worden voor de Acella bedden. Dit zijn hoezen die regelmatig kwijt zijn. Toen bleek dat ze op een andere verdieping deze hoezen ook weer gaan gebruiken maar een onderbouwing of uniforme afspraak hoe dit algemeen te doen is er niet."
- "Er is ook vaak gebrek aan de juiste informatie. Patiënten beseffen ook niet dat ze een risico hebben en wanneer ze meer zouden bewegen neemt dit risico af."
- "Informatie vanuit het ziekenhuis betreffende decubitus komt echter wel terug via verpleegkundige op afdeling, rapportages en prevalentiemetingen."
- "De respondent legt uit dat een stuk feedback naar de verpleegkundige mist wanneer een probleem wordt aangekaart. Het ontbreekt aan de informatie wat met een probleem wordt gedaan, wat de uitkomst is en wat de overwegingen zijn geweest."

Data representation

- "De respondent vertelt dat in de huidige situatie absolute cijfers gemeten worden, maar dat dat de respondent weinig zegt over de situatie rondom de cijfers. Wat leidt er precies tot deze cijfers?"
- "Ook consequenties aan slechte cijfers over decubitus op de afdeling hangen zou kunnen helpen om meer bewustwording en verantwoordelijkheid te creëren. Of een aandachtspunt maken hoe het probleem opgelost gaat worden en elke week de cijfers verbeterd kunnen worden. Gezien verpleegkundigen volgens de respondent ook graag goede zorg willen leveren, maar dit pas met cijfers en consequenties gaan voelen. Kortom eigenaarschap te creëren voor het probleem. Dit kan volgens de respondent via teammanagers die hier leiderschap in geven en de cijfers te delen met de vraag hoe dit opgelost gaat worden."
- "De respondent vertelt dat de data belangrijk is. De prevalentiemeting is goede data, maar wel een momentopname. Betrouwbare data is met name belangrijk. Op de IC nu vooral bezig met dashboards. Hierin is het cruciaal dat de data betrouwbaar is, want anders worden er verkeerde conclusies getrokken. De data moet zuiver zijn. Aan de hand van de data wordt namelijk gemeten of het goed gaat binnen het ziekenhuis. Als de data kloppen, dan kan je ook gericht handelen op die data."

Data transparency

- "De transparantie over zaken is afhankelijk van de manager, en in hoeverre een manager aan de benodigde informatie kan komen. Een voorbeeld hiervan is dat, een collega zelf niet de informatie kon verkrijgen en toen heeft besloten zelf alle metingen uit te voeren."
- "Transparantie over cijfers zou hier volgens de respondent een oplossing voor kunnen zijn. De teammanagers zouden deze cijfers door moeten sturen."
- "De verpleegkundigen hebben geen inzicht wat het handelen en de beslissingen die ze maken doet. Er is daarentegen wel een tevredenheid enquête die laat zien hoe het gaat. De uitkomsten van deze enquête worden alleen gedeeld met het managers team, maar krijg je niet mee als verpleegkundige. Afhankelijk van het management en hoe transparant ze zijn, wordt bepaald wat je als verpleegkundige wel en niet te horen krijgt van het patiënt tevredenheidsonderzoek. Er moet meer bewustwording gecreëerd worden op een werkbespreking, met de uitkomsten van de enquête, wat goed gaat en minder goed gaat. Op deze manier kan dan in samenspraak besloten worden hoe het beter kan. Er is absoluut geen inzicht hoe het er met decubitus voor staat, niet

de aantal gevallen, niet hoe het handelen de cijfers beïnvloed, niks. De zorg en IT moeten beter samenwerken en moeten nog een hoop van elkaar leren."

6.2.10. Processes

The eight system element of the socio-technical system of preventing pressure ulcers in the ErasmusMC is processes. Four themes were found in the analysis of the qualitative data: process ownership, prevention, logistics/mattresses, and time. For the prevention theme, all the quotes found of processes regarding preventing pressure ulcers in the ErasmusMC are displayed. The other quotations for the themes found in the data are shown below.

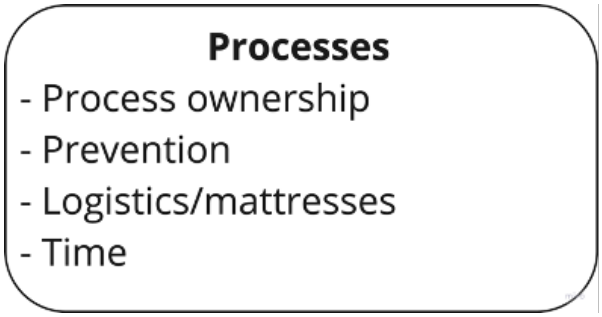

Figure 6.9: The system element of processes of the socio-technical system

Process ownership

- "Daarnaast geeft de respondent aan dat er verder ziekenhuis breed nieuwe bedden zijn doorgevoerd en het proceseigenaarschap is veranderd door de verpleegkundige al aan boord is om decubitus te voorkomen. Proceseigenaar werkt in een niche en is daardoor niet volledig op de hoogte van alles over decubitus."
- "De respondent geeft aan dat er een proceseigenaar is die het beleid maakt wat betreft decubitus. Dit is iemand die samenwerkt met wondexpertise die kijkt naar hoe er met decubitus wordt omgegaan."
- "De respondent is nu proceseigenaar van decubitus. De respondent was het hier initieel niet mee eens, want dit is veel te hoog in de organisatie."
- "Er moet iemand zijn die kan ondersteunen in het doorlopen van de plan-do-check-act (PDCA) cyclus, het opzetten en het vormgeven. Dit moet je niet als enige verpleegkundige doen maar met een groepje, ter ondersteuning en ook om draagvlak te creëren. Mede doordat een verpleegkundige niet alles in zijn/haar eentje kan bedenken/beslissen maar ook omdat anderen het niet meer aannemen."
- "Uit drie verschillende werkbezoeken gebleken dat het ErasmusMC als enige geen verpleegkundige directeur heeft en in een ander ziekenhuis de rol van proceseigenaar op problemen waardoor iemand toegewezen was op een probleem en hiervoor verantwoordelijk was."

Prevention

- "Als wondexpertise erbij komt is er dus meestal al decubitus vastgesteld en dan worden de maatregelen goed ingezet, maar eigenlijk is dit al te laat. De respondent geeft aan dat dit eerder zou moeten gebeuren om decubitus te voorkomen. Met de wonden die zijn ontstaan wordt er ook bewustwording gecreëerd onder de verpleegkundigen."
- "De respondent vertelt over de volgende schakels in het proces van decubitus: de patiënt, verpleegkundige, verzorgenden, de artsen, facilitaire zorgmedewerkers voor materiaal, de beddenleverancier en uiteindelijk de managers. Ook de wondconsulenten voor consult als de afdeling het niet meer weet."
- "Hiernaast vertelt de respondent dat bij het proces van decubitus de aandachtsvelders betrokken zijn, de artsen, de managers, wondexpertise, maar ook de juiste materialen vanuit logistiek."
- "De respondent legt ook uit zelf niet te veel leidend te zijn in het ondersteunen van het proces. Als voorbeeld wordt verteld over dat er soms initiatieven van afdelingen doorkruist worden door

initiatieven vanuit kwaliteit en patiëntenzorg. De respondent geeft aan dat dit niet moet gebeuren, aangezien afdelingen eindelijk zelf bedenken wat er nodig is."

- "Alleen met speciale gevallen zoals ondervoeding wordt de diëtist erbij gevraagd. Nu komt het nog vaak voor dat de diëtist pas in consult wordt gevraagd als de wond al groot is. De respondenten geven aan dat het prettiger zou zijn om eerder te betrokken te kunnen worden om de focus te verleggen op voorkomen."
- "De respondent vertelt in het proces rondom decubitus er begonnen moet worden bij de patiënt. Hierin is voorlichting geven belangrijk over het onderwerp, zodat de patiënt ook kan bijdragen aan de preventie van decubitus. Daarnaast zijn beweging, voeding en gewone dagelijkse zorg belangrijk. Dit zijn de facilitaire zorgmedewerker, dietethiek, fysiotherapie en de verpleegkundige met het overzicht met welke risico's er allemaal zijn. Het doel is ook om die verpleegkundige die preventieve maatregelen te laten inzetten. Sommige verpleegkundigen hebben hier een soort zesde zintuig voor, maar sommige ook niet. In de tweede ring om decubitus zitten de wondaandachtsvelders en het wondexpertise centrum die allemaal moeten voeden aan de verpleegkundige. Hier staat ook het stukje onderzoek naar wat goed gaat en wat verbetert kan worden. In de ring daar weer omheen zit het management. Hier zit het belang ook van het lijnmanagement. Dit is heel belangrijk als je ziekenhuis breed iets wilt veranderen."
- "Elke OK zou dus een taylor made oplossing moeten krijgen, wat generiek zou kunnen werken. Anders krijg je te lange wisseltijden."
- "Ketenoverleg was vorig jaar september afgerond en er is nu besloten om met alle disciplines eens in de drie maanden te zitten. De IC is daar ook bij en er wordt gezien dat in sommige situaties dat daar al een begin kan zijn van een complicatie. Door het onder de aandacht te brengen worden er ervaringen gedeeld."
- "In dossier wordt ook gewerkt met activiteitenplannen maar dat project is twee keer gestrand, nu voor de derde keer opgestart een jaar lang maar het zit er nog niet in. Nu moet in ditzelfde dossier, waar al matig wordt gewerkt met activiteitenplan en moet er ook een verpleegplan gemaakt worden. Respondent maakt zich hier wel zorgen over."
- "Volgens respondent is de keten als volgt: eerst komen de patiënten van de OK, daarvoor komen ze van huis waar ze al langer wachten op de operatie waardoor ze niet de juiste voedingstoestand hebben. Vervolgens worden ze opgenomen en daar moeten ze gescreend worden dat ze het juiste bed krijgen daarna moeten ze naar de OK waarvoor ze misschien al een extra dag nuchter zijn geweest maar de behandeling is uitgesteld en dan ligt de patiënt ook nog eens acht uur lang bij 18 graden op een bed. Dat matras zijn ook al van allerlei dingen op losgelaten, veel mensen wijzen erop dat de matrassen niet meer zoals vroeger zijn op de OK. Respondent weet dat niet of dat waar is. Maar daar begint het al wel. Patiënten komen binnen maar de mensen op de afdeling signaleren het niet want de plekken komen meestal twee dagen later en dan zijn de patiënten alweer weg. Dus al je het hebt over awareness is dat er meestal niet. Blijft een patiënt langer en druk je de plekken niet meer weg ben je eigenlijk al te laat met de behandeling. En als je dan verder terugkijkt kun je concluderen dat de urgentie nog niet helemaal voelbaar is en daar hebben ze allemaal een taak in."
- "Het erbij betrekken van de fysio is een aandachtspunt. De fysio is in staat om te helpen met het door bewegen en het mobiliseren van een patiënt, of de methode om patiënten (snel) uit bed te krijgen. De houdingveranderingen hebben de meeste impact voor het voorkomen van decubitus. Hierin speelt de diëtiek van mensen met ondervoeding en overvoeding ook een rol."
- "Het zou volgens de respondent ook makkelijker zijn als het proces veranderd zou worden naar dat de verpleegkundigen consulten met bijvoorbeeld een fysio of diëtist zelf aan kunnen vragen in plaats van dit via de arts te moeten doen die toch altijd akkoord geeft. Hierdoor ontstaat er volgens de respondent onnodige vertraging in de behandeling van de patiënt."

Logistics/mattresses

- "Op het inkoopproces stagneert het nu bijvoorbeeld met de inkoop van nieuwe kussens. Aankopen is zo gebeurd, maar het logistieke proces erachter moet ook gewaarborgd wordt. Niemand neemt het probleem op zich, waardoor nu iemand buiten de afdeling dit moet oppakken. Alle 'poppetjes' in zo een proces moeten aan."

- “Ook is er vaak gebleken dat er een tekort was aan Acella matrassen en dat ook door de levertijd van 6-8 weken er dan nog meer vertraging op die tekorten was. De aanschaf van de nieuwe Accumax matrassen zorgt hopelijk voor een verbetering in deze tekorten en de verwachtingen zijn hoog. De respondent geeft aan dat de Flexi matrassen niet de juiste matrassen waren om te kunnen gebruiken. Het heeft het ErasmusMC jaren geduurd om de vervanging van deze matrassen te verkrijgen.”
- “De respondent geeft aan dat het doel is om het proces goed te laten verlopen van het uitrollen van de nieuwe matrassen.”
- “Bij het beddenproces zijn verschillende partijen betrokken: Inkoop, juridische zaken, de zorg (verschillende facetten van de zorg). Is het een volwassen bed of een kinderbed? Wondexpertise, de UNIP (unit infectiepreventie), de uitvoerende kracht (beddenlogistiek/facilitair), alle zorgverleners (voor het testen van het bed).”
- “Hiernaast vertelt de respondent dat bij het proces van decubitus de aandachtsvelders betrokken zijn, de artsen, de managers, wondexpertise, maar ook de juiste materialen vanuit logistiek.”

Time

- “De respondent vertelt dat er extra tijd is vrij gemaakt in de vorm van 8 uur per maand voor de aandachtsvelders omdat decubitus nu erg urgent is. Over een jaar evaluatie of die tijd nog steeds nodig is. Daarnaast heeft het ook een jaar geduurd om deze tijd te krijgen.”
- “Bij oudere mensen gaat het meer om de tijd, het duurt lang om een oudere te wassen en te helpen waardoor niet alles meer wordt gecheckt omdat deze weer door naar de volgende moet. Veel tijd gaat verloren bij de computer, doordat alle gegevens en updates ingevoerd moeten worden is de verpleegkundige veel minder bij de patiënt. Vroeger werd veel meer ingevuld op papier en met de hand en bij het bed waardoor de verpleegkundige langer bij de patiënt was.”
- “Dat teamgevoel en de neuzen dezelfde kant op krijgen is lastig. Dit komt met name doordat iedereen op verschillende tijden en dagen werkt, dus het is moeilijk om iedereen iets te vertellen of mee te nemen in een proces.”

6.2.11. Technology

The ninth system element of the socio-technical system of preventing pressure ulcers is technology. In the analysis of the qualitative data, two themes were identified: tools and innovation. These themes will be elaborated on with quotations from the data.

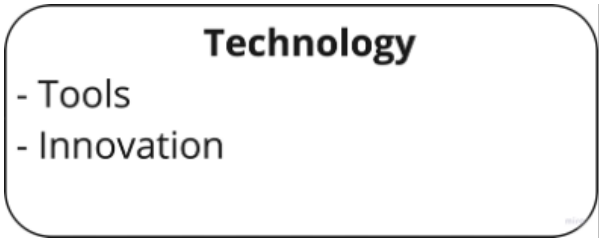

Figure 6.10: The system element of technology of the socio-technical system

Tools

- “Bijvoorbeeld op de IC. Er spelen meerdere dingen. Ook E-learning maken voor facilitaire zorgmedewerkers. Nu ook bezig met een filmpje maken op een tablet, zodat de patiënt makkelijk geïnformeerd kan worden.”
- “Hieruit volgt data, want hier kunnen dingen gemeten worden zoals gewicht, het aantal graden van het bed en de gewichtsverplaatsing van de patiënt op rug of zij.”
- “De respondent vertelt dat de resultaten van de prevalentiemeting nu ook worden verwerkt in een dashboard, waarin het inzichtelijk is voor alle verpleegkundigen hoe het gaat. Hier kunnen de verpleegkundigen ook van elkaar leren hoe het gaat op andere afdelingen.”
- “Respondent vindt de wisselliggingsklok erg leuk die voor de patiënt is gemaakt waarbij de patiënt betrokken wordt en dit slaat erg aan. Door deze mensen te informeren breng je eenieder op de hoogte van de gevaren van decubitus. Interventies waarbij je de patiënt betrekt zijn vernieuwend.”

- “Eigenaarschap is heel belangrijk, maar daar zijn we nog lang niet. Een verpleegkundige voelt zich soms gedwongen om een score in te voeren zonder het voordeel van in te zien. De verpleegkundige ziet de tool niet als een hulpmiddel voor de patiënt, maar het is er wel om de patiënt beter te kunnen verplegen.”

Innovation

- “De respondent geeft aan dat met eventuele technische opties op het bed in de toekomst de tijdswinst kan helpen met de personeelstekorten in de zorg. Dit kan met verschillende wifi-opties op het bed waar gegevens kunnen worden verzameld en gebruikt kunnen worden in het monitoren van de patiënt. Daarnaast wordt aangegeven dat de slimme oplossingen voor de toekomst lastig zijn in het oude gebouw waarin wordt gewerkt.”
- “Hiernaast geeft de respondent aan dat er wel mooie dingen in de toekomst kunnen gebeuren. Bijvoorbeeld een track and trace op de bedden zetten, waardoor je de bewegingen van de bedden door het ziekenhuis kan volgen. Dit zou natuurlijk de doorlooptijden van de bedden verbeteren.”
- “Ook technische innovaties zoals een barcode op een bed waar alle informatie makkelijk op te vragen is.”
- “De respondent legt uit dat thoraxchirurgie heel veel dingen heeft uitgezocht om te verbeteren. Zo is er overgestapt van de oude fleximatrassen naar luchtbed achtige matrassen. Nu gestart met een meetmethode waarbij de drukpunten van het lichaam op de operatiekamer tafel gemeten worden, uitgevoerd door een student van de TU delft die promotieonderzoek doet. Patiënten liggen op een speciaal matje waarbij je kunt meten waar de drukpunten zijn. De grootste druk is op het stuitje en je kunt ook de druk meten van bijvoorbeeld de hielen, schouders en het hoofd en de vraag is wat moet je eraan doen en hoe kun je het verbeteren.”
- “Op dit moment wordt er gewerkt met AI die een voorspellingsmodel maakt voor het berekenen van patiënten die risico op decubitus vertonen. Het liefst zou de respondent een real-time dashboard hebben op de afdeling met de decubitus gevallen.”
- “In Amerika positioneren ze verpleegkundigen op een goeie manier waardoor ze hun patiënten hoge kwalitatieve zorg geven. De verpleegkundige speelt in Amerika een sleutel rol en is 24/7 bij de patiënt. De rollen zouden als volgt moeten zijn: de verpleegkundige is degene die het meest invloed kan uitoefenen op de patiënt, en de arts/dokter komt op visite en de behandeling. In een Magnet ziekenhuis ligt de verantwoordelijkheid veel meer bij de verpleegkundige. Er zijn dashboards aanwezig die inzicht geven in de problemen. En er is ondersteuning vanuit het ziekenhuis om hiermee aan de slag te gaan.”

6.2.12. Tasks

The tenth and final system element of the socio-technical system of preventing pressure ulcers in the ErasmusMC is tasks. The two themes that were found in the qualitative data are: managers and nurses. The quotations that explain these two themes are displayed below.

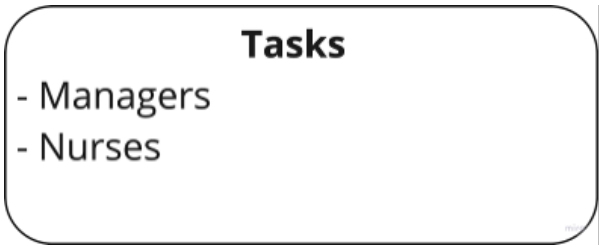

Figure 6.11: The system element of tasks of the socio-technical system

Managers

- “De rol van de manager moet worden veranderd, hier is het ziekenhuis mee bezig. Dit doen ze door intervisie te hebben en hoe managers op eigen afdeling bepalen wat hun eigen taken zijn en wat die van de verpleegkundigen zijn. Zodat managers niet de taken van verpleegkundigen gaan oppakken.”

- “De respondent geeft aan dat er verantwoordelijkheid komt te liggen bij leidinggevenden. Vraag de verpleegkundigen naar wat er gebeurt en wat moet er opgeleverd zijn. En stuur hierop. In de praktijk is dit anders. De zorgmanager moet iedereen inplannen, materiaal zoeken of vervangen en bijspringen. Hierbij is de ondersteuning aan het personeel dus te laag. Nu is het niet duidelijk wat er op een dag echt gedaan moet worden en wat mee kan naar morgen. De urgentie van de taken zijn dus vaak niet helemaal duidelijk. De respondent geeft aan dat dit een falen is van de leidinggevende. Die bepaalt en ondersteunt dat.”
- “Opdrachten van de artsen moeten wij natuurlijk uitvoeren, maar er kan onderscheid gemaakt worden tussen opdrachten die sowieso uitgevoerd moeten worden door verpleegkundigen maar ook opdrachten die door anderen uitgevoerd kunnen worden. Denk aan bijvoorbeeld doktersassistenten voor het bloed afnemen, het ophalen van afvalzakken voor de schoonmakers. Een duidelijke taakverdeling kan veel schelen, de non-nursing tasks moeten eruit gehaald worden. Definiëren wat dan de verpleegkundige taken zijn is dan de kunst, dit is niet bekend. Er is geen lijst met taken die een verpleegkundige moet uitvoeren/doen.”

Nurses

- “Wat betreft terugkoppeling zijn er bijvoorbeeld casusstudies gedaan op de afdeling wat wel een impact heeft de verpleegkundigen. Hier kwam naar voren dat bijvoorbeeld met eiwitrijke voeding verpleegkundigen een extra stap moesten ondernemen die vaak niet gedaan werd.”
- “De respondent vertelt dat nu ook vaak het stukje mondverzorging niet goed gaat. Dit wordt vaak vergeten.”
- “De respondent geeft aan dat er vaak te weinig gebruik wordt gemaakt van wisselligging, de hielen vaak niet vrij liggen, barrière crème vaak ontbreekt in de standaardpakketten op afdelingen, vaak niet voldoende faciliteiten zoals kussens op de afdelingen. Ook bijvoorbeeld eindeloos veel pleisters, waardoor soms niet duidelijk is waarvoor welke pleister nodig is. Hiernaast is er ook weerstand op de IC wat betreft wisselligging.”
- “Hiernaast vertelt de respondent dat er overgegaan op een nieuwe functie duiding van verpleegkundige. Er komen regieverpleegkundigen met kwaliteit in de portefeuille. Hiervoor wordt ook tijd vrijgemaakt. De aansturing van kwaliteit komt nu nog van een iemand die bezig is met alle kwaliteitsonderwerpen op thema niveau.”
- “De respondent valt op dat er bij decubitus iets zit bij de verpleegkundige, bij de patiënt en de systemen. Voorbeelden zijn dat de patiënt vaak te weinig beweegt hierbij en dat de instructies van de bedden hoe je die moet bedienen vaak ingewikkeld zijn.”
- “De respondent geeft aan dat de verantwoordelijkheid op meerdere fronten bij de verpleegkundige gelegd moet worden.”
- “De respondent vertelt dat als het inzicht er niet is bij de verpleegkundige wat voor een effect het kan hebben als bepaalde handelingen of preventiemaatregelen niet worden uitgevoerd, dat de verpleegkundige zich er niet verantwoordelijk voelt. Dit stukje inzicht kan cruciaal zijn voor het begrip en het veranderen in uitvoering en het verhelpen van de weerstand.”
- “Sommige verpleegkundigen vinden het volgens de respondent ook te veel moeite om een patiënt iedere 3 uur te draaien. Daarnaast nemen verpleegkundige vaak de verantwoordelijkheid voor dit punt niet, gezien zij niet weten of niet denken dat het hen iets aangaat.”
- “De respondent geeft aan dat het de taak van de verpleegkundige is om hier mee bezig te zijn. Hiermee moet een themadirecteur zich bijvoorbeeld niet mee bemoeien. Dit is niet de taak van iemand als een themadirecteur. Dit klopt niet.”
- “Verpleegkundigen moeten eigenaarschap nemen voor alle sensitieve uitkomsten, dat valt allemaal onder de professie. Dit is inclusief de borging, meten, kijken en het in de gaten houden van problemen/oplossingen. Er is geen officiële lijst van verpleegkundige sensitieve uitkomst mate aspecten. Dit komt doordat er geen consensus is over de taken en wat het allemaal inhoudt.”

Patient complexity

During the analysis of the qualitative data (and the search for corresponding quote), the researcher noticed a general trend regarding the prevention of pressure ulcers which is worth mentioning. The general trend is the increasing complexity of the patients. Lead times of the patients before operating and recovery time of patients are shorter. Next to this, the age of patients is significantly higher. This

means that patients stay longer at home before going to the hospital, which creates an increased risk of pressure ulcers and other diseases.

6.3. Actor-related patterns of the current measures

Geels describes that “although processes at different levels can converge and create windows of opportunity for regime change, the actual linkages always need to be made by actors” [18]. Therefore, additional specific actor-related patterns need to be included to the MLP. Diffusion becomes a non-linear process involving accelerations and slowdowns when actors are involved. According to Geels, “this is the result of sometimes rapid shifts in perceptions, ‘moods’ and strategic interactions. In case studies, these shifts can be analysed in detail, looking at micro-activities in local practices” [18]. At the beginning of this chapter the following research is presented: *What are the actor-related patterns of the current measures for the prevention of pressure ulcers in the ErasmusMC?* When looking at the observational notes, and Figure 6.1, the actor-related patterns that are drafted by Geels can be recognised [18]: firm-related patterns, user- and culture-related patterns, and policy-related patterns. Next to these actor-related patterns, another actor-related pattern can be found in the observational notes and the analysis of the socio-technical system: The information-related patterns.

6.3.1. Information-related patterns

This research would like to contribute to “the somewhat more generic patterns in social interactions” found by Geels [18]. The information-related pattern can be described by the crucial role of information and the flow of information in an organisation for the accelerations and slowing down in diffusion and breakthrough of new technologies. In this case study, information regarding the current measures for the prevention of pressure ulcers often gets lost in the layers of the organisation or between departments, is communicated suddenly, or is withheld or not shared amongst respondents. Next to this, the role of data in the information-related pattern is important. Data is going to play a great role in future technological innovations in the hospital (such as the AI driven dashboard). The transparency of this data supports the information-related pattern in an organisation. In this case study, the transparency of this data is often missing, and this information is not shared amongst (all) actors involved. Last, the behaviour of actors has a role of importance in the information-related pattern. The involvement of actors in the prevention of pressure ulcers often stimulated information sharing with or amongst other actors. On the other side, when actors were not as involved in the prevention of pressure ulcers, valuable information was not shared or the information could stagnate at these actors.

6.4. The interconnectivity of the system elements

At the beginning of the analysis, it was stated that the system elements seemed interconnected. Figure 6.1 shows these interconnections with the dotted lines between the system elements. The inter connectivity is found in the coding scheme in Appendix F. The system elements regulations and policies and organisational structure is interconnected through communication. Next to this, regulations and policies is interconnected with processes through the implementation of the prevention measures. People and culture are interconnected through the gathered opinions about the prevention measures of pressure ulcers. Also, regulations and policies and current measures are interconnected through the policy steps taken for the current measures. Regulations and policies and culture are interconnected through doubts about the measures. And last, regulations and policies, organisational structure, and tasks are interconnected through the responsibility amongst managers and nurses regarding the prevention of pressure ulcers. The identified interconnections between the system elements will be used as the key leverage points in the next chapter.

7

Key leverage points

In this chapter, the key leverage points in the socio-technical system of preventing pressure ulcers in the ErasmusMC will be presented. As discussed in chapter 3, key leverage points are “places that are most effective in resolving problems” [11]. It is important to identify these key leverage points to build resilience in the system. Next to this, identifying the key leverage points will help to understand (and possibly solve) the mismatch between the measures created for preventing pressure ulcers in the hospital and the socio-technical system of preventing pressure ulcers in the ErasmusMC to possibly. Thus, the key leverage points could help create a nested hierarchy, where regimes are embedded in landscapes and niches in regimes.

The identified key leverage points are: communication, implementation strategy, doubts and opinions of the prevention measures, and responsibility. These key leverage points are explained by the experiences and suggestions found in the quotations of the analysis section. The experiences can be used to motivate changes in the key leverage points, and the suggestions could be helpful in resolving problems in the key leverage points of the socio-technical system.

7.1. Communication

The first key leverage point in the socio-technical system is communication. From the analysis of the identified themes in chapter 6, this key leverage point can be divided into various sub categories.

7.1.1. Horizontal communication

The communication between departments in the hospital is not optimal. Here, a form of horizontal communication is meant where horizontal communication refers to the communication between hospital staff on an equal hierarchical level and vertical communication refers to the communication of the policymakers at the top of the organisation to the operational staff at the bottom of the organisation. in the quotations it is stated that in some departments there is no consultation regarding pressure ulcers between departments. However, some departments have a chain consultation with the various disciplines. The experiences from the quotations are positive towards these chain consultations. It is specified that communication between departments could help to learn from each other.

The communication regarding the interchangeability of materials (such as beds and mattresses) is experienced to be difficult due to the exceptions between departments. Again, the communication between the departments does not help in this situation.

7.1.2. Vertical communication

Also, experiences towards the communication in the various layers of the hospital is not optimal. Here, a form of vertical communication is meant. In this vertical communication, it is not only about exchanging information between these layers but it is also about giving instruction-based information (or orders). In the quotations, it is shown that the hospital has a Board of Directors, themadirecteuren, sectormanagers, and managers. Then, it is stated that it is expected that the communication is good between

these layers but experience shows it is not. Every layer has its own interpretation and order of importance on the prevention measures of pressure ulcers and it is even speculated communication would flow faster with the removal of one of the management layers. Information gets lost or changes and there is an alteration of information between the various layers of the hospital. This means that there is a distortion in the communication in the various layers of the hospital. Additionally, it means that there is a problem between the transmitter and receiver of information in the various layers of the hospital.

Next to this, it is indicated that there is a certain slowness in communication to the top and sometimes communication from the top to the bottom of the organisation stagnates at the managers. As a result of the slowness of the communication, initiatives regarding the prevention of pressure ulcers from the operational layer to the strategic layer take much more time than planned. This is experienced as stagnating communication at the managers from the strategic layer of the organisation where the operational layer cannot get time or space for initiatives regarding the prevention of pressure ulcers. The stagnation of communication indicates that certain information does not reach the target group of the information.

Last, the transparency of the numbers of pressure ulcer measurements from the managers is given as an example of communication not being optimal. The managers are supposed to share these numbers amongst operational staff. in the quotations, the communication between the sectormanager and the manager is argued. How can these two functions communicate (and inform each other) in an optimal manner? The lack of transparency implies that the prioritizing of information is missing in the communication.

7.1.3. External communication

In the analysis, there are mixed statements about the communication with other hospitals. For example, the approach of a hospital in Deventer is interesting for the hospital. The researcher noticed positive reactions regarding the method of moving the wound care to the front of the process of the treatment of pressure ulcers. However, the majority of participants in the case study was not aware of this approach. A reason that was given for not communicating as often with other hospitals was that the ErasmusMC is only interested in the approach of other academic hospitals because the complexity of the patients is similar to that of the ErasmusMC. Another reason is that other hospitals usually do not have a strict guideline regarding the prevention of pressure ulcers because it is not a main issue in those hospitals. A positive reason towards the communication between other hospitals is the role of the specialist nurses. This concept is implemented by looking at the use of this role in the hospital of Maastricht.

7.2. Implementation strategy

The second key leverage point in the socio-technical system is the implementation strategy regarding the bundle of measures for the prevention of pressure ulcers. Four main points regarding implementation, and five points regarding policy steps for strategy are given below. The experiences found in the analysis regarding the policy steps and implementation of measures could be used as motivation to review the implementation strategy at the ErasmusMC regarding the measures for preventing pressure ulcers.

7.2.1. Implementation coach

First, it is argued that an implementation coach could help to ensure the process of implementation of initiatives in the hospital. Now, there is often a distance between coming up with new policies and the implementation of these policies. Next to this, it is experienced that not everyone in the hospital is reached with these new policies due to the size of the organisation and the communication in the organisation as described in the previous paragraph.

7.2.2. Too much measures

Second, it is stated that there are too much measures in the bundle of measures for the prevention of pressure ulcers. These are the measures that are displayed in the paragraphs of the current measures (6.3.2) and the tasks of nurses (6.11). It is experienced that these measures cannot be implemented all at once at every department. The measures are developed at the strategic level but the operational

level has to make choices in the measures that work for their department and the measures that do not work for their department. It is suggested that the group of wondconsulenten helps with fitting the implementation of the measures to each department.

7.2.3. Coherent implementation approach

Third, it is noted that not everybody or every department can be reached in the hospital due to certain information not reaching its target group as described in the stagnation of communication. It is suggested that a more coherent implementation approach is missing that helps the departments in the hospital to fit the bundle of measures to their department.

7.2.4. Sudden changes

Last, it is indicated that often the information regarding implementations is bad. The distortion in the communication in the various layers of the hospital results in sudden changes that are made without proper communication to the departments. As an example, the role of the regieverpleegkundige is given. This is a new role but it is said that the interpretation of this new role is lacking. Another example is the schooling of all operational personnel to resuscitate on planks before the implementation of the new mattresses. This was communicated two weeks before the implementation of the new mattresses. It is argued that communicating these things ad hoc, happens too much in the hospital.

7.2.5. Visibility of quality advisers

First, it is stated that the quality advisers are too invisible for nurses that have to execute the bundle of measures. The advisers are responsible for drafting the policy and the execution of this policy for the bundle of measures regarding the prevention of pressure ulcers. It is suggested that these advisers should be more visible and approachable for nurses. It is claimed that this is one of the reasons for the insufficient and incorrect filling in of the Waterlow scoring method.

7.2.6. Guidelines and protocols

Second, it is argued that a proper guideline regarding physiotherapy and nutrition is limited. Certain policy steps in broadening these guidelines are missing. Next to this, it is noted that there is a protocol regarding the prevention of pressure ulcers in the operating rooms. However, tools or measures are missing in the operating rooms since it is expected that the matress that is used is the best there is and helps to prevent pressure ulcers in the best way possible.

7.2.7. Interpretation of strategy

Third, it is experienced that a strategy regarding the implementation policy of the bundle of measures for preventing pressure ulcers is missing. The development of new policies is done in ‘higher’ segments of the organisation (strategic level) in an overarching manner, so that it is applicable for every department in the hospital. It is pointed out that this leads to differences of interpreting these new policies in every department due to the quality team and managers that are assigned to the department.

7.2.8. Stuurgroep decubitus

Fourth, it is argued that the composition of the stuurgroep decubitus should be different. It was good to create awareness in the organisation and to implement new mattresses in a fast way but now it is unnecessary. The group should be composed with specialist nurses and nurses and other responsible disciplines (such as physiotherapists, doctors, and dietitians). It is proposed that the specialist nurses should take the lead and other members should be in a facilitating role.

7.2.9. Top down vs. bottom up

Last, it is made clear that a different approach is being used in the ErasmusMC regarding the implementation of the bundle of measures for preventing pressure ulcers. A top down approach is replaced by a bottom up approach. Here, the focus is laid on the specialist nurses. It is suggested that the specialist nurses have to be empowered and given the space to develop themselves.

7.3. Attitude and managers

The third key leverage point is the attitude and the positions of managers in the ErasmusMC following from the doubts and the gathered opinions about the bundles of measures for the prevention of pressure ulcers. Here, four important points are presented.

7.3.1. Feedback (aanspreekcultuur)

Multiple reasons are given regarding the feedback amongst nursing staff. It is noted that the norm amongst nurses differs, there are no obligations amongst nurses, there is a resistance against certain measures, and that if nurses do not hold each other accountable by giving feedback then a sense of responsibility is missing.

7.3.2. Behaviour

It is said that by creating awareness amongst nurses regarding the prevention of pressure ulcers could help influence the behaviour in a positive way.

7.3.3. Nursing ownership

The third point is the term nursing ownership. In the analysis it is specified that the strategic staff is working on creating ownership of their own profession amongst nurses. Also, it is said that to ensure this ownership, good material and schooling is a necessity. However, it is pointed out that it is crucial that the nurses should not be hesitant to ask for those things.

Next to this, it is argued that the ownership can be achieved by stimulating, magnifying, and rewarding the good actions and outcomes of nurses regarding the prevention of pressure ulcers. It is suggested that a proactive attitude of the wondconsulenten could contribute to this.

Additionally, it is noted there is a difference between nurses that are willing to put in extra time and work towards the concept of nursing ownership and nurses that are no willing to do put in the extra time and work. Furthermore, it is stipulated that the term nursing ownership is something that is created by the strategic staff. It is stated that other disciplines (such as dietitians, physiotherapist, and doctors) also have a responsibility in the prevention of pressure ulcers.

7.3.4. Power distance/managerial support

The last point is the power distance/managerial support in the ErasmusMC. Three important concepts are highlighted in this key leverage point.

Supportive role of managers

It is alleged that management needs to have a supportive role to get a balance in the nurses that are willing to put in the extra effort and nurses that do not want to put in the extra effort.

Urgency amongst managers

Besides, it is implied that the urgency amongst managers to focus on subjects similar to the prevention of pressure ulcers is missing. For example in mail correspondence towards managers regarding information on measuring moments of pressure ulcers, multiple deadlines were passed and the waiting time for responses is long. Moreover, there are differences amongst the managers. Often it is experienced that there is stubbornness or denial when asking about the prevention of pressure ulcers on the corresponding department of the managers.

Trust

It is indicated that the trust in managers on some departments is not great due to the differences in leadership amongst managers. It is noticed that nurses act surprised when told that they are allowed to come up with ideas and suggestions on the improvement of healthcare quality. It is experienced that nurses do not always indicate problems or feedback on certain processes. It is pointed out that nurses have a feeling that their notifications are not taken seriously and sometimes do not know where to go with problems or reports. However, it is suggested that this should be done at the managers because managers should have a supportive role towards nurses.

7.4. Responsibility

The fourth and final key leverage point is responsibility. This key leverage point is mentioned frequently in the analysis of qualitative data. Here, three points of importance are distinguished.

7.4.1. Sense of responsibility

It is stipulated that a sense of responsibility is missing amongst operational staff regarding missing materials. Reasons of time pressure and workload are given, but responsibility in missing materials is not taken when materials are missing. A reason for the missing sense of responsibility has yet to be found.

Next to this, it is indicated that insight into the effects of certain prevention measures not being executed is lacking amongst nurses which leads to a missing sense of responsibility. This insight into the effects (with various stages of pressure ulcer wounds as outcomes) could be crucial for the understanding of the effects, changing in the execution of the measures, and help in fixing the resistance of applying certain measures.

Additionally, it is made clear that the sense of responsibility of the prevention of pressure ulcers is too easily laid down on nurses. It is a multidisciplinary problem, where physiotherapists, ergo therapists, doctors, and procurement are involved.

7.4.2. Managerial facilitating role

It is argued that the role of the managers has to change. The hospital is working on this by setting up intervision meetings where managers can defy their tasks and the tasks of the nurses on their departments. This is done to avoid that managers take over tasks that belong to nurses.

Next to this, it is stated that in theory the managers have to ask the nurses what happens on the department and what needs to happen on the department. The managers need to manage these things. However, it is said that in practice this does not happen. The manager has to make schedules for nurses, find material or replace material, and assist in certain tasks of nurses. There needs to be more support from the manager towards the nurses. Here, the urgency of the tasks is missing. What needs to be done today and what needs to be done tomorrow? A manager has to define and support these things. Also, a list of these tasks and their definition is missing. This could help to give guidance to both managers and nurses.

7.4.3. Nurses

First, it is alleged that nurses need to take an extra step in providing protein-rich food to the patients. Also, oral care is often forgotten and needs to be provided more by nurses.

Second, it is claimed that the task of repositioning is not carried out in a sufficient manner amongst nurses, the heels are often not lying free, barrier creme is missing in the standard packages on departments, and there is not a sufficient amount of facilities (such as cushions) on departments.

Last, it is reported that nurses need to take ownership in the sensitive outcomes. This includes assurance, measuring, observing, and checking problems and solutions. For the sensitive outcomes, consensus amongst nurses and managers is necessary to make a list of the outcomes.

the task of repositioning is not carried out in a sufficient manner

8

Conclusion

By using the mutli-level perspective theory of Geels and applying it to a healthcare setting, this thesis has shown why the current measures for preventing pressure ulcers are not working as expected and intended in the ErasmusMC. From the concept of systems thinking (the dynamic interaction, synchronisation, and integration of people, processes, and technology), a first visual representation of the socio-technical system for preventing pressure ulcers in the ErasmusMC was drafted (see Figure 5.2). The socio-technical system contained 10 system elements, which were found in literature. The artefacts of the system were the current measures for preventing pressure ulcers. A literature review of the policy of preventing pressure ulcers in the Netherlands presented the theoretical reasons for the measures not working as expected and intended. When applying the dynamic multi-level perspective on system innovations to the situation of preventing pressure ulcers in the ErasmusMC, it was found that the landscape developments represented the urgency of the policymakers of the hospital to lower the occurrence of pressure ulcers, the technological niches were the measures (or system innovations) created for preventing pressure ulcers, and the socio-technical regime could be described as the socio-technical system for preventing pressure ulcers in the ErasmusMC. Combining the hypothesis of the multi-level perspective and the findings of the theoretical reasons in the literature review, it was stated that a nested hierarchy (where regimes are embedded in landscapes and niches in regimes) was missing. Therefore, the focus was laid on the mismatch between the measures created for preventing pressure ulcers and the (drafted) socio-technical system for preventing pressure ulcers in the ErasmusMC.

This lead to the practical socio-technical system of preventing pressure ulcers in the ErasmusMC, where the 10 system elements were filled in with overarching themes found in the qualitative data (see Figure 6.1). The key leverage points found in the interconnections of the socio-technical system were: communication, implementation strategy, attitude and managers, and responsibility. Suggestions made from the experiences that were found in the analysis, could be helpful in resolving problems in the key leverage points of the socio-technical system. Implementing chain consultations between departments and removing one of the management layers would contribute to the improvement of horizontal- and vertical communication at the hospital. Hiring an implementation coach, implementing a coherent implementation approach, improving the visibility of quality advisors for nurses, making a strategy regarding the implementation policy of the bundle of measures and empowering the specialist nurses could be helpful in reviewing the implementation strategy at the ErasmusMC. Focusing on trust in managers and creating a facilitating role amongst managers could contribute to the attitude of operational staff and the position of managers, and the responsibility of operational staff and managers. This research has shown that by addressing these key leverage points, the mismatch between the measures created for preventing pressure ulcers and the socio-technical system for preventing pressure ulcers in the ErasmusMC could be resolved. This will build resilience in the socio-technical system and helps to create a nested hierarchy.

When looking at the generic actor-related patterns for the understanding of accelerations and slowing down in diffusion and breakthrough in the dynamic multi-level perspective on system innovations

of the ErasmusMC, the firm-related patterns, user- and culture related patterns, and policy related patterns could be found in the qualitative data. This research makes a contribution to the generic actor-related patterns found in the dynamic multi-level perspective on system innovations by introducing the information-related patterns. This case study has shown that this new pattern can be described by the crucial role of information and the flow of information in an organisation for the accelerations and slowing down in diffusion and breakthrough of new technologies.

9

Discussion

This research shows why the current measures for the prevention of pressure ulcers are not working as expected and intended in the ErasmusMC hospital. From the multi-level perspective theory of Geels [18], the focus was placed on creating a nested hierarchy (regimes that are embedded in landscapes and niches in regimes) between the urgency of the policymakers of the hospital to lower the occurrence of pressure ulcers in the ErasmusMC, the measures created for preventing pressure ulcers in the hospital, and the socio-technical system for preventing pressure ulcers in the ErasmusMC. The analysis of the case study presents 10 system elements in the socio-technical system for preventing pressure ulcers in the ErasmusMC. In the analysis of the qualitative data, the following actor-related patterns are found: firm-related patterns, user- and culture-related patterns, policy-related patterns, and information-related patterns. The inter connectivity between system elements identified the following key leverage points for the building of resiliency in the socio-technical system: communication, implementation strategy, attitude and managers, and responsibility.

9.1. Interpretation of results

Next to the key leverage points found in the inter connectivity of the system elements, the theoretical reasons, the observational notes and the analysis of the case study show much more interesting findings that can be elaborated on.

9.1.1. In-between activities of nurses

In the research of de Laat et al. it is found that not focusing on seeing the replacement of mattresses as a key component of an intervention, not looking at the impact of the 'in-between activities of nurses, and not creating strong nursing leadership are theoretical reasons for measures not working as expected and intended. in the case study, new mattresses were implemented and strong nursing leadership in the form of the regieverpleegkundige are applied. However, it is stipulated that the nursing tasks should be defined clearly from non-nursing tasks. Looking at the impact of the 'in-between' activities of nurses could be important to create a clear definition of the nursing tasks.

9.1.2. Repositioning of patients

Amir et al. found that not regularly repositioning and providing special treatment for the prevention of dehydration and malnutrition, and the information distribution among participants/patients are theoretical reasons for the measures not working as expected and intended. In the analysis of the case study it is found that regularly repositioning of patients is often forgotten by nurses. Here, respondents on the operational level and the strategic level often questioned why this happened. Examples of reasons that were given for not regularly repositioning patients were time constraints, low prioritisation, and not being aware. As mentioned in the key leverage points, the implementation strategy for the bundle of measures for the prevention of pressure ulcers needs to be reviewed. A thorough implementation plan could help to tackle the reasons for not regularly repositioning patients.

9.1.3. Organisational support

The study of Halfens et al. shows that not focusing on personal, cultural, and institutional factors, not giving enough organisational support,and not focusing adoption behaviour of nurses are theoretical reasons for the measures not working as expected and intended. With the socio-technical system of Figure 6.1, this research contributes to the focus on all of these factors. These terms are of importance to succeed in the adoption behaviour of nurses. However, to implement certain initiatives it is of more importance on what kind of organisational support is needed and how to apply the organisational support to the initiative to optimise the implementation process of these certain initiatives. An example would be the visibility of the quality advisers for nurses. The quality advisers from the strategical level could provide the kind of organisational support that is needed for the nurses at the operational level. This would contribute to fit the implementation of the bundle of measures to the operational level.

9.1.4. Resources

Meijers et al. conclude that missing a nutritional guideline, and lack of knowledge, skills, and resources are theoretical reasons for the measures not working as expected and intended. A proper guideline for nutrition regarding the prevention of pressure ulcers is missing. Focusing on creating a proper hospital wide nutritional guideline could be useful. A lack of knowledge or skills regarding a nutritional guideline was not found in the analysis. Nevertheless, a lack of resources regarding in the hospital was found in the analysis. The lack of resources consists of two parts: lacking the amount of resources and the missing of the existing resources. Lacking the amount of resources could be explained by budgetary and necessity reasons, but the missing of the existing resources remains a point of interest. In this research it seems that the sense of responsibility amongst operational staff in the hospital is lacking towards the resources. Making staff aware or creating some type of resource management system could help to prevent the lack of resources and the missing of resources. Researching the sense of responsibility of operational staff towards resources in the hospital could be interesting and maybe even necessary.

9.1.5. The concept of nursing ownership

The last theoretical reasons for the measures not working as expected and intended were found in the research of Stalpers et al, where not having feedback and participatory learning amongst nurses, and not focusing on nurses' satisfaction and autonomy were presented as reasons. These two topics have a strong presence in the analysis of the qualitative data. The feedback (or aanspreekcultuur) amongst nurses was often lacking or experienced as negative. It could be said that it is not about giving feedback but instead on how to give feedback to one another. Giving and receiving feedback in a constructive way where it is experienced as positive amongst nurses, is something worth investigating or researching in the hospital. The measurement of pressure ulcer prevalence, where the specialist nurses work together and experienced specialist nurses train the new specialist nurses to get certified in measuring the pressure ulcer incidence in the hospital, is a great example of participatory learning. This example could be used more amongst nurses to really create depth in subjects and the researcher experienced this as a good interactive manner of teaching. The nurses' satisfaction and autonomy is widely questioned in the analysis. The nursing ownership shows that there is a lot of questioning on how to give purpose and a feeling amongst nurses into the two topics. In the research of Schirle et al. [50] it is found that "organisational climate had a strong positive relationship with psychological ownership. Fostering advanced practice nurse psychological ownership could improve job satisfaction and decrease turnover leading to increased effectiveness in acute care settings." Nursing ownership is not a term that is 'owned' by nurses. Strong organisational support and leadership of managers and medical personnel is needed for giving purpose and feeling amongst nurses about nursing ownership.

9.1.6. Implementing the multi-level perspective in a healthcare setting

At the beginning of the research of Geels it is stated that the paper "deals with transitions at the level of societal functions such as transportation, communication, housing, energy supply, feeding" [18]. This research tries to implement the theory of the multi-level perspective in a new societal function: healthcare. The theoretical framework helped to design and fill in the socio-technical system for preventing pressure ulcers in the ErasmusMC. The implementation of the multi-level perspective theory in a healthcare setting can be deemed a success, and the statement of Geels could be rewritten: This paper deals with transitions at the level of societal functions such as transportation, communication,

healthcare, housing, energy supply, feeding. Societal functions are fulfilled by socio-technical systems, which consist of a cluster of elements, including regulations and policies, organisational structure, resources/material, data/information, processes, technology, tasks, artefacts, culture, and people (see Figure 6.1). Further research needs to be conducted with the theory of the multi-level perspective in other healthcare settings to find out if the rewritten statement is correct.

9.1.7. The contribution of the information-related patterns

Next to this, a contribution to the actor-related patterns drafted by Geels, has been made with the identification of the information-related patterns in the analysis of the qualitative data. To be a somewhat more generic patterns in social interactions, the role of this new actor-related pattern needs to be investigated. In this research, the role of information is crucial and the flow of information affects all the identified key leverage points. Further research should focus on other trends in the information-related pattern, other than the role of data, the behaviour of actors in organisations, and the loss of information in the layers of the organisation. However, it should also be found out if these trends occur when applying the information-related pattern as an actor-related pattern.

9.2. Limitations

As mentioned earlier in this research, the ErasmusMC is a large organisation with more than 14.000 employees. The researcher was limited to a certain amount of employees and could not create a representation of respondents of every department. However, the researcher focused on speaking every key player involved in the creation and execution of the measures for preventing pressure ulcers in the ErasmusMC. The representation of these respondents and observations in the qualitative data is sufficient enough to describe, analyse, and conclude in a well-founded matter.

Next to this, not all respondents were willing to cooperate and participate to an interview for the case study. It must be said that this only occurred once in the case study, but the researcher could not involve every key player in this research.

Furthermore, the researcher was limited by time. The extensive amount of qualitative data collected during the case study in the ErasmusMC could provide even more conclusions on the prevention measures and is potentially interesting for further studies. Since this research is a master thesis with an average time limit of six months, the researcher could only analysis everything onto a certain level. Though, it was more than enough data to make underpinned arguments and conclusions.

9.3. Bias

This research is subjected to one type of bias: interviewer bias. Interviewer bias comes from the person conducting the case study. It can be caused by how individuals respond to inquiries or questions as well as by any facet of their identification, including their sex, race, socioeconomic class, or level of perceived attractiveness. To keep the effect of this bias to a minimum, the researcher always shared the drafted questions of Appendix B and C, and the researcher asked for explicit consent (first by signing the form of Appendix D and E, and a second time by giving permission on the summary of the interviews).

9.4. Generalisability of case studies

According to the research of Wikfeldt [51] into the generalisability of case studies, it is found that “the literature, although discrepant, suggests that case studies can be generalised close to the same extent as statistical studies, *if* done correctly.” Case study research has frequently been criticised for having non-generalisable results, particularly when contrasted with survey research. For this case study, the hospital setting and the exact situation inside the hospital would be difficult to simulate in other research. Therefore, this exact case study and its findings cannot be generalisable to the population. However, the application of the multi-level perspective of Geels in a healthcare setting, the new information-related patterns, and the findings in the analysis of the socio-technical system for the prevention of pressure ulcers can be simulated in other research. When done correctly and as adequate as possible, these findings in this case study could be generalised to the population and could come close to the

same extent of generalisability as statistical studies.

10 Recommendations

The recommendations are split up into two parts: recommendations on the key leverage points and recommendations regarding the use of the multi-level perspective on a healthcare setting.

10.1. Key leverage points

First, the recommendations on the key leverage points (communication, implementation strategy, attitude and managers, and responsibility) are shown.

10.1.1. Optimisation of communication

This research revealed that the communication between departments is not optimal and there is a positive experience towards chain consultations between departments. On that basis, the ErasmusMC should investigate how these chain consultations could contribute to the optimisation of the communication between departments.

Also, this research displays that communication between the various layers of the hospital is not optimal and it is suggested that the removal of one of these (management) layers would improve the communication through the various layers. Hence, the ErasmusMC should examine if it is necessary to communicate through all these various layers of the hospital or if there is an easier way of communicating. The hospital should investigate these chain-of-commands on unnecessary bureaucracy. Next to this, this research demonstrated that there is a certain slowness of communication from the operational level to the strategic level of the organisation that stagnates at the management level. Thus, the ErasmusMC should conduct further research in the improvement of consistency, prioritisation and throughput of information from the operation level to the strategic level (and the other way around).
For the external communication, this research found that the ErasmusMC is often only interested in methods and approaches regarding the prevention of pressure ulcers of other academic hospitals in the Netherlands. With the example of the Deventer hospital, the ErasmusMC should investigate the option of including approaches and methods of other hospitals in the Netherlands.

In contrast with the previous recommendation regarding the external communication, this research shows that the concept of the specialist nurses is a successful implementation from another hospital. So, the ErasmusMC did successfully implement a concept that was communicated from another academic hospital.

10.1.2. Improvement of implementation

This case study showed that the operational level of the hospital experienced that too much measurements from the strategic level have to be implemented all at once. To fit the bundle of measures for the prevention of pressure ulcers to each department, a selection of measures for each department needs to be made from the bundle of measures for implementation. Next to this, it is suggested that an implementation coach could help to ensure the implementation process. Hence, the ErasmusMC should examine the removal of some of the measures per department and should investigate adding an

implementation coach for the purpose of ensuring the implementation processes at each department.

Also, this case study found that not every department is reached with the measures for preventing pressure ulcers and a coherent implementation approach is missing. Another finding of this case study is that implementations are communicated ad hoc and sudden changes in departments have to be made in a short time span. Therefore, the ErasmusMC should research the application of a structured and well formulated bundle of measures (to create a coherent implementation approach) to improve communicating implementations on time.

10.1.3. Improvement of policy

This research showed that the visibility of quality advisers is missing for nurses that have to execute the prevention measures of pressure ulcers. So, the ErasmusMC should examine making the quality advisers more visible and approachable for nurses that have to execute the prevention measures for pressure ulcers.

Also, this research found that certain policy steps for broadening a proper guideline regarding physiotherapy and nutrition, and tools or measures in the protocol of preventing pressure in the operating rooms are missing. Therefore, the ErasmusMC should conduct further research in the development of policy steps for broadening a proper guideline for physiotherapy and nutrition, and the provision of tools and measures in the protocol of the operation rooms.

Further, this research presented that a strategy for the differences of interpreting new policies in every department was missing due to the quality team and managers assigned to departments. Thus, the ErasmusMC should investigate utilising the quality team and managers for the purpose of fitting new policies to every department.

Additionally, this research displayed that the stuurgroep decubitus should consist of specialist nurses and nurses (who take the lead), and physiotherapists, doctors, dietitians, and other disciplines should be facilitating. Hence, the ErasmusMC should study changing the composition of the stuurgroep decubitus with the specialist nurses and nurses in a leading role.

Next to this, this research looked at the top down vs. bottom up approach regarding the bundle of measures for preventing pressure ulcers. Again, the specialist nurses have a crucial role for changing the approach to bottom up and should be empowered and given space to develop themselves into this role.

10.1.4. Nursing ownership and managerial support

This thesis revealed that term nursing ownership is something that is created by the strategic staff an that other disciplines (such as dietitians, physiotherapist, managers and doctors) also have a responsibility in the prevention of pressure ulcers. Furthermore, it is found that to achieve the nursing ownership the good actions and outcomes of nurses have to be stimulated, magnified, and rewarded. Thus, the ErasmusMC should conduct further research into broadening the responsibility of the prevention of pressure ulcers amongst other disciplines instead of focusing on the nurses and the stimulation, magnifying, and rewarding of good actions and outcomes of nurses.

Additionally, this thesis displayed that the management should have a supportive role towards nurses to create trust in managers amongst nurses. It was also found that the urgency amongst managers to focus on subjects similar to the prevention of pressure ulcers is missing. Hence, the ErasmusMC should investigate the creation of an equal level of support and urgency amongst managers towards nurses and operational staff.

10.1.5. Feedback and behaviour

This case study showed that the norm amongst nurses differs, there are no obligations amongst nurses, and there is a resistance against certain measures. Also, the creation of awareness regarding the prevention of pressure ulcers amongst nurses could help influence the behaviour in positive way. Further, this research presents that the transparency of managers to operational staff regarding the numbers

of the prevention of pressure ulcers is not optimal. Therefore, the ErasmusMC should analyse the possibility to create full transparency and feedback from the strategical level to the operational level including the responsibility of the choices made by nurses.

10.1.6. Improvement of responsibility

This thesis found that a sense of responsibility amongst operational staff regarding missing materials is missing. Therefore, the ErasmusMC should conduct further reason in the lack of sense of responsibility amongst operational staff regarding missing materials, and the execution of tasks (such as regularly repositioning patients).

Also, this thesis found that amongst nurses nurses an extra step in providing protein-rich food to the patients, oral care, repositioning of patients, and the heels are often not lying free is often forgotten. Thus, the ErasmusMC should investigate the reasons behind these tasks not being executed by nurses.

Furthermore, this thesis displayed that barrier creme is missing in the standard packages on departments, and there is not a sufficient amount of facilities (such as cushions) on departments. So, the ErasmusMC should study the supply chain of materials in patient rooms.

10.2. The multi-level perspective in a healthcare setting

Second, the recommendations regarding the use of the multi-level perspective on a healthcare setting are given.

10.2.1. Validation of multi-level perspective in healthcare

This research successfully implemented the multi-level perspective of Geels to a healthcare setting by conducting a case study regarding the prevention measures for pressure ulcers in the ErasmusMC. This was the first time that the theory of Geels was applied to a healthcare setting. More data needs to be collected regarding the implementation of Geels to a healthcare setting. The healthcare settings could be other than a hospital. For example, nursing homes or psychological institutions could be used as healthcare settings. Next to this, the application of the MLP on hospitals in other countries would be an interesting topic for further research. Taking into account cultural differences and other healthcare systems could influence the approach and application of the theory. On that basis, future research should examine the validation of the multi-level perspective of Geels in healthcare settings.

10.2.2. Validation of information-related patterns

This case study found a new generic actor-related pattern in the form of information-related patterns. This new generic actor-related pattern describes the crucial role of information and the flow of information in an organisation for the accelerations and slowing down in diffusion and breakthrough of new technologies. To investigate if this is indeed a new generic actor-related pattern, extensive research into the occurrence of the information-related pattern in healthcare or other settings such as transportation or housing. Gathering more data of the applicability of this new contribution to the research of Geels is crucial to see if the theory could be adapted into the paper and is generalisable to the population. In that regard, future research should study the validation of the information-related patterns in a multi-level perspective setting.

References

[1] *Erasmus MC Rotterdam. Make it Happen.* July 21, 2022. URL: https://rotterdammakeithappen.nl/merkpartners/erasmus-mc/ (visited on 10/01/2023).

[2] Cheryl Bansal et al. “Decubitus ulcers: A review of the literature”. In: *International Journal of Dermatology* 44.10 (Oct. 1, 2005), pp. 805–810. DOI: 10.1111/j.1365-4632.2005.02636.x.

[3] Joshua E. Mervis and Tania J. Phillips. “Pressure ulcers: Pathophysiology, epidemiology, risk factors, and presentation”. In: *Journal of The American Academy of Dermatology* 81.4 (Oct. 1, 2019), pp. 881–890. DOI: 10.1016/j.jaad.2018.12.069.

[4] European pressure ulcer advisory Panel, national pressure ulcer advisory Panel, and Pan pacific pressure injury alliance. *Prevention and treatment of pressure ulcers/injuries: clinical practice guideline*. 3rd ed. EPUAP, NPUAP, PPPIA, 2019. URL: https://www.internationalguideline.com.

[5] Jan Kottner et al. “Pressure ulcer/injury classification today: An international perspective”. In: *Journal of Tissue Viability* 29.3 (Aug. 1, 2020), pp. 197–203. DOI: 10.1016/j.jtv.2020.04.003.

[6] Mona M. Baharestani and Catherine R. Ratliff. “Pressure Ulcers in Neonates and Children”. In: *Advances in Skin Wound Care* 20.4 (Apr. 1, 2007), pp. 208–220. DOI: 10.1097/01.asw.0000266646.43159.99.

[7] Liesbet Demarré et al. “The cost of prevention and treatment of pressure ulcers: A systematic review”. In: *International Journal of Nursing Studies* 52.11 (Nov. 1, 2015), pp. 1754–1774. DOI: 10.1016/j.ijnurstu.2015.06.006.

[8] Lina F. Kanj, Spencer Van B. Wilking, and Tania J. Phillips. “Continuing Medical Education”. In: *Journal of the American Academy of Dermatology* 38.4 (Apr. 1998), pp. 517–538. DOI: 10.1016/s0190-9622(98)70113-6. URL: http://dx.doi.org/10.1016/s0190-9622(98)70113-6.

[9] Richard M. Allman. “Epidemiology of pressure sores in different populations.” In: *Decubitus* 2.2 (May 1, 1989), pp. 30–3.

[10] Zena Moore et al. “The prevalence of pressure ulcers in Europe, what does the European data tell us: a systematic review”. In: *Journal of Wound Care* 28.11 (Nov. 2, 2019), pp. 710–719. DOI: 10.12968/jowc.2019.28.11.710.

[11] Patricia Trbovich. “Five Ways to Incorporate Systems Thinking into Healthcare Organizations”. In: *Biomedical Instrumentation Technology* 48.s2 (Sept. 22, 2014), pp. 31–36. DOI: 10.2345/0899-8205-48.s2.31. URL: https://meridian.allenpress.com/bit/article-pdf/48/s2/31/1488953/0899-8205-48_s2_31.pdf.

[12] Ronda Hughes. *Patient Safety and Quality. An Evidence-based Handbook for Nurses*. Department of Health and Human Services, Jan. 1, 2008.

[13] Reid et al. *Building a Better Delivery System: A New Engineering/Health Care Partnership*. Washington (DC), us, 2005. URL: https://pubmed.ncbi.nlm.nih.gov/20669457/ (visited on 03/16/2023).

[14] Peter Tugwell et al. “Applying clinical epidemiological methods to health equity: the equity effectiveness loop”. In: *BMJ* 332.7537 (Feb. 9, 2006), pp. 358–361. DOI: 10.1136/bmj.332.7537.358.

[15] John W. Creswell and J. David Creswell. *Research Design. Qualitative, Quantitative, and Mixed Methods Approaches*. SAGE Publications, Nov. 27, 2017.

[16] Robert K. Yin. *Case Study Research and Applications. Design and Methods*. SAGE Publications, Sept. 27, 2017.

[17] Anthony Staines et al. “Impact of a Swiss pressure ulcer prevention breakthrough collaborative”. In: *Journal of Evaluation in Clinical Practice* (Oct. 1, 2021). DOI: 10.1111/jep.13529.

[18] Geels. “Processes and patterns in transitions and system innovations: Refining the co-evolutionary multi-level perspective”. In: *Technological Forecasting and Social Change* 72.6 (July 1, 2005), pp. 681–696. DOI: 10.1016/j.techfore.2004.08.014.

[19] Russell Lincoln Ackoff. *Ackoff’s Best. His Classic Writings on Management*. John Wiley Sons, Feb. 16, 1999.

[20] Juliet Blenman and Di Marks-Maran. “Pressure ulcer prevention is everyone’s business: the PUPS project”. In: *British journal of nursing* 26.6 (Mar. 27, 2017), S16–S26. DOI: 10.12968/bjon.2017.26.6.s16.

[21] Carina Bååth et al. “Pressure-reducing interventions among persons with pressure ulcers: results from the first three national pressure ulcer prevalence surveys in Sweden”. In: *Journal of Evaluation in Clinical Practice* 20.1 (Feb. 1, 2014), pp. 58–65. DOI: 10.1111/jep.12079.

[22] L Nherera et al. “An economic analysis of a wearable patient sensor for preventing hospital-acquired pressure injuries among the acutely ill patients”. In: *International journal of health economics and management* (Dec. 1, 2021). DOI: 10.1007/s10754-021-09304-7. URL: https://link.springer.com/content/pdf/10.1007/s10754-021-09304-7.pdf.

[23] Elizabeth McInnes et al. “Support surfaces for treating pressure ulcers”. In: *The Cochrane library* 2018.10 (Oct. 11, 2018). DOI: 10.1002/14651858.cd009490.pub2.

[24] Qinhong Zhang, Zhongren Sun, and Jinhuan Yue. “Massage therapy for preventing pressure ulcers”. In: *The Cochrane library* (June 17, 2015). DOI: 10.1002/14651858.cd010518.pub2.

[25] Melanie Stephens, Carol Bartley, and Jo C Dumville. “Pressure redistributing static chairs for preventing pressure ulcers”. In: *The Cochrane library* 2022.2 (Feb. 17, 2022). DOI: 10.1002/14651858.cd013644.pub2.

[26] Chunhu Shi et al. “Alternating pressure (active) air surfaces for preventing pressure ulcers”. In: *The Cochrane library* 2021.8 (May 1, 2020). DOI: 10.1002/14651858.cd013620.pub2.

[27] Ju Ming Wang and Yang Gong. “Potential of Decision Support in Preventing Pressure Ulcers in Hospitals.” In: *Studies in health technology and informatics* 241 (Jan. 1, 2017), pp. 15–20.

[28] Yu-Kyeong Seo and Young Hak Roh. “Effects of pressure ulcer prevention training among nurses in long-term care hospitals”. In: *Nurse Education Today* 84 (Jan. 1, 2020), p. 104225. DOI: 10.1016/j.nedt.2019.104225.

[29] Ministerie van Volksgezondheid, Welzijn en Sport. *Personeelstekorten in de zorg*. Feb. 13, 2023. URL: https://www.igj.nl/onderwerpen/personeelstekort.

[30] Yvonne Krabbe-Alkemade et al. “Containing or shifting? Health expenditure decomposition for the aging Dutch population after a major reform”. In: *Health policy* (Jan. 10, 2020). DOI: 10.1016/j.healthpol.2019.12.016. URL: https://doi.org/10.1016/j.healthpol.2019.12.016.

[31] de Savigny and Adam. *Systems Thinking for Health Systems Strengthening*. Geneva: World Health Organization, Jan. 1, 2009.

[32] Duncan McNab et al. “Development and application of ‘systems thinking’ principles for quality improvement”. In: *BMJ open quality* 9.1 (Mar. 1, 2020), e000714. DOI: 10.1136/bmjoq-2019-000714. URL: https://doi.org/10.1136/bmjoq-2019-000714.

[33] Alexander Komashie et al. “Sick systems: Towards a generic conceptual representation of healthcare systems”. In: *ICED 11 - 18th International Conference on Engineering Design - Impacting Society Through Engineering Design* 4 (Jan. 1, 2011), pp. 430–440. URL: https://www.designsociety.org/download-publication/30569/sick_systems_towards_a_generic_conceptual_representation_of_healthcare_systems.

[34] Yufitriana Amir, J.M.M. Meijers, and Ruud J.G. Halfens. “Retrospective study of pressure ulcer prevalence in Dutch general hospitals since 2001”. In: *Journal of Wound Care* 20.1 (Jan. 1, 2011), pp. 18–25. DOI: 10.12968/jowc.2011.20.1.18. URL: https://doi.org/10.12968/jowc.2011.20.1.18.

[35] Marina Bosch et al. “Organizational culture, team climate, and quality management in an important patient safety issue: nosocomial pressure ulcers”. In: *Worldviews on Evidence-based Nursing* 8.1 (Mar. 1, 2011), pp. 4–14. DOI: 10.1111/j.1741-6787.2010.00187.x. URL: https://doi.org/10.1111/j.1741-6787.2010.00187.x.

[36] Ewa A. Crunden et al. “Reporting of pressure ulcers and medical device related pressure ulcers in policy and practice: A narrative literature review”. In: *Journal of Tissue Viability* 31.1 (Feb. 1, 2022), pp. 119–129. DOI: 10.1016/j.jtv.2021.10.010. URL: https://doi.org/10.1016/j.jtv.2021.10.010.

[37] Erik H. De Laat et al. “Implementation of a new policy results in a decrease of pressure ulcer frequency”. In: *International Journal for Quality in Health Care* 18.2 (Nov. 10, 2005), pp. 107–112. DOI: 10.1093/intqhc/mzi088. URL: https://doi.org/10.1093/intqhc/mzi088.

[38] Brigid M. Gillespie et al. “The quality and clinical applicability of recommendations in pressure injury guidelines: A systematic review of clinical practice guidelines”. In: *International Journal of Nursing Studies* 115 (Mar. 1, 2021), p. 103857. DOI: 10.1016/j.ijnurstu.2020.103857. URL: https://doi.org/10.1016/j.ijnurstu.2020.103857.

[39] Ruud J.G. Halfens, Gerrie Bours, and Claudia M. Bronner. “The impact of assessing the prevalence of pressure ulcers on the willingness of health care institutions to plan and implement activities to reduce the prevalence”. In: *Journal of Advanced Nursing* 36.5 (Dec. 1, 2001), pp. 617–625. DOI: 10.1046/j.1365-2648.2001.02024.x. URL: https://doi.org/10.1046/j.1365-2648.2001.02024.x.

[40] J.M.M. Meijers et al. “Differences in nutritional care in pressure ulcer patients whether or not using nutritional guidelines”. In: *Nutrition* 24.2 (Feb. 1, 2008), pp. 127–132. DOI: 10.1016/j.nut.2007.10.010. URL: https://doi.org/10.1016/j.nut.2007.10.010.

[41] Dewi Stalpers et al. “Barriers and carriers: a multicenter survey of nurses’ barriers and facilitators to monitoring of nurse-sensitive outcomes in intensive care units”. In: *Nursing open* 4.3 (May 27, 2017), pp. 149–156. DOI: 10.1002/nop2.85. URL: https://doi.org/10.1002/nop2.85.

[42] Mathilde Strating et al. “Creating effective quality-improvement collaboratives: a multiple case study”. In: *BMJ Quality Safety* 20.4 (Jan. 26, 2011), pp. 344–350. DOI: 10.1136/bmjqs.2010.047159. URL: https://doi.org/10.1136/bmjqs.2010.047159.

[43] Everett M. Rogers, Simon, and Schuster. *Diffusion of Innovations, 5th Edition*. Jan. 1, 2003. URL: https://www.amazon.com/Diffusion-Innovations-5th-Everett-Rogers/dp/0743258231.

[44] Kemp and Rip. “Technological Change”. In: *Human choice and climate change* (1998). Ed. by Rayner and Malone, pp. 327–399.

[45] Frank W. Geels. “Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study”. In: *Research Policy* 31.8-9 (Dec. 1, 2002), pp. 1257–1274. DOI: 10.1016/s0048-7333(02)00062-8. URL: https://doi.org/10.1016/s0048-7333(02)00062-8.

[46] Saima Hinno, Pirjo Partanen, and Katri Vehviläinen-Julkunen. “Nursing activities, nurse staffing and adverse patient outcomes as perceived by hospital nurses”. In: *Journal of Clinical Nursing* 21.11-12 (Dec. 15, 2011), pp. 1584–1593. DOI: 10.1111/j.1365-2702.2011.03956.x. URL: https://doi.org/10.1111/j.1365-2702.2011.03956.x.

[47] Emfietzoglou. *Osmosis - Semi-Fowler Position: What Is It, Difference from Fowler, and More*. Ed. by Haag, Miao, and LaFayette. URL: https://www.osmosis.org/answers/semi-fowler-position (visited on 09/15/2023).

[48] W. Verbeke, Marco Volgering, and Marco G.P. Hessels. “Exploring the Conceptual Expansion within the Field of Organizational Behaviour: Organizational Climate and Organizational Culture”. In: *Journal of Management Studies* 35.3 (May 1, 1998), pp. 303–329. DOI: 10.1111/1467-6486.00095. URL: https://doi.org/10.1111/1467-6486.00095.

[49] Edgar H. Schein. “Culture: the missing concept in organization studies”. In: *Administrative Science Quarterly* 41.2 (June 1, 1996), p. 229. DOI: 10.2307/2393715. URL: https://doi.org/10.2307/2393715.

[50] Lori Schirle, Brian E. McCabe, and Victoria B. Mitrani. “The relationship between practice environment and psychological ownership in advanced practice nurses”. In: *Western Journal of Nursing Research* 41.1 (Jan. 22, 2018), pp. 6–24. DOI: 10.1177/0193945918754496. URL: https://doi.org/10.1177/0193945918754496.

[51] Emma Wikfeldt. “Generalising from Case Studies”. In: *Halmstad University* (Jan. 1, 2016). URL: http://www.diva-portal.org/smash/record.jsf?pid=diva2:1051446.

A

Time schedule

The time schedule is build around four important moments within the planning of the thesis: the start, the kick-off meeting, the midterm meeting, and the green light meeting. These are the main moments of assessment where the progress within this thesis will be tested. In between these assessment moments, the data collection and analysis is displayed for answering the sub-questions of this thesis. Last, some room for delay within the process of data collection or documenting this thesis is shown. Also, this is done to take into account unprecedented circumstances or unfortunate events that might occur whilst performing this research.

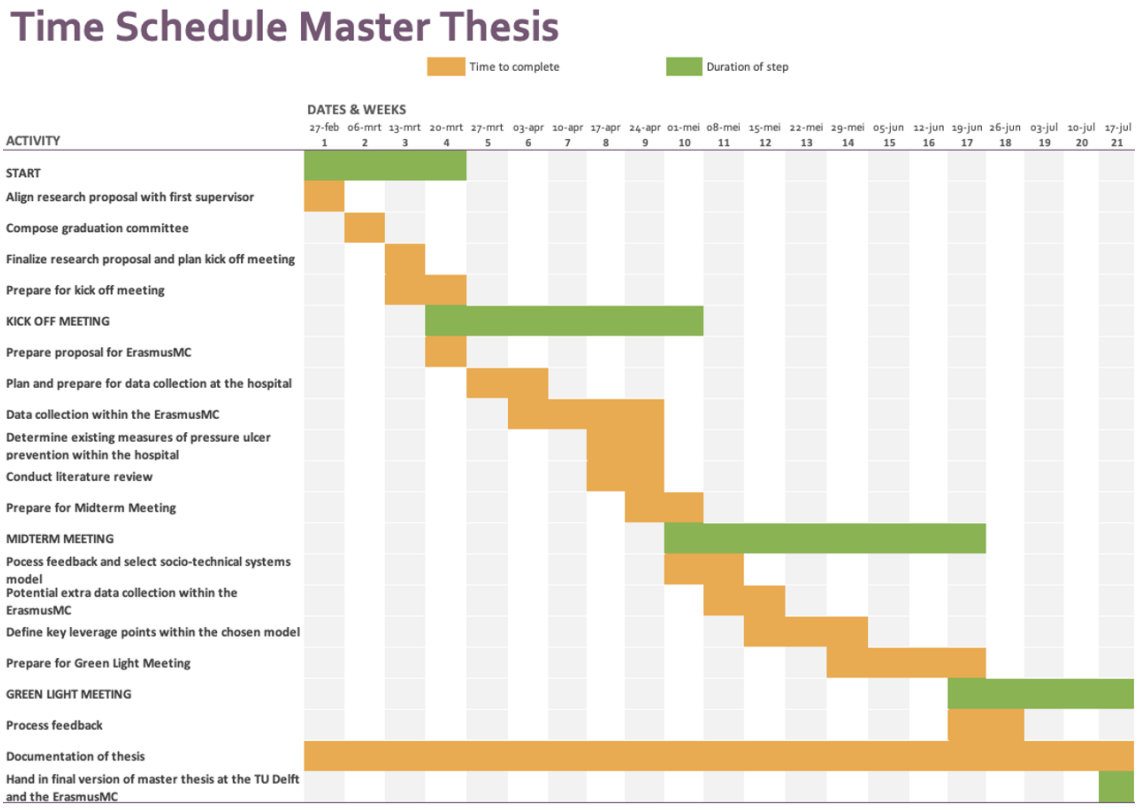

Figure A.1: Gantt chart time schedule

B

Questions for semi-structured interview

Persoonlijk

1. Wie ben je en wat doe jij binnen het ErasmusMC?
2. Hoe vind je het werken binnen het ErasmusMC?
3. Hoe ben je hier gekomen?
4. Hoe ziet de toekomst eruit?

Decubitus

1. Wat weet je van Decubitus binnen het ErasmusMC?
2. Wie zijn er volgens jou allemaal bij betrokken?
3. Wie is waarvoor verantwoordelijk?
4. Welke preventiemaatregelen zijn er allemaal wat betreft Decubitus?
5. Wat vind je van de preventiemaatregelen die zijn getroffen/worden genomen?
6. Hoe denk jij dat Decubitus binnen het ErasmusMC gepreventeerd kan worden?
7. Gaat het ergens mis? Of gaat het juist goed? Kunnen er dingen beter?
8. Hoe wordt Decubitus besproken binnen het ErasmusMC?
9. En de preventie hiervan?
10. Wordt er bijvoorbeeld gekeken naar andere ziekenhuizen?

Kwaliteitskompas

1. Wat is het kwaliteitskompas?
2. Hoe is dit tot stand gekomen?
3. Wat vind je ervan?
4. Gebruik je het zelf veel?
5. Wat hoor je over het kwaliteitskompas?
6. Krijgen jullie veel feedback?
7. Zo ja. Wat doen jullie hiermee?
8. Zo nee. Waarom niet?
9. Wie gebruiken het kwaliteitskompas allemaal?
10. Hoe hebben jullie het geïmplementeerd?
11. Werkt het?

C

Adjusted questions for semi-structured interview

Vragen AI

1. Hoe zijn jullie begonnen met het programma?
2. Hoe ziet het model eruit?
3. Waar lopen jullie tegenaan?
4. Wat moet het allemaal kunnen?
5. Zijn er vervolgplannen?
6. Met hoeveel man werken jullie eraan?
7. Wat is de kern van het model?
8. Wat doen jullie nog meer op het gebied van AI?

Matrassen

1. Wat is er allemaal gebeurd met de inkoop van de matrassen?
2. Hoe ging dit voorheen?
3. Hoe verloopt het proces?
4. Wie zijn er allemaal bij betrokken?
5. Hoe wordt een dergelijk contract opgesteld?
6. Waar moet het allemaal aan voldoen?
7. Kijken jullie hierbij ook naar andere ziekenhuizen?
8. Wat vind jij van de matrassen die zijn besteld?
9. Wat zijn de mogelijkheden?
10. Wat voor een invloed heb jij/jouw afdeling op het proces?
11. Hoe verloopt het proces binnen de afdeling en wat betreft het opstellen van contracten voor aankopen binnen het ErasmusMC?

D

Informed consent form Dutch

GEINFORMEERDE TOESTEMMINGSFORMULIER

Openingsverklaring

Je wordt uitgenodigd om deel te nemen aan het onderzoek met de titel *Preventing pressure ulcers within the ErasmusMC*. Dit onderzoek wordt gedaan door *Simon ter Laak* van de TU Delft in samenwerking met het ErasmusMC.

Het doel van dit onderzoek is *om erachter te komen waarom de huidige maatregelen van de preventie van decubitus niet werken zoals verwacht en bedoeld* en zal ongeveer 30 minuten duren. De verzamelde data zal worden gebruikt om een master scriptie te schrijven die wordt gepubliceerd binnen de TU Delft. Er zal worden gevraagd om *uw ervaringen met betrekking tot de preventie van decubitus in het ErasmusMC* te omschrijven.

- Dit interview zal worden opgenomen en daarna getranscribeerd. Vervolgens zal er een samenvatting worden geschreven van de antwoorden die u zult geven.
- De samenvatting zal worden gebruikt in de MSc scriptie. Alvorens deze zal worden gebruikt, zal uw expliciete toestemming worden gevraagd voor de publicatie van deze samenvatting in de scriptie.

Met elke activiteit online bestaat er een risico op gegevensschendingen. De antwoorden die u geeft zullen tot ons beste vermogen vertrouwelijk blijven. We minimaliseren het risico hierop door alle verzamelde data uit het interview op te slaan binnen de dataopslag van de TU Delft (alleen toegankelijk voor gekwalificeerd personeel binnen de TU Delft). Ik zal een samenvatting toesturen van dit interview en zal wachten op uw toestemming en terugkoppeling voordat het gepubliceerd wordt.

Alle persoonlijke data die wordt verzameld tijdens dit interview zal worden verwijderd tot maximaal één maand na het voltooien van de het project (opnames, transcript en potentiële notities). De samenvatting, mocht u hiervoor toestemming geven, zal verschijnen in de bijlage van de master scriptie.

Uw participatie in dit onderzoek is volledig vrijwillig en u kunt zich ten alle tijden terugtrekken. U bent vrij om vragen te stellen. Ondanks onze uiterste inspanning zou het kunnen voorkomen dat u wordt geïdentificeerd aan de hand van de informatie die wordt weergeven in de samenvatting. Mocht u of het TU Delft onderzoeksteam enige twijfels hebben hierover, dan zal de samenvatting niet worden gepubliceerd.

[redacted]

EXPLICIETE TOESTEMMINGSPUNTEN

GELIEVE HET JUISTE VAKJE AAN TE VINKEN	Yes	No
A: ALGEMENE OVEREENKOMST – ONDERZOEKSDOELEN, DEELNEMERSTAKEN EN VRIJWILLIGE DEELNAME		
1. Ik heb de bovenstaande informatie over het onderzoek gelezen en begrepen of het is aan mij voorgelezen. Ik heb vragen kunnen stellen over het onderzoek en mijn vragen zijn naar tevredenheid beantwoord.	☐	☐
2. Ik stem er vrijwillige mee in om deel te nemen aan dit onderzoek en begrijp dat ik ten alle tijden kan weigeren om vragen te beantwoorden of mij kan terugtrekken uit het onderzoek zonder dat ik hier een reden voor hoef te geven	☐	☐

_____ _____ _____

Naam van deelnemer Handtekening Datum

Contact gegevens onderzoek voor verdere informatie: [redacted]

E

Informed consent form English

Delft University of Technology
HUMAN RESEARCH ETHICS
INFORMED CONSENT

Opening statement

You are being invited to participate in a research study titled *Preventing pressure ulcers within the ErasmusMC*. This study is being done by *Simon ter Laak* from the TU Delft in cooperation with ErasmusMC.

The purpose of this research study is *to get to know why the current measures of preventing pressure ulcers are not working as expected and intended and* will take you approximately 30 minutes to complete. The data will be used for writing a master thesis that is going to be published within the TU Delft. We will be asking you to *describe your experiences regarding the prevention of pressure ulcers within the ErasmusMC*.

- This interview will be recorded and then transcribed. Then a summary is written from the responses you give.
- The summary will be included in the MSc thesis. Before that we will request your explicit approval for the publication.

As with any online activity the risk of a breach is always possible. To the best of our ability your answers in this study will remain confidential. We will minimize any risks by storing all the data collected from the interview within the TU Delft storage (only accessible by qualified personnel within the TU Delft). I will send you the summary of this interview and will wait for your approval and feedback before publication.

All personal data collected during this interview will be deleted at the latest one month after the completion of the project (recording and transcript and potential notes)
The summary, should you approve it, will be the in the appendices of the master thesis.

Your participation in this study is entirely voluntary and you can withdraw at any time. You are free to omit any questions. Despite our best effort, it could be that you may be re-identified based on the information contained within the summary. Should you, or the TUD research team, have any doubts in that regards, the summary will not be made publicly available.

[redacted]

EXPLICIT CONSENT POINTS

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
A: GENERAL AGREEMENT – RESEARCH GOALS, PARTICPANT TASKS AND VOLUNTARY PARTICIPATION		
1. I have read and understood the study information above, or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	☐	☐
2. I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	☐	☐

Signatures

_____ _____ _____

Name of participant [printed] Signature Date

Study contact details for further information: [redacted]

F

Code list

Table F.1: Code list for textual analysis

Code	Code Group 1	Code Group 2	Code Group 3	Code Group 4	Code Group 5	Code Group 6	Code Group 7	Code Group 8	Code Group 9	Code Group 10
Aandachtsvelders	People									
Beleid decubitus		Regulations and policies								
Bottom up vs. top down			Organisational structure							
Communicatie andere ziekenhuizen		Regulations and policies	Organisational structure							
Cultuur ziekenhuis				Culture						
Functie binnen ziekenhuis	People									
Gelaagdheid ziekenhuis			Organisational structure							
Gewenste effect maatregelen		Regulations and policies			Processes					
Huidige situatie decubitus						Current measures				
Informatiestroom ziekenhuis							Data/information			
Innovatie decubitus								Technology		
Kennis decubitus	People						Data/information			
Kwaliteitskompas										
Maatregel decubitus						Current measures				
Materiaal									Resources/-material	
Mening decubitus	People			Culture						
Proces decubitus					Processes					
Randvoorwaarden preventie						Current measures				

Scoringsmetho-den decubitus						Current measures				
Stappenplan maatregelen decubitus		Regulations and policies				Current measures				
Twijfel maatregel	People	Regulations and policies		Culture						
Verantwoordeli-jkheid decubitus		Regulations and policies	Organisational structure							Tasks
Verpleegkundig eigenaarschap	People			Culture						Tasks