Improving Care Coordination in Regional Oncology Care Pathways

MSc Thesis

Stefanie den Engelsman

TU Delft

Improving Care Coordination in Regional Oncology Care Pathways

Developing a Coordination Improvement Framework for Comprehensive Cancer Networks

By

Stefanie den Engelsman

in partial fulfilment of the requirements for the degree of

Master of Science
in **Management of Technology**

at the Delft University of Technology,
to be defended publicly on Thursday April 25th, 2024 at 16:00.

Supervisor:	Dr. N. van der Linden	TU Delft
Thesis committee:	Prof.dr.ir. M.F.W.H.A. Janssen	TU Delft, Chair
	Tim Duijf	Qconsult Zorg
	Frank de Roo MBA, MPA	Qconsult Zorg

Cover page: https://gentem.com/blog/exciting-news-for-private-medical-practices/

This page is intentionally left blank

Executive summary

This research investigates coordination and related improvement possibilities between hospitals delivering joint care via collaboration in regional oncology care pathways.

The Dutch healthcare system is under pressure due to an increasing number of cancer patients combined with increased complexity, multidisciplinary and personalisation of care. A shift in the organisation of oncology care is observed towards collaboration between hospitals in (regional) oncology networks (CCNs) to allow high-quality care and maintain accessible, and affordable care in the future. The collaborating hospitals align their care processes and design a joined regional care pathway (RCP)[I] to standardise and structure healthcare services. Within an RCP the patient is transferred between hospitals in the CCN. Often, the patient receives a diagnosis and simpler treatments like chemotherapy in a hospital nearby, but for more specialised and complex care like surgery, the patient is transferred to the "surgical" or expert hospital of the CCN.

Problem statement and research objective

The various disciplines and institutions involved within the CCN in the delivery of needed care in the different phases of disease ask for coordination of care, clear agreements, and proper handovers of tasks between healthcare professionals. Inter-organisational collaborations within CCNs introduce new challenges regarding coordination compared to intra-hospital collaborations, because within RCPs organisational and geographical boundaries are crossed besides boundaries between specialisms. Newly introduced challenges and prerequisites in RCPs are for example information exchange of medical records and creating a well-organised governance structure.

A heterogeneity of definitions and theoretical models for care coordination are identified in scientific literature. However, care coordination within the setting of RCPs has not yet been researched. Additionally, research on inter-organisational networks and RCPs in care is scarce and current models for care pathways within single hospitals and integrated care pathways (ICPs)[II] do not sufficiently account for the coordination challenges in RCPs.

This thesis aims to contribute to the gap in the literature by developing a framework including aspects of care coordination to support hospitals within a regional oncology network in coordinating care among the hospitals. The framework gives insight into the elements and actions influencing coordination processes within and between teams in the RCP. Moreover, evaluation measures and potential improvement possibilities are outlined to support coordination between hospitals. The main objective is to give insights into the way care coordination within RCPs can be improved. The developed framework can facilitate this aim by supporting hospitals in identifying the important aspects of coordination, outlining corresponding evaluation measures, and improvement directions for each aspect in the context of RCPs.

[I] A (regional) care pathway describes the route of a patient with a specific medical condition from diagnosis to follow-up and includes the tasks that need to be completed at each stage.

[II] An integrated care pathway (ICP) shows similarities with an RCP but is generally more focused on aligning and connecting different types of organisations/sectors across the continuum of health and thereby linking the cure and care sector. The main differences between RCPs and ICPs are that RCPs generally include a more extensive collaboration and has higher interdependencies of tasks between the different partners.

Methodology

A mixed-method approach is used including a literature search, semi-structured interviews, supplemented by observations at the case study hospital which is part of a CCN (referred to as a case study network). An initial conceptual framework of care coordination was selected based on the literature search by combining different papers describing models and aspects of coordination. Additional targeted literature searches were completed to define each aspect of the framework and identify evaluation measures, and potential improvement actions related to each aspect. The semi-structured interviews took place with different stakeholders of CCNs: 1) healthcare professionals working in CCNs e.g. project coordinators, nurses, and physicians; 2) interviewees with other roles such as policymakers, and researchers; 3) patients. The interview questions were derived from the research questions and covered a broad range of topics because questions about all research sub-questions were included. The interviews served two main goals: 1) grasp an overview of the aspects of coordination within RCPs to adjust the conceptual framework; and 2) get to know the state of coordination in the Netherlands including experienced challenges, success factors and potential improvement possibilities. Lastly, the information obtained about the case study network during the interviews and observations was utilised to assess the situation of the case study network with the developed framework.

Findings

The definition of care coordination was derived from literature and defined to bridge "gaps" between healthcare professionals who have interdependent sequencing tasks in the RCP of a patient. The framework for Care Coordination in Chronic and Complex Disease Management, originally developed by Weaver et al. (2018), was opted as the initial conceptual framework, and the adjustments suggested by Duan-Porter et al. (2022) were incorporated. The framework differentiates coordination at the two levels, within and between healthcare teams or organisations. However, because of the focus on RCPs, only the aspects describing coordination between healthcare teams have been included. The conceptual framework categorises the aspects of care coordination in domains creating an overview of how different input factors, coordination mechanisms/actions and behaviours impact outcomes of care. This framework was extended with three additional aspects[III] identified by two studies retrieved during the literature search to ensure a comprehensive coverage of aspects. Based on the interview findings, two extensions of the framework were made by including alignment of resources and processes besides cultural alignment, and the importance of leadership/coordination at the network level besides the boundary spanning role of the case manager at the patient level. Figure shows the final proposed framework for RCPs. All aspects of the original conceptual framework applied to RCPs, yet some overlap between some concepts was identified.

The literature search revealed many evaluation instruments of care coordination which were heterogeneous in setting and aspects of coordination. Accordingly, no general measure assessing the quality and state of coordination covering a majority of aspects was identified. Measures were distinguished into two categories: 1) tools filled out by individuals e.g. surveys or observation forms; 2) indicators based on available data from the electronic medical record (EMR) or national register. For most aspects of the framework potential evaluation measures were identified, but these were not yet combined into one general tool. The interviewees revealed most hospitals and CCNs currently mainly use the national registers (like SONCOS and DICA) to obtain data for the evaluation of the RCP.

[III] being shared goals, knowledge, and need for coordination.

Monitoring enhances coordination by reviewing the progress and facilitating the timely detection of errors in the care pathway of patients. Two different types of monitoring could be distinguished: 1) retrospective/strategic monitoring, providing steering information to assess performance compared to standards; 2) operational monitoring, including monitoring the delivery of healthcare services and detecting potential errors or delays. CCNs mainly experience challenges regarding operational monitoring within RCPs. This is caused by the hospitals having no access to the EMR system of the other hospitals and insufficient information exchange and communication. Due to the lack of a monitoring dashboard, interviewees currently monitor patients by scheduling moments to check the status of the patients.

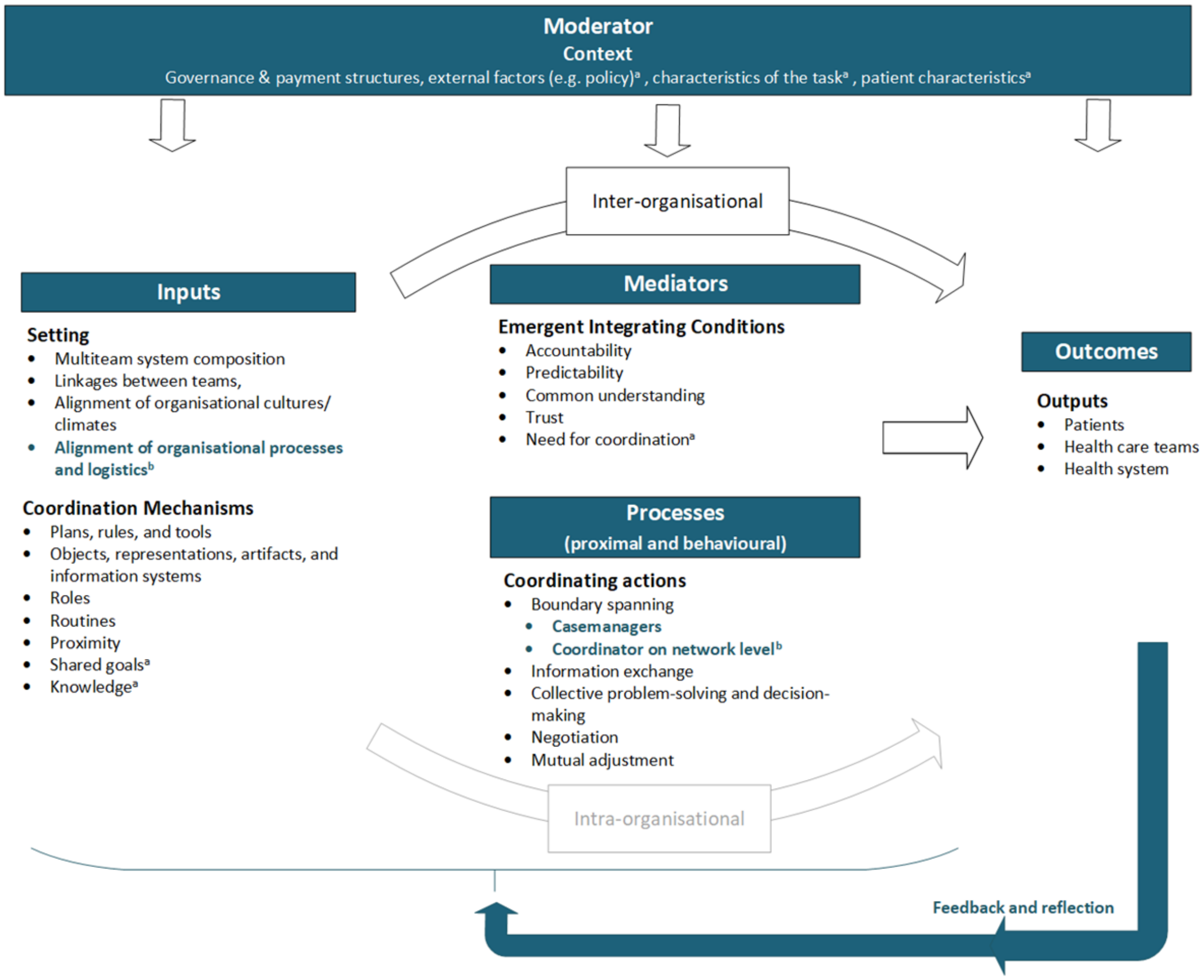


Figure I: Framework of care coordination as proposed in this thesis. Original framework is adapted from Duan-Porter et al. (2022). [a] aspects added to the original framework during literature search. [b] aspects added based on the interview results.

A well-designed monitoring system will support healthcare professionals in the coordination. The system can create an overview of the care process and tasks. Reminders and alerts are beneficial for these monitoring systems to signal new tasks, delays, and potential errors within the care process. Dashboards are a useful tool to standardise and harmonise monitoring methods but are time- and labour-intensive to create. Challenges in creating dashboards are unstructured data within the EMR and the differences in data warehouses between the hospitals. Interviewees aspire regional shared dashboards but are still investigating options for steering information and opportunities to create dashboards at the network level.

Conclusion

The developed framework allows an extensive overview of aspects of care coordination in oncology networks and lists evaluation measures and improvement initiatives for each aspect. The framework could guide RCPs in improving care coordination by evaluating the current state of coordination within the CCN and selecting appropriate improvement initiatives.

Most challenges described by the interviewees related to ambiguity and unclarity about roles and responsibilities which were caused by imperfect communication, misunderstandings, or undefined steps in the protocols. Based on the literature search and the described challenges by interviewees, the following aspects could be considered most important to improve existing RCPs:

1) Information exchange and communication could be improved by setting standards for communication and information transfer. Standardised formats and routines could facilitate the complete, timely, uniform, and unambiguous exchange of information. Ideally, solutions allowing easier information transfer of patient records that are currently investigated are implemented, such as an MDM portal or other (EMR) data-sharing solutions.
2) Shared RCP protocols should be documented and aligned with all partners. The RCP protocol should clearly describe roles, agreements, responsibilities, and throughput times for each step of the RCP.
3) Develop trust and proximity by getting to know each other, facilitating low-threshold contact, and meeting each other in person. This will facilitate collective problem-solving, communication, and self-correction mechanisms when deficiencies in the process arise.
4) Organise the role of a boundary spanner at the level of the patient via case management and at the level of the network via the network programme office (manager).

A well-designed monitoring system including reminders and alerts will support healthcare professionals in the coordination. Besides operational monitoring, the RCP and coordination should be evaluated with steering information. Dashboards could be used for these purposes but are challenging to build due to non-standardised and non-harmonised data in the EMR.

Practical recommendations and implications

Even though the framework focused on oncology CCNs, the framework and its various aspects will likely have relevance to RCPs of other medical conditions and other inter-organisational collaborations in healthcare.

CCNs and hospitals could start by investigating the state of the four aspects mentioned in the conclusion. The aspects of the framework could first be quickly assessed to get a general idea of the status of coordination in the CCN and identify areas for "quick wins" in improvements. Thereafter, a detailed analysis for a limited number of aspects could be conducted including more elaborate evaluation measures. Based on these analyses select the appropriate improvement actions. Implementation of improvements calls for more than a right tool; it also concerns other resources like time, knowledge and skills, and financing combined with cultural and behavioural changes within the organisations.

Many challenges are experienced by several regions, such as challenges in digital information exchange or regional case management. Therefore, it is important to exchange useful tools and facilitate learning from each other within and between CCNs. In several of these larger challenges, policy and the government should play a role by bringing the CCNs together to further scale-up initiatives. In challenges related to governance and financing structures, the government has a crucial role in facilitating care provided within RCPs.

Scientific contribution and recommendations for further research

The founded scientific literature base about CCNs and RCPs is small. This paper extends the current literature by creating a care coordination framework for RCPs and CCNs by extending earlier frameworks with the results from semi-structured interviews. The proposed framework creates an understanding of the different relations between the aspects and how these have a role in RCPs. Additionally, the interviews with different stakeholders allowed us to create an overview of the current challenges and improvement actions regarding coordination in the field. Within the framework evaluation measures and improvement actions are linked to each aspect, which was not done in the identified earlier studies.

Further research could deepen the understanding of how the different aspects interact and how each aspect affects care coordination. In collaboration with healthcare professionals, more depth in the measures and their validity could be provided and a general measurement tool could be developed for care coordination in RCPs. Moreover, this thesis shows the importance of further research on standardisation and harmonisation of data from the EMR systems to create opportunities for information exchange and shared monitoring dashboards. However, the feasibility and cost-efficiency of dashboards compared to other monitoring methods should also be explored in more detail.

Table of Contents

List of abbreviations

CCN	Comprehensive Cancer Network[a]
(PET-)CT scan	(Positron Emission Tomography)-Computed Tomography Scan
DICA	Dutch Institute of Clinical Auditing
EMR	Electronic Medical Record
GP	General Practitioner
HiX	EMR system from the manufacturer Chipsoft
ICA	Integrated Care Act
ICP	Integrated Care Pathway
ICPAT	Integrated Care Pathway appraisal tool
IT	Information technology
MDM	Multidisciplinary (team) Meeting
PDCA cycle	Plan-Do-Check-Act cycle
RCP	Regional Care Pathway
RMIC	Rainbow Model of Integrated Care
SONCOS	*Stichting Oncologische Samenwerking*
SPKS	Patient federation: *Stichting voor Patiënten met Kanker aan het Spijsverteringskanaal*
SQ	Sub-question
XDS	Cross Document Sharing

[a] CCN is used for all types of regional oncology networks. No difference between the supra-regional networks and regional networks is made.

Note: In this report, the pronoun 'his' is used for brevity and clarity, but it is intended to be inclusive for all genders and can be replaced with 'her' or a gender-neutral form.

1. Introduction

1.1 Background

The Dutch healthcare system is under pressure because of an increase in the number of individuals having cancer while simultaneously care becomes more multidisciplinary, personalised and complex (Zorginstituut Nederland, 2023a). Several Dutch healthcare parties and the Ministry of Health have signed the Integrated Care Act (ICA) to retain accessibility, quality and affordability of care in the future (*ICA*, 2022). Agreements within this act focus on the right care in the right place, shared decision-making, quality of life, and further and better collaboration among care organisations within a region. Regional collaboration, coordination, and agreements are necessary not only between hospitals but also between hospitals and primary or social care organisations to realise appropriate, high-quality care (Mériade & Rochette, 2021).

Movement towards regional oncology networks

Cancer treatment is complex and needs cooperation and collaboration beyond disciplinary boundaries. The multiple specialisms taking part in the care process make multidisciplinary coordination necessary. These multidisciplinary collaborations have formed over the last decades mainly within hospitals. Collaborations between hospitals in networks of oncology care are formulated as the most important way to further improve the quality and affordability of cancer care (*ICA*, 2022). In the near future, each hospital should be part of at least one oncology network (Platform Oncologie - SONCOS, 2023). Hospitals state national policies like ICA and volume norms as reasons for the collaboration among hospitals (interviewees, personal communication, 2024).

The concentration of care forced by national policies including volume norms is one of the motives for the initiation of collaborations and oncology networks. Volume norms prescribe that each location of a hospital should conduct a minimum number of surgeries for a specific medical condition per year, to be allowed to continue offering this type of care (Platform Oncologie - SONCOS, 2023). These volume norms were introduced to ensure the quality of care. The volume norms imply collaboration between hospitals is needed to keep the care for some medical conditions within a region and thereby ensure the accessibility of care throughout the country. The volume norms are likely to increase towards at least 50-100 treatments per location per year making regional oncology networks likely to grow, with more hospitals collaborating together (Gijsen et al., 2022; *ICA*, 2022).

If the oncology network is organised effectively the motto of *“care close by if possible, further away if necessary”* (Cancer Center Amsterdam, 2019, p. 10) can be achieved (Zorginstituut Nederland, 2022a). In regional oncology networks, this is often translated by the patient receiving a diagnosis and treatments like chemotherapy in a hospital nearby, but for more specialised and complex care like surgery will be delivered by the expert “surgical” hospital of the regional collaborative network. These collaborations obtain a higher value of care according to interviewees recruited for this thesis by combining expertise from different hospitals, having more specialists determining the treatment plan and encountering a higher number of cases results in improved expertise through more experience (personal communication, 2024). Networks allow healthcare professionals[1] to have “*structural insights into best practices within their network, leading to a continuous drive for improvement*” (Integraal kankercentrum Nederland, 2021, p. 40).

---

[1] A healthcare professional is any individual involved in the delivery of care including physicians, nurse (practitioners), secretary and other hospital staff.

Additionally, lower variability in treatment across the region is achieved by collaboration within oncology networks by having similar or joint treatment protocols (Integraal kankercentrum Nederland, 2021; van Hoeve et al., 2023). Networks help to ensure that regardless of where a patient lives or which hospital they visit, each patient will receive similar care based on the latest knowledge (Zorginstituut Nederland, 2022b). A national policy advisor mentioned they aim to move towards having similar care on a national level, but similar care in each oncology network is already a first step forward to achieve this (policy advisor, personal communication, January 5, 2024).

Care coordination in regional care pathways

When organising care within regional oncology networks, good care coordination becomes crucial, especially when patients are transferred between hospitals for parts of their care pathway. Collaborating hospitals design and align their care pathways by developing a regional care pathway (RCP) to standardise and structure healthcare services (De Bleser et al., 2006). A (regional) care pathway describes the route of a patient with a specific medical condition from diagnosis to follow-up and facilitates coordination between the hospitals. Care coordination has been recognised to be important to improve the quality of care and reduce waiting times. Additionally, care coordination is considered a priority area for improving patient care across the lifespan (Lodewijckx et al., 2012; Schultz & McDonald, 2014). The various disciplines and institutions involved in delivering the needed care in the different disease phases ask for coordination of care, clear agreements and proper handovers of tasks (Visserman et al., 2014). Coordination of care becomes more important when more healthcare professionals or other hospitals are involved, since alignment and collaboration between more partners with more distance is needed (Zorginstituut Nederland, 2023a). Also, new prerequisites and challenges linked to care coordination arise in RCPs like digital information exchange of medical records, developing shared agreements and arranging a governance structure. These conditions should be met to stimulate and facilitate close alignment and collaboration within the network (*ICA*, 2022). The oncology region should facilitate meeting these prerequisites, and coordinate and facilitate the regional care pathway (Zorginstituut Nederland, 2023a). Poor coordination and fragmented care will compromise the quality of care and increase the chances of medical errors (McDonald et al., 2007).

Current literature about care coordination in regional care pathways

The current models on care pathways within single hospitals (Van Houdt et al., 2013a) do not sufficiently account for the challenges of collaborating and aligning aspects of an RCP between network partners. For example, the need for information sharing and being able to have insights into the electronic medical record (EMR) becomes more relevant to be able to follow a patient through the RCP. Moreover, the tools and measures designed for care pathways are often decision-support tools to help decide the appropriate treatment or data mining methods to extract information with no direct focus on coordination.

The importance of concepts related to care coordination like cooperation, organisational and professional alignment, clinical leadership and centralised and shared information are identified for Integrated Care Pathways (ICPs)[2] (Mériade & Rochette, 2021). However, specific research on

---

[2] An integrated care pathway (ICP) shows similarities with an RCP but is generally more focused on aligning and connecting different types of organisations/sectors across the continuum of health and thereby linking the cure and care sector (Suter et al., 2009). The main differences between RCPs and ICPs are that RCPs generally include a more extensive collaboration and higher interdependencies between the different partners (see section 2.3).

coordination in RCPs and the differences and/or similarities in coordination between ICPs and RCPs is currently lacking in literature.

Frameworks and measures evaluating coordination of care are limited to certain settings/contexts and perspectives (patient/family, healthcare provider or system) or have substantial limitations regarding their comprehensiveness and psychometric quality (Bautista et al., 2016; Valentijn et al., 2023). The measures for coordination of care either focus on a single hospital (without concerning care pathways) or integrated care pathways (Schultz et al., 2013; Valentijn et al., 2013). The available dashboards and digital tools related to care pathways are mainly focused on medical outcomes or decision-support for physicians based on medical guidelines, patient-specific characteristics, and deviations from the pathway (Blaser et al., 2007; Huang et al., 2012; Klucken et al., 2018). However, these tools do currently not cover concepts of care coordination or real-time monitoring of the treatment phase of the patient.

Overall, regional oncology networks (CCNs) are a relatively new way of organising collaborations in a structured contracted way (Gijsen et al., 2022). And more collaboration pushed by ICA and the new volume norms is likely needed in the future. In these regional collaborations care coordination plays an important role. Care coordination between healthcare professionals becomes important in these situations to have a synchronised, efficient care pathway for the patient. However, knowledge about the ways care coordination can be improved and evaluated is lacking.

1.2 Problem statement and research relevance

Scientific literature about care coordination and care pathways is heterogeneous and has not been combining regional oncology networks with care coordination. This thesis aims to contribute to the gap in the literature by investigating aspects and measures of functional integration and care coordination in the context of regional oncology networks. This will give insight into coordination components and identify best practices for coordination of care within CCNs. This will facilitate the shift towards RCPs and improve the current pathways (Lodewijckx et al., 2012). Moreover, the current models on care pathways often explain the aspects of implementation of the RCP, but do not cover monitoring options and improvement possibilities. Ways to monitor patients within a (regional) care pathway effectively have not been studied in detail.

On a practical and managerial level within hospitals, this thesis guides hospitals with which aspects should be considered regarding care coordination and which aspects should be regarded as prerequisites for good care coordination. Currently, hospitals in the Netherlands experience difficulties in some aspects of care coordination like information exchange including sharing information from the EMR (Regionale oncologienetwerken, 2023a). A case study will be used to apply the developed framework to the situation of the oesophagus and gastric cancers in a regional oncology network in the Netherlands, with a particular focus on one of the hospitals. The care providers at the case study hospital presented the care coordination challenges they encountered, resulting in reduced efficiency within the care pathway. This case allows us to include the hospital and healthcare professional perspective.

Additionally, the healthcare professionals of the case study hospital expect monitoring of patients to enhance care coordination by gaining insights into the positioning of the patient within the predetermined care pathway and the associated actions. Healthcare professionals assume monitoring will require less personal communication to coordinate care by giving insights into the phase and tasks, which helps to ensure the timely delivery of appropriate care without unnecessary delays. Moreover, it could be hypothesised that knowing the number of expected treatments and surgeries via the monitoring system, could improve planning and logistics, thereby preventing unnecessary delays.

Therefore, the methods of monitoring patients, the impact of monitoring and how this should be used (managerial and operational) are also included within the scope of this thesis.

The main objective of this thesis is to design a framework that could support hospitals operating within a regional oncology network in the coordination and alignment of care among the partner hospitals. This framework includes the aspects that should be considered and methods hospitals could use to measure and evaluate the coordination of care of RCPs. Moreover, insights into the current challenges regarding care coordination in oncology networks according to healthcare professionals are sketched. The case of the oncology region is used to apply the framework and methods identified to get an idea of the current situation in their RCP of oesophagus and stomach cancer.

In addition, monitoring methods on the patient level for operational use by the hospital to potentially improve care coordination are explored. These methods should allow healthcare professionals to follow the location of patients through the entire care pathway, even when patients are (temporarily) treated in a different hospital. The limited time range of the research does not offer the opportunity to implement and evaluate certain monitoring methods to improve the coordination of care within the setting of the case study.

Care coordination in this thesis will be mainly discussed from the perspective of healthcare professionals and hospitals in contrast to earlier studies mainly focusing on the patient perspective and their experiences. The views of the healthcare professionals are regarded and improvement actions focused on helping them with their tasks are discussed. Since many regional oncology networks are already formed via the earlier existing organic collaborations between hospitals, the focus will be on already existing oncology networks. Therefore, this thesis focuses on networks already having a shared RCP instead of newly started oncology network collaborations in which the RCPs need to be developed.

1.3 Research questions and research objectives

The main objective of the study is to develop a framework to support the improvement of coordination and alignment of care in regional oncology care pathways. The main research question is defined as:

How can coordination between collaborative hospitals organised in a regional oncology care pathway be improved?

Sub-questions

To investigate the main research question five sub-questions (SQs) were defined.

The focus of the first sub-question (SQ) will be on the differences between care pathways within a single hospital, integrated care pathways and regional care pathways. The answer to the first sub-question will clarify the link between the currently existing literature about care coordination in single hospital care pathways, regional collaborations (either in ICPs or RCPs) and RCPs.

1. How do regional care pathways (and coordination within these pathways) differ from integrated care pathways and care pathways within a single hospital?

The second and third sub-questions focus on care coordination. The second sub-question identifies relevant frameworks for care coordination and aspects delineating care coordination (e.g. communication). The status of care coordination should be evaluated using measures to identify improvement possibilities for care coordination. In the third sub-question, methods to evaluate the state of the different aspects of coordination identified in the second sub-question are studied. Additionally, improvement actions for each aspect of coordination are outlined by describing current and potential improvement activities for RCPs to answer the main research question.

2. What conditions should be fulfilled to achieve good coordination within a regional care pathway?
3. Which tools and measures could be used to give insights/monitor the coordination of care in the context of a regional care pathway?

Monitoring patients is hypothesised to be one of the ways to improve care coordination in RCPs (Kianfar et al., 2019; personal communication, 2023). Insights into patient flows, the care services that are already provided, and the planned care activities for a patient could help determine the planning for each individual patient. The fourth sub-question explores the potential methods to monitor patients and processes within an RCP. This includes the challenges of monitoring the patients while they receive care in a different hospital.

4. How could collaborating hospitals within a regional care pathway organise monitoring and follow-up of patients (while patients receive care in different hospitals)?

Once other potential solutions for monitoring patients are described, a further focus is placed on a dashboard. Dashboards are assumed to be one of the primary tools for facilitating patient monitoring across hospitals[3]. The aim of the dashboard should be to display where a patient is located in the care pathway and which care activities are expected in the near future. The conditions and challenges for this dashboard will be the main focus of this sub-question.

5. What are the requirements/recommendations for a dashboard aiming to improve coordination of care in the shared regional care pathway?

1.4 Connection to Management of Technology

The switch towards regional care pathways and regional oncology networks requires changes in governance structures from all collaborating partners. Coordination at the network level includes governance and the way the oncology network is structured. Management-related elements at this level include organising the collaboration, aligning the interests of different stakeholders, and evaluating and improving the RCP. Examples of topics covered in the study programme linked to the topic are: leadership and decision-making including alignment of processes within the network and process mapping techniques to evaluate the current healthcare pathway and moments of contact between the different collaborating partners. Moreover, at the level of the individual patient coordination should take place which also involves skills to communicate, organise the care process and facilitate coordination of the overall care pathway of an individual patient.

A part of the study programme focuses on how technology could be explored and used in organisations. This thesis shows how hospitals and oncology regions could use technology to strengthen coordination and improve their objective of delivering good quality care. This includes assessing potential technology solutions to improve the RCP and enhance the coordination between partners in the RCP. For example, by introducing RCPs, new challenges regarding information technology (IT) are raised. Patient information should be exchanged between the hospitals which calls for new technological solutions such as new data-sharing platforms or a shared EMR environment.

---

[3] The case study hospital also indicated that they wish a dashboard to allow patient monitoring and that they believed this would be the most suitable method.

Additionally, monitoring and dashboarding are potential (data-driven) ways to improve coordination by providing overviews. These could include insights at an operational level showing unfinished tasks or potential deficiencies and steering information about the processes and coordination for the management staff of the oncology network.

1.5 Research outline

The trends in regional care pathways and oncology networks including the linkages with the concept of integrated care (sub-question 1) are discussed in chapter 2. Chapter 3 covers the methodology of the interviews and case study used to answer the research question. The conceptual framework of care coordination integrated with the findings from the interviews is outlined in chapter 4 (covering sub-questions 2 and 3). Thereafter, chapter 5 discusses how monitoring of patients and dashboards could support coordination in RCPs based on the interviews (sub-questions 4 and 5). In chapter 6, aspects of the conceptual model are applied to the case study leading to recommendations to improve the coordination of care for the investigated RCP. Finally, the limitations and contributions of the current study and recommendations for future research are discussed. In the conclusion, the answer to the main research question is given including the most important recommendations for RCPs.

2. Theoretical context: regional and integrated care pathways

This section introduces the concepts of (regional) care pathways and oncology networks to answer the first sub-question on how RCPs differ from other types of collaborations. Outlining this information indicates why other literature might (not) apply to the setting of oncology networks.

2.1 Care Pathways

Since the 1990s care pathways are increasingly being implemented to better organise patient care and could also be used as a method to monitor care processes. A care pathway could be defined as a planned care process of an individual with a specific medical condition including medical procedures like consultations, diagnostics and treatments from diagnosis to follow-up, often in a multidisciplinary care team (De Bleser et al., 2006). The care pathway includes a set of separate services and interventions delivered by several actors during the care process, which facilitates mutual decision-making and organisation of care (Allen, 2009). A care pathway is described for a well-defined group of patients (having a specific medical condition) during a well-defined period (having a clear start, e.g. diagnosis, and end, e.g. start of the follow-up period) (Vanhaecht et al., 2010). The care pathway is generally based on evidence-based guidelines extended with agreed protocols to improve compliance and additional agreements between the collaborators. Most care processes are standardised within the care pathway, however, sometimes deviation from the care pathway is necessary based on the patient’s specific situation. Care pathways are described by multiple synonyms in literature such as clinical pathways, critical pathways, integrated pathways, care maps or patient journeys (de Luc, 2000; Vanhaecht et al., 2010). The terms clinical pathway and care pathway will be used interchangeably in this thesis.

Care pathways aim to enhance quality, efficiency and compliance, reduce variation and lower waiting- and throughput times through better care coordination and reduced fragmentation of care (De Bleser et al., 2006; Rotter et al., 2012; Vanhaecht et al., 2010). A care pathway facilitates the structuring and organisation of the processes of care and helps by implementing evidence-based guidelines. Simulation studies (Bettencourt-Silva et al., 2015) and multiple pre-post studies (Del Turco et al., 2010; van Hoeve et al., 2014) show care pathways impact medical outcomes, efficiency and waiting- and throughput times positively in a hospital setting.

A complete description of a care pathway includes several elements. They should explicitly state the goals and key elements by combining evidence, best practices and patients’ expectations (Panella et al., 2003). This includes a range of activities like documentation, monitoring and evaluation of outcomes and adherence to or differences with the described care pathway; identification of appropriate resources and optimising their deployment; facilitation of communication among healthcare professionals and towards the patient; coordination of roles and activities and sequence activities of the multidisciplinary team (Panella et al., 2003; Vanhaecht et al., 2010).

2.2 Inter-organisational networks in healthcare

An oncology network refers to a group of three or more hospitals consciously organised and directed in ways that a patient receives care at different locations from multiple healthcare professionals (Provan et al., 2007). A regional oncology network (CCN)[4], also known as "Comprehensive Cancer Infrastructures", is an overarching governance body comprised of all regional parties involved in oncology care seeking alignment (Citrienfonds, 2023). In the Netherlands, many regional oncology networks have been established in the last years which results in all hospitals having currently committed to an oncology network to provide shared care services (Gijsen et al., 2022). Seven larger supra-regional Comprehensive Cancer Networks (CCNs) are formulated which are often divided into smaller tumour-specific oncology networks including a smaller number of hospitals that collaborate closely (Citrienfonds, 2023). For example, the supra-regional CCN North-East includes the four other oncology networks of Friesland, Groningen-Drenthe, and parts of Gelderland (Figure 2.1).

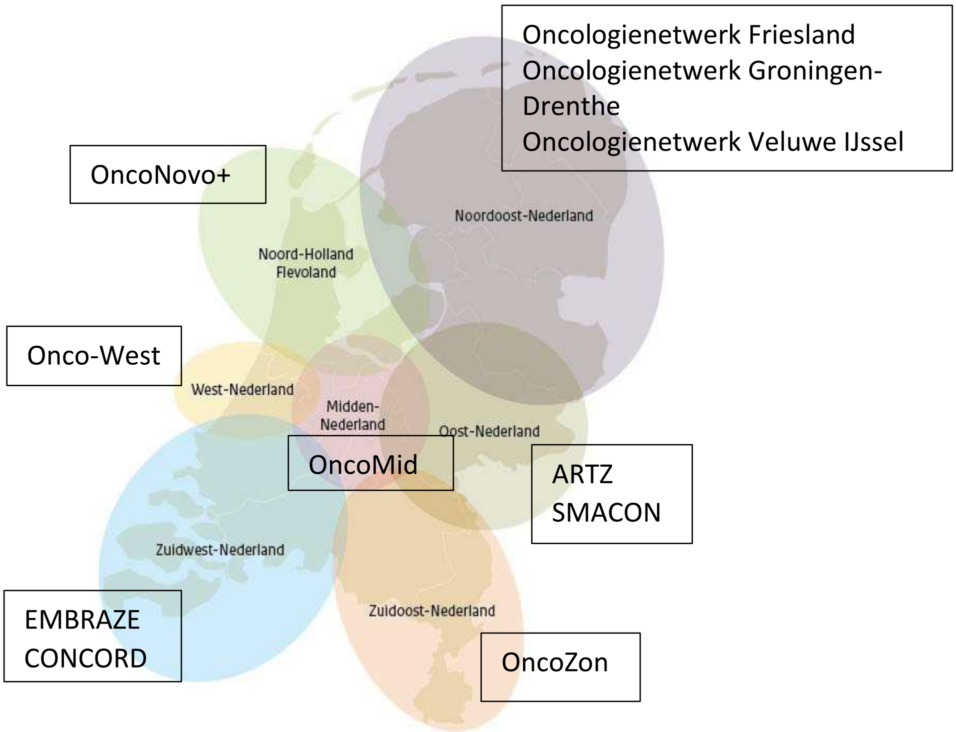


Figure 2.1 Overview of the Comprehensive Cancer Networks and specific tumour oncology regions in the Netherlands. Original image adapted from Citrienfonds (2023), modifications made by adding the smaller networks.

The organisation of care in networks is needed because the diagnosis and treatment of cancer have become more complex, requiring specific expertise, skills, resources, and technologies. The supra-regional CCNs have a larger size to organise care, research and education efficiently and effectively, and ensure continuity of care by offering treatment to almost all patients within the oncology network (Citrienfonds, 2023). Additionally, volume norms are externally pushing hospitals towards larger collaborations. Oncology networks aim to provide equal, accessible care with high quality in line with the national guidelines to all patients regardless of their place of residence (Chiang et al., 2018; Gijsen et al., 2022; van Hoeve et al., 2023) have shown oncology networks reduce unwarranted clinical variation and organise improvements in standardisation of the care pathway for oesophagus cancer.

---

[4] The term CCN will be used for all kind of regional oncology networks. It will therefore be used to refer to the smaller regional network collaborations, but also for the supra-regional networks.

Other research on a multidisciplinary regional breast cancer care pathway shows a well-organised RCP improves organisational aspects and processes of care (van Hoeve et al., 2014). A commonly agreed RCP could especially be beneficial for rare tumours, lacking routine, guidelines, and local expertise (van Hoeve et al., 2014).

In this thesis, a regional care pathway (RCP) is defined as an individual care process which a patient with a specific condition goes through in which a transfer to another hospital is included. This means a part of the care of the RCP most often the surgical procedure is in another hospital. The partner hospitals also have a joint MDM discussing patients with the surgical treatment centre. This definition is also verified during the conducted interviews (interviewees, personal communication, 2024).

Within RCPs, the transfer of information plays an important role throughout the care continuum as the information and responsibility should be transferred between institutions, physicians and from the different providers to the patients and their families (Taplin & Rodgers, 2010). Triangles of communication exist between the patient and their providers and among the providers in each transition of care (Bodenheimer, 2008; Taplin & Rodgers, 2010), Figure 2.2. These triangles also play a role in facilitating good care coordination.

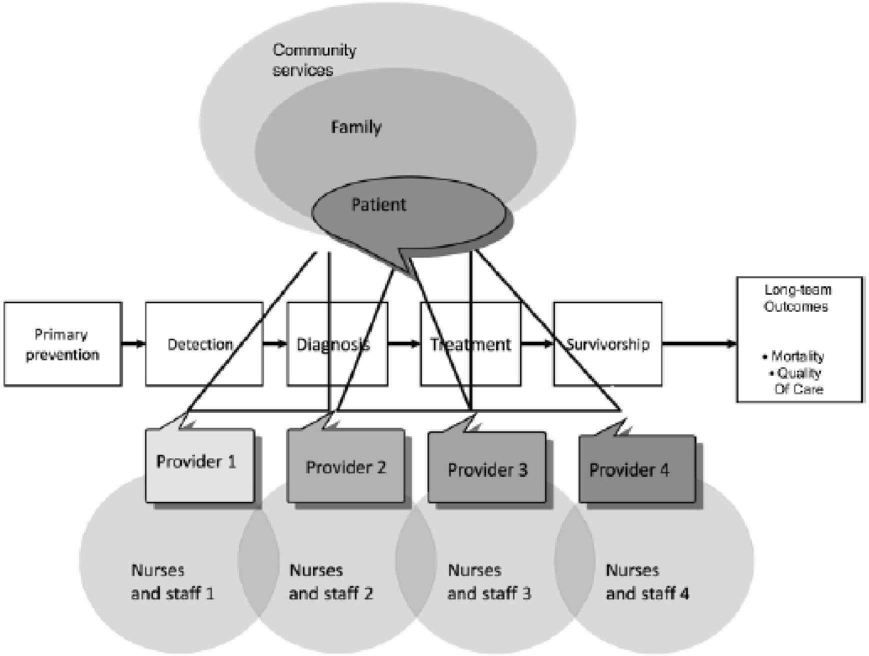


Figure 2.2 Transfer of information between different providers; adapted from Taplin and Rodgers (2010)

Governance within regional oncology networks in the Netherlands

The general governance structure of CCNs in the Netherlands is quite similar with a board, coordinators, and tumour working group (Gijsen et al., 2022). However, the composition of each of these groups is often organised differently. Tumour working groups focus on the RCP of a specific tumour type within the regional network and show many differences within and between CCNs. Often medical specialists and nurses of the different hospitals are part of the tumour working groups.

Most oncology networks organise plenary meetings with medical professionals of the partner hospitals to stimulate knowledge sharing, change agreements if necessary and evaluate the RCP together. These meetings with the oncology network are also recorded in the *Stichting Oncologische Samenwerking* (SONCOS) standardisations (2023) and were mentioned by most interviewees to be planned twice a year (interviewees, personal communication, 2024).

A national coordination meeting with representatives of the seven CCNs is intended to be organised to support the development of governance structures and facilitate learning and knowledge sharing between the regions (Citrienfonds, 2023; Gijsen et al., 2022). This network can also facilitate in undertaking of larger nationwide challenges relevant to all CCNs.

2.3 Integrated care pathways

Although integrated care will be no focus of this thesis, the differences between integrated and regional care pathways will be outlined. Frameworks relating to integrated care (Leijten et al., 2018; Valentijn et al., 2013) and coordination already exist. Outlining the differences and similarities between integrated and regional care pathways allows us to indicate to which extent the described concepts for integrated care could be applied in the setting of RCPs and the other way around. Therefore, it is important to understand the differences between the frequently described concept of integrated care and regional care pathways.

Integrated care often has an ambiguous meaning as it is used as an umbrella term in literature. An integrated care pathway (ICP) is generally more focused on aligning and connecting different types of organisations/sectors like health and social care organisations across the continuum of health thereby linking the cure and care sector (Suter et al., 2009). Integrated care could be described as structured efforts to provide multidisciplinary, person-centred coordinated care by these different care providers (Leijten et al., 2018). Since it connects different sectors, integrated care is often mentioned in the context of primary care. Primary care forms an integral part of the Dutch healthcare system by being the first level of contact for individuals in need of health care, but also playing a role in the continuity, comprehensiveness, and coordination of care (Valentijn et al., 2013). Coordination takes place by referring the patient based on their health status and needs to the appropriate care services from other providers. One of the described challenges of integrated care is to allow freedom for each organisation and professional, but also create a similar way of working (Valentijn et al., 2013).

The Rainbow Model of Integrated Care (RMIC) discusses the inter-relationships and dimensions of integrated care from a primary care perspective (Valentijn et al., 2013). RMIC is considered one of the most comprehensive and validated models of integrated care and describes interactions between collaborating partners within integrated care. Although the focus is on primary integrated care, this model could also be applied to the setting of RCPs by using the defined six dimensions of integration at different levels of the healthcare system. Therefore, the RMIC model and the different levels of integration needed to facilitate the continuous and coordinated delivery of services are explained in Appendix C.

2.4 How does coordination differ in these types of collaboration

The concept of ICPs is related to regional collaboration connecting different components of healthcare systems aiming to improve care through better coordination of care from different perspectives (Mériade & Rochette, 2021). In a similar way as in a care pathway, partners know each other and integrated care forms a coherent set of methods on the funding, administrative, organisational, and clinical levels (Suter et al., 2017). Regional hospital care pathways differ from integrated care pathways by collaborating with the same type of organisations focused on medical treatment, while in IPCs different types of organisations collaborate and ICPs also focus on the social context (e.g. physiotherapist, psychologist). In an RCP the care is often continued at the first hospital which requires more alignment between the partners and asks for updates about the status of the patient when treated in the other hospital to have enough information and avoid unnecessary delays in the treatment process.

The need for coordination becomes more important during transitions in which new providers or care organisations become involved (Taplin & Rodgers, 2010). This underscores the need for good coordination in regional oncology networks, because besides disciplinary boundaries, also organisational and geographic boundaries are crossed. As explained earlier joint RCPs including clear protocols and division of roles can improve care coordination between organisations (*ICA*, 2022). Implementing an RCP within an oncology network leads to a solid base for cooperation on a regional level by enhancing a uniform way of working in line with evidence-based guidelines. This also leads to more clarity about the patient route and more awareness about complying with evidence-based guidelines leading to improved care coordination (van Hoeve et al., 2015).

3. Research methodology

A mixed-method approach is used by accomplishing an extensive literature search, and data collection through semi-structured interviews, supplemented by observations at the case study hospital. This approach facilitates triangulation and multiple perspectives on the topic enhancing the findings (Patton, 1999). The interviews were conducted with healthcare professionals in the oncology network of the case study and other CCNs in the Netherlands, professionals related to CCNs such as policymakers, and patients. The main steps undertaken to carry out the research are schematically outlined in Figure 3.1.

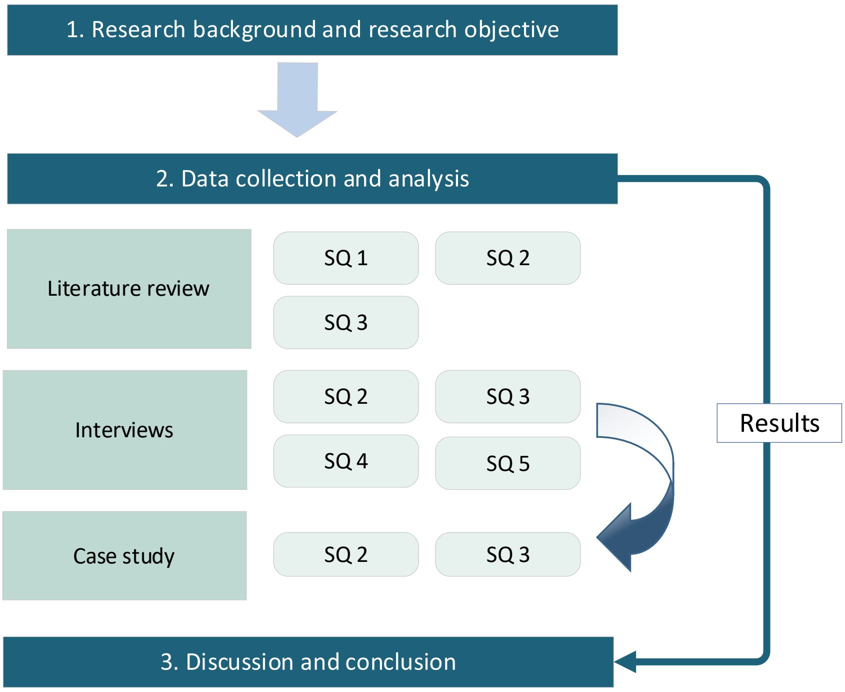


Figure 3.1 Diagram of the research design with the related research questions. SQ = sub-question

3.1 Literature search

In the first phase, a literature search was conducted to complement the problem statement formulated based on the problems and wishes of the case study hospital. The other literature searches were performed to identify relevant literature for each of the sub-questions. Frameworks and theories covering coordination of care in the context of RCPs were explored by looking for matching literature using search terms like “coordination”, “alignment”, “care” (in the context of integrated care, multidisciplinary care, or care pathways) and “theory” or “framework”. Additional targeted literature searches were completed for each sub-question including Dutch reports about the current state and challenges of oncology networks. Academic papers were retrieved to identify evaluation measures, potential improvement actions and information related to monitoring (patients) in care pathways. The references of relevant papers were screened for any other relevant papers. Both concepts, care pathways and care coordination, are dispersed throughout the literature and encompass a wide range of associated terminology. Therefore, targeted searches were conducted to ensure the feasibility of the searches.

3.2 Interviews

Since a limited amount of literature related to care coordination in regional healthcare pathways was identified, the interviews were mainly used to grasp an overview of the aspects of coordination within a regional oncology pathway to adjust the conceptual framework. Additionally, the interviewees were questioned about the organisation of the RCP and the challenges they experienced regarding coordination. Additionally, they were asked for success factors and best practices including potential improvements they desired. Questions regarding monitoring and the use of dashboards were asked to identify best practices. Thereby, the interview questions encompassed all research questions.

The interviews allowed an in-depth exploration of the perspectives and concepts in literature including experiences from different stakeholder's perspectives. Approval for the interviews and the data management plan was given by the TU Delft Human Research and Ethics Committee[5].

Data collection

The interviewees were obtained by actively contacting individuals to participate in the research by email, via contact information on the websites of oncology networks in the Netherlands, and via the professional network at the internship company. To be selected an interviewee should be involved in a regional oncology network or provide a certain expertise related to coordination within regional oncology pathways. Patients were recruited via the case study hospital and the patient federation for oesophagus and gastric cancer SPKS (*Stichting voor Patiënten met Kanker aan het Spijsverteringskanaal*) via a request in their digital newsletter.

Different stakeholders and positions within the RCP were interviewed to increase the reliability and generalizability of the results. The interviewees could be divided into four general categories:

1. Interviews with the employees within the case study CCN;
2. Interviews with employees in other regional oncology networks in the Netherlands;
3. Individuals with individuals with other roles like policymakers, researchers, and experts in data exchange;
4. Patients being treated in an RCP in the Netherlands.

In the RCPs, individuals with different positions (e.g. physicians, nurses, and project coordinators) were interviewed. Besides the general insights in coordination within oncology networks, interviews within the case study network enabled insights into the specific challenges of the case study CCN allowing the generation of specific recommendations for them. The interviews with other CCNs enabled broadening the perspective and creating an overview of the status of RCPs in the Netherlands. These interviews also facilitated getting a deeper insight into best practices in other regions and how they were able to achieve this. Interviewees with other roles and patients enabled to include different perspectives on care coordination in RCPs. Some of these interviews also offered the opportunity to deepen knowledge on a specific topic within coordination such as monitoring of patients or data exchange. As care is arranged for the patients their experiences regarding coordination in RCPs were also included. This could offer insights into the outcomes or effects of the coordination between healthcare professionals and the different hospitals (McDonald et al., 2014). For instance, whether coordination ensured that patients did not receive conflicting information, and the patient was able to oversee his care pathway.

---

[5] The approval was granted via the letter of approval 3692 by the faculty of Technology, Policy and Management.

All interviews were set up as semi-structured interviews allowing flexibility by predetermined questions providing a general direction combined with the freedom to ask additional exploratory questions. This flexibility offered the possibility to have some more depth in a certain topic depending on the function of the interviewee. The questions covered the different elements of all sub-questions, and the focus of the interview was tailored based on the participant's role and the distinctive attributes or special conditions mentioned during the interview. This allowed an in-depth exploration and understanding of the topics regional cancer networks are dealing with and different views on the topic of coordination. The standardised question set for both the healthcare professionals and patients is included in Appendix A. A personalised question overview (not included in the appendix), slightly different from the standard, was drafted for certain interviews with other experts.

Each interview was conducted individually or with two participants with a similar function within the same RCP and lasted between 20 and 50 minutes. The interviews took place in person when possible and were otherwise carried out via an online video call. Before the interview, the participants received the questionnaire to prepare themselves. The informed consent form was collected and stored before the start of the interview. All interviewees gave permission to voice record the interview to allow accuracy of the data. This improves the quality of the interview and the completeness of the data by the interviewer being able to focus on listening to the interviewee.

Data analysis

The interviews were transcribed to have a transcript as a foundation for further analysis. Transcription was performed with the automatic transcription functionality of Microsoft Teams and Microsoft Streams (Microsoft, 2024). Thereafter, the automatically generated transcripts were compared to the audio recording and changed when they did not match, in Microsoft Word (Microsoft, n.d.). In this correcting process, the data was also partly processed by adding punctuation, and removing stutters such as "eh", "ah", repetitions and the reactions of the interviewer like "okay". This was done to have a readable and accessible transcript because the study did not involve a linguistic or psychological analysis.

An anonymised summary of each interview was composed and structured into parts aligned with the different sub-research questions. The summary of the main findings and conclusions of each interview was checked for correct interpretation by the interviewee, and additions or adjustments were made where needed. Once the voice recording was transcribed and checked by the interviewee, the recording was deleted.

Instead of a thematic analysis including coding, a summary of each interview was used to identify links between the findings (Figure 3.2). This approach was chosen, because of the broad range of questions asked relating to different topics such as aspects important for coordination, challenges, success factors, wishes, and current methods of monitoring. The linkages between the interviews were expected to be covered by summarising and combining the different summaries, because the summaries were structured in line with the different sub-questions. In line with a deductive coding approach (Clarke & Braun, 2013), the aspects of the conceptual framework for care coordination based on literature (section 4.3) were used as predefined themes for the identified aspects and challenges of coordination from the interview. Strategies mentioned to overcome barriers or stimulate success were also connected to one of the aspects of the framework. When interview findings fitted two aspects of the framework, the most likely aspect was chosen and the relation with the other aspects was mentioned within the text. The aspects of coordination that were not categorised in one of the existing aspects of the framework, were added inductively to the existing framework as new aspects (section 0). The categorisation of the interview findings into the aspects of the framework underwent review by re-examination of the interview summaries when all findings were assigned to one of the coordination aspects.

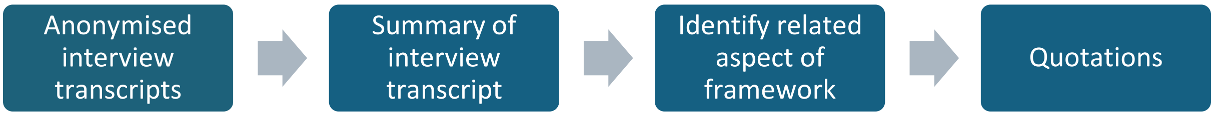


Figure 3.2 Data analysis of the interviews.

The findings related to monitoring and dashboarding were not divided into (predefined) “themes” and the results were drawn from the drafted summary of the interview. The analysis of the interviews was extended with a narrative approach by adding direct quotes from the interviews. This provides a holistic view of the perceptions of the interviewees and supports the arguments.

The interviewer tried not to influence the interview findings by avoiding asking open questions and giving examples to allow the interviewees to generate their own ideas. Only when the interviewee had no idea in which direction to think an example was mentioned especially for the questions related to monitoring and dashboarding. The representativeness of the identified challenges was checked in the literature by looking at the challenges described in Dutch policy reports about CCNs (e.g. Citrienfonds, 2023; Zorginstituut Nederland, 2023a).

Characteristics of the interviewees

In total 30 interviews[6] were conducted including four interviews with patients. Characteristics of the interviewees are provided in and **Fout! Verwijzingsbron niet gevonden.** plots their working locations.

Due to time constraints, only the results of the interviews with the professionals in the case study CCN and the three[7] interviews with individuals with another function are included in the thesis. One of the interviewed patients came from the case study CCN and the other three were all treated in different regions. Two patients were not treated in an RCP but were transferred to the other hospital after the first diagnosis and received all treatments in the “surgical” hospital. In these interviews, the experiences of the coordination between the two hospitals were still inquired, because these still give an indication of the patients’ experiences regarding coordination.

3.3 Case study

In the final phase of the research, an assessment was conducted on the situation of both the case study hospital and its associated oncology network (referred to as the case study network). All three hospitals within the case study CCN approved this thesis and were offered the opportunity to read the thesis and give feedback before publication. The case study also facilitated the application and refinement of the developed framework for care coordination. The case study researched the current situation of coordination of care in the case study hospital and identified the current problems by using the developed framework including the evaluation measures. Recommendations were drawn from the improvement actions mentioned in the literature and the interview findings applied to the context of the case study network.

---

[6] The number of interviews does not align with the number of interviewees, as some interviews involved two participants.

[7] Some interviews were completed with two individuals with a similar function which makes the number of interviews and number of interviewees (Table 3.1) do not correspond.

Table 3.1 Overview of roles of the interviewees and the regional network in which they are involved

		Number of interviewees
Comprehensive Cancer Network	Oncologienetwerk Veluwe IJssel	8
	Oncologisch Netwerk Friesland	1
	Embraze	2[b]
	OncoWest	3
	OncoNoVo+	3
	ARTZ	2
	Oncologienetwerk Groningen-Drenthe	2
	Social care oncology networks (Integrated Care Pathways)	2[a]
Role	Nurse (specialist)	4
	Administrative staff	2
	Medical specialist	4[b]
	Project coordinator	13
	Policymakers and academia	4[a]
	Data transfer/Business Intelligence specialist	3[a]
	Patient	4

Patients are not counted within one of the Comprehensive Cancer Networks. [a] Interviews included some different questions than the one included in Appendix A, because of the different scope of the interview. [b] One other interview had a shorter time of 20 minutes only covering the most important questions.

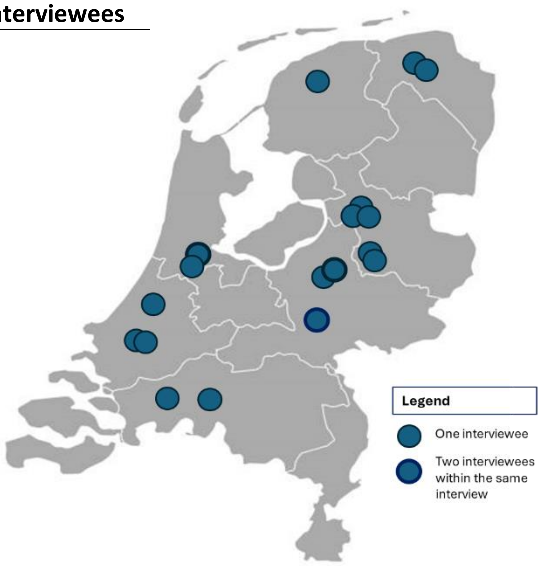


Figure 3.3 Overview of the working location the interviewees (academics, policymakers and patients not included).

The research methods within the case study could generally be divided into three categories.

1. Information retrieved during the interviews with healthcare professionals and patients of the case study network;
2. Observations by on-site visits to the case study hospital. The observations included two visits to the administrative staff of the case study hospital (including the preparation of the MDM and the tasks after an MDM) and a visit to the MDM;
3. Documentation and data from the case study network. Documentation included the documented regional healthcare pathway of two hospitals, providing an additional overview of the current workflow and processes, complementing the insights gained from interviews and on-site visits.

4. Conceptual framework: Coordination of care

Care coordination is important to achieve high-quality, high-value and patient-centred care. Well-designed care coordination involving the right people can improve the outcomes for society including patients (by enabling them to coordinate their own care), healthcare providers and insurance companies (Agency for Healthcare Research and Quality, 2018). Care coordination improves the efficiency and effectiveness of care by improving quality and safety and reducing waiting times (Lodewijckx et al., 2012). Poor coordination, on the other hand, can lead to complications like medication errors, preventable readmissions, higher costs or unnecessary suffering for patients (McDonald et al., 2007).

First, the definition of care coordination for this thesis will be established which could thereafter be used to identify the best fitting framework and aspects describing care coordination. Based on the aspects describing care coordination, the most important evaluation measures to gain insight into the current process and level of coordination in the RCP will be determined. Given the current state of the RCP, improvement actions can be formulated with the final goal of better outcomes on the level of all three perspectives: patient, healthcare professional and system (Figure 4.1). In this chapter, all these elements will be introduced and included in a final framework.

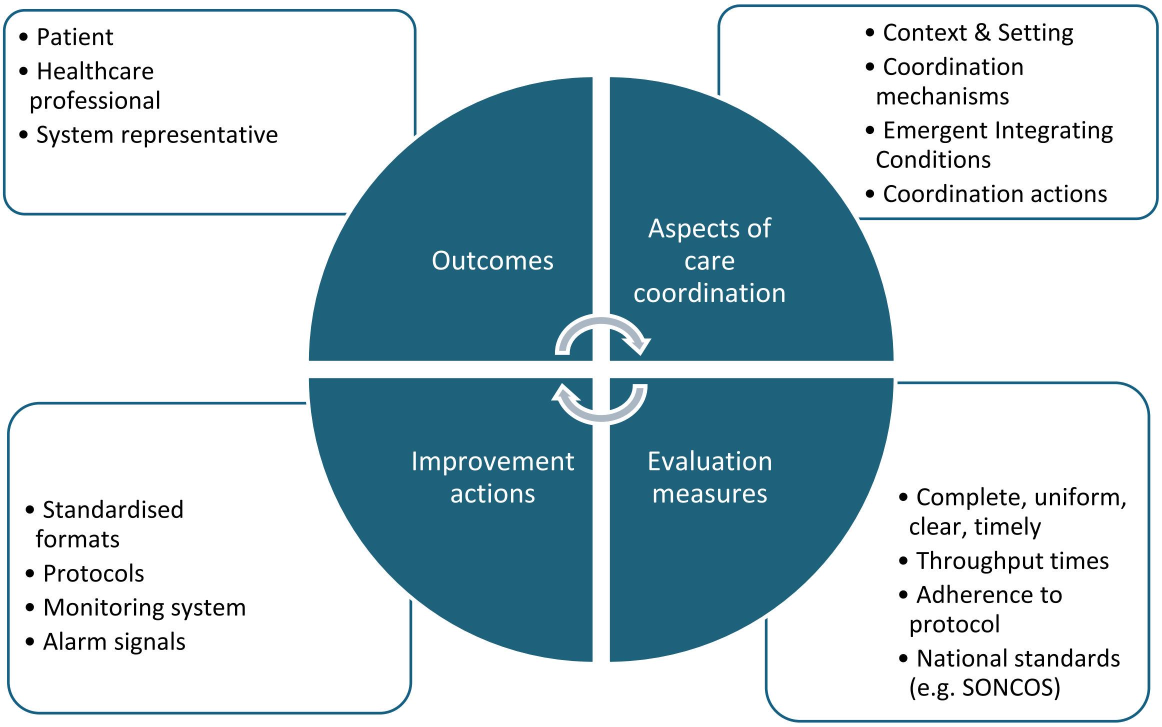


Figure 4.1 Overview of the relations between aspects of coordination and the related evaluation measures and improvement measures. Together relating to the outcomes on the different levels.

4.1 Defining care coordination

A definition of care coordination for this thesis is needed to identify relevant literature and distinguish care coordination interventions from other types of improvement actions (Schultz & McDonald, 2014; Schultz et al., 2013). In literature, the term care coordination is used in heterogeneous settings resulting in multiple definitions with a slight variety in emphasis, perspective, and setting. This is complicated by other terms being used as synonyms or in combination with coordination for example improvement activities focused on care coordination (McDonald et al., 2014; McDonald et al., 2007). Examples of synonyms and related terminology include collaboration, teamwork, continuity of care, care integration disease management, case/care management, Chronic Care Model and care/patient navigator (McDonald et al., 2014; McDonald et al., 2007). The broadness of definitions could reflect the emerging field and iterative process of refining theoretical models related to care coordination (Schultz & McDonald, 2014).

Three perspectives on care coordination

Different perspectives on care coordination can be taken, including the patient/family, healthcare professional(s) or system representative(s) perspective (McDonald et al., 2014). Each perspective has a different angle and together they form a comprehensive description of care coordination (Schultz & McDonald, 2014).

The difference between these perspectives is mainly determined by their different aims (McDonald et al., 2014). This also translates into a heterogeneity of definitions and focus of care coordination (Schultz & McDonald, 2014). Some definitions focus, for example, on the experiences and needs of patients, others on the actions healthcare professionals should conduct, and yet others focus on efficient care delivery at the system level. The organisational perspective is most commonly taken in the definition of care coordination (Schultz & McDonald, 2014). The three perspectives could be described as follows:

1) **Patient/family perspective**: focus on meeting the patient's (medical and social) needs and preferences for high-quality and high-value care (Antonelli et al., 2009; McDonald et al., 2014).
2) **Healthcare professional(s)**: includes care coordination actions like sharing information, managing responsibility among healthcare professionals and taking care the right services are provided to ensure they can provide the appropriate care (McDonald et al., 2014).
3) **System representative(s)**: care coordination facilitates the appropriate and efficient delivery of care both within and across organisations by deliberately integrating personnel, information and other resources to be able to carry out all required care activities (McDonald et al., 2014).

For this thesis, I will especially focus on care coordination actions and experiences from the healthcare professional(s) perspectives which will partly facilitate the aims of the other two perspectives. The system representative(s) perspective will be reflected in this thesis by aspects related to organising personnel, information, and resources within an RCP and evaluation measures based on the EMR system. The patient/family perspective is echoed in creating high-quality and appropriate care for the patient and is attempted to capture through the patient interviews.

Framing the definition of care coordination

McDonald et al. (2007) give a broad and inclusive working definition of care coordination for research which can be adapted to specific contexts.

> *"Care coordination is the deliberate organization of patient care activities between two or more participants (including the patient) involved in a patient's care to facilitate the appropriate delivery of health care services. Organizing care involves the marshalling of personnel and other resources needed to carry out all required patient care activities, and is often managed by the exchange of information among participants responsible for different aspects of care." - (McDonald et al., 2007, p. 41)*

The definition is based on five common elements of care coordination known as participants, interdependence, roles and resources, information, and articulation of a goal (Table 4.1). The working definition captures many understandings of care coordination and could be adapted by a different composition of elements to the specific context, setting and patient population (McDonald et al., 2014; McDonald et al., 2007). In literature related to care coordination, this definition is still influential and most cited (Peterson et al., 2019).

Table 4.1 Five common elements of care coordination adapted from McDonald et al. (2007); and Schultz and McDonald (2014).

Participants	In care coordination, numerous individuals are involved like a patient, physician, nurse, social worker and supporting staff. When care becomes more complex the number of inter-relationships and participants tend to increase.
Interdependence	Coordination is necessary when participants are dependent upon or complement each other in carrying out differentiated tasks.
Roles and resources	Each participant needs adequate knowledge about their own and others' roles and the available resources to coordinate care activities. Discrepancies in perceptions about roles and interdependencies of tasks may lead to ineffective navigation back and forth across professionals.
Information exchange	Collaborators rely on the exchange of information (at least critical clinical information) to manage all required care activities and facilitate decision-making.
Articulation of a goal	Within the definition of care coordination, the purpose is often stated and generally described as the appropriate delivery of care by facilitating "*delivery of the right services in the right order, at the right time and in the right setting*". The aim could differ between the perspectives by meeting the medical, social, and emotional needs of patients (patient perspective) to offering cost-efficient care by minimising waste, having efficient resource use and avoiding unnecessary care (system perspective) (Agency for Healthcare Research and Quality, 2018).

The definition of McDonald et al. (2007) could be extended by a visual representation of care coordination, Figure 4.2. The circles represent relevant organisations, participants and information for the care pathway and workflow (McDonald et al., 2014). Care coordination is visualised as a ring connecting the different circles and is defined as *"anything that bridges gaps (white spaces in the figure) along the care pathway"* (McDonald et al., 2014, p. 6). "*Anything*" in this definition refers to actions or groups of activities and/or tools assumed to support coordination (e.g. information transfer or managing accountability). Coordinated care is achieved when for a given patient at a given point in time the bridges are formed between the applicable partners (McDonald et al., 2014).

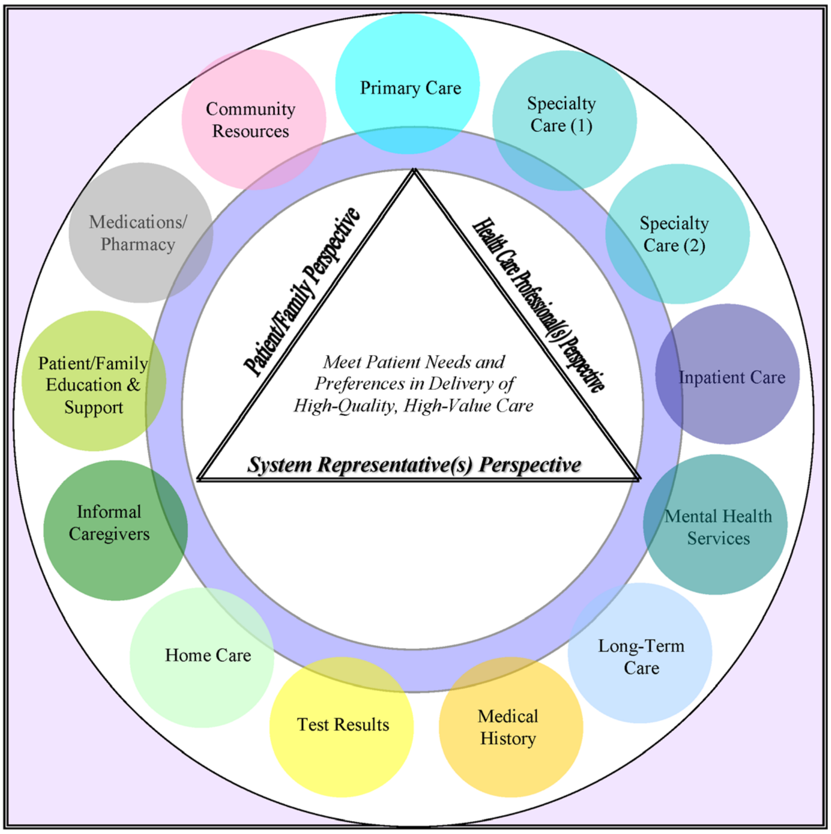


Figure 4.2 Visual definition of care coordination. Organisations or professionals organised closer to each other show circles closer to each other, calling a lower degree of coordination. Adapted from McDonald et al. (2014)

Taking the five elements, the working definition and incorporating the visual representation, the final definition of care coordination as defined in this thesis is drawn. Care coordination in the context of regional oncology networks is described as:

<u>Care coordination</u> bridges gaps between different healthcare professionals or organisations in the RCP of the patient. Care could be defined as coordinated care when gaps between the participants are bridged for a given patient at a given point in time. Coordination is achieved by facilitating and deliberately organising care activities and aspects of coordination. Care coordination is necessary when numerous participants/organisations depending upon each other to carry out their disparate tasks and roles are involved in the patient's care pathway.

Only the elements of interdependency and participants are included in this definition (McDonald et al., 2007; Schultz & McDonald, 2014). I consider roles and resources and information exchange as aspects enabling or facilitating care coordination among partners instead of the core of the definition, since there are also other tools/actions (e.g. protocols) to facilitate care coordination. The element “articulation of a goal” is not included, because I believe all three perspectives are relevant and should be considered as an aim. Therefore, according to me, including a specific aim does not fit the purpose of a definition of care coordination.

The interviewees agreed with the definition of coordination as provided above. One individual added towards the goal of coordination that when coordination is optimal the process is working smoothly, and no unnecessary work is done.

4.2 Importance of care coordination

The need for care coordination is greater when there is greater system fragmentation (wider gaps between the circles in **Figure 4.2** Visual definition of care coordination. Organisations or professionals organised closer to each other show circles closer to each other, calling a lower degree of coordination. Adapted from McDonald et al. (2014)Figure 4.2), greater complexity (e.g. more involved healthcare entities or more difficult tasks) and/or when the patient is less capable of effectively coordinating his own care (McDonald et al., 2014). Care coordination becomes more challenging when care spans boundaries of roles (e.g. hospital to social care) or geography (e.g. multiple care sites), which are both present in a regional oncology pathway (McDonald et al., 2014). Additionally, the complexity of the situation, and thereby the need for coordination, might be increased when tasks are more uncertain or variable (Gittell & Weiss, 2004).

Compared to a care pathway within a single hospital, the treatment process within an RCP includes different healthcare organisations including more steps and links between partners within the process. According to the interviewed healthcare professionals, involving more organisations and collaborators also increases the risk of non-aligned, incomplete, or improper information transfers (also towards the patient). This increases the importance of care coordination for RCPs compared to other healthcare paths, because more information and processes should be arranged and aligned in an RCP. Interviewees noted that when coordination is effective, patients perceive the care provided by the various professionals as a unified process characterized by strong collaboration.

Some interviewees pointed out that the transition of care towards patient-centred and appropriate care, alongside regional collaboration, poses challenges to coordination within the care pathway. This trend reduces standardization in care delivery increasing the number of exceptions and the need for coordination.

The interviewees emphasised alignment is needed at every transition point in the healthcare pathway. Transitions occur when information and/or responsibility/accountability is transferred or shifted (McDonald et al., 2014). These transition points occur within one hospital (intra-hospital) when patients move between different departments or physicians and between hospitals (inter-hospital) when certain treatments take place in a different hospital.

4.3 Framework of care coordination

A framework assists in delineating care coordination in constituent aspects (e.g. information exchange, trust or accountability) (Schultz et al., 2013). The aspects together comprise principles and concepts of care coordination and are valuable to understand the mechanisms and effective pathways of care coordination (Sheinfeld Gorin & Haggstrom, 2018). The framework will be used as a foundation to explore which aspects regional oncology networks should consider to enhance coordination. The framework can also extract the aspects important for optimal care coordination within and between teams and guide the development of improvements. The identified framework from the literature will be adapted by including the results from the interviews. The final framework can facilitate the process of evaluating and optimising care coordination within the RCP.

In this chapter, a framework is chosen in which the aspects of care coordination for regional oncology networks are explained. The results of the interviews are integrated within this chapter to link the perspective of healthcare professionals to the literature. Additionally, when each concept of the framework is explained the measures and potential improvement possibilities related to the aspect will be explained. Therefore, each section about an aspect of the framework will include an explanation, related measures, potential improvement actions and the results from the interviews. Lastly, in section 0 the framework will be adjusted and extended by the insights identified from the interviews.

Selection of framework for care coordination

Different frameworks considering aspects and improvement activities related to care coordination were identified in literature (Peterson et al., 2018; Peterson et al., 2019; Van Houdt et al., 2013c). The review by Peterson et al. (2019) is the most recent systematic review evaluating the existing healthcare coordination theoretical frameworks until May 2018. They uncovered five of their identified 37 frameworks are relevant for healthcare organisations coordinating care with external partners, which is the situation in which oncology networks operate. These five identified frameworks were considered and compared to make a well-weighted choice for the framework used in this study (**Fout! Verwijzingsbron niet gevonden.**). The advantages and disadvantages of these frameworks for the regional oncology network setting were identified by the authors and described in the final two columns.

Since the focus of this thesis is on coordination, the frameworks starting off from the integrated care perspective (Leijten et al., 2018; Valentijn et al., 2013) were not selected (see section 2.3 for the differences between integrated care and RCPs). The adapted framework for Care Coordination in Chronic and Complex Disease Management (Duan-Porter et al., 2022; Weaver et al., 2018) was opted as an initial conceptual framework for this thesis (Figure 4.3). This framework was chosen, because it delineates the aspects on the level of within and between healthcare teams. The framework uses a multiteam system lens which offers a theoretical foundation to analyse why and how different coordination mechanisms and behaviours impact the outcomes for care provided by multidisciplinary teams or multiple organisations (Weaver et al., 2018). The external component involving other teams is interesting for RCPs covering network collaborations with multiple hospitals.

Additionally, the framework has categorised the aspects describing care coordination (Van Houdt et al., 2013c) into larger domains such as “context & setting” and “coordination mechanisms”. These domains align with a classic structure-process-outcome-structure (Donabedian, 2005). This creates an overview of input factors like the composition of the collaboration, processes defined by actions and emergent states, and outputs.

The framework (Weaver et al., 2018) uses the framework of Okhuysen and Bechky (2009) as a foundation, describing the coordination mechanisms and integrating conditions necessary for effective coordination. This foundation is adapted by Weaver et al. (2018) to the healthcare context by including the domains of “coordinating actions”, “context & settings” and “outcomes” based on teamwork behaviours elements (McDonald et al., 2014) and a multiteam model (Weaver et al., 2013). In line with Duan-Porter et al. (2022), I changed the outcome categories of the original framework (Weaver et al., 2018) into categories in line with the perspectives of care coordination: patient, healthcare teams and health systems.

Table 4.2 Overview of the five relevant frameworks identified by Peterson et al. (2019)

Author	Framework and reference	Approach	Description	Main concepts included/advantages	Main concepts not included/disadvantages
Leijten et al. (2018)	SELFIE framework (Sustainable integrated chronic care models for multi-morbidity: delivery, Financing and performance)	Integrated care	Integrated care programmes for multi-morbidity are described from the holistic understanding of the patient. Concepts grouped in the six categories of the WHO: service delivery, leadership & governance, workforce, financing, technologies & medical products, and information & research.	Multidisciplinary care within or across sectors; distinctions on levels of macro, meso and micro level (in line with RMIC framework).	Focus on evaluating integrated care programmes; Complex representation in figure; Scope is too broad (e.g. macro level and financing not directly relevant).
Valentijn et al. (2013)	Rainbow Model of Integrated Care (RMIC)	Integrated care	Describes inter-relationships among dimensions of integrated care from a primary care perspective.	Integration on four different integration levels (clinical, professional, organisational and system) on three levels (macro, meso and micro).	Does not outline related or important aspects for each integration type;
Gittell (2002)	Relational Coordination	Care coordination	Based on organisational design theory, suggests a diversity of coordination mechanisms (interactions and work routines) to achieve coordination.	Focus on communication- and relationship-intensive forms of coordination like information exchange, goal sharing, role recognition and quality of the relationship; Includes many of the relevant aspects for RCPs.	No focus on external and cultural factors.
Gittell and Weiss (2004)	Multi-level Framework	Care coordination	Elaborates on relational coordination theory by studying coordination between organisations.	Includes many of the relevant aspects for RCPs; Separate aspects in coordination between and within organisations; Distinction between inter-organisational mechanisms and networks; Showing relationships schematically with arrows.	No focus on external and cultural factors.
Weaver et al. (2018) and Duan-Porter et al. (2022)	Care Coordination in Chronic and Complex Disease Management	Care coordination	Differentiate tools used to coordinate care.	Many concepts are included, divided into four domains; Differentiate inter- and intrateam aspects.	Does not consider the full range of teamwork processes and factors that might affect care coordination (Verhoeven et al., 2021).

The proposed framework (Figure 4.3) distinguishes coordination mechanisms and teamwork behaviours important for care coordination at two levels: 1) within care teams (intra-team); and 2) between teams working across disciplines, organisations or other boundaries (inter-team) (Weaver et al., 2018). RCPs are defined by different organisations working together. Therefore, only the inter-team aspects of the model are highlighted. However, a similar organisation of coordination mechanisms both within and between the organisations likely strengthens the network collaboration resulting in better quality care (Gittell & Weiss, 2004). The framework includes mediating conditions and actions that can help to explain how and why different mechanisms and behaviours impact patient outcomes (Weaver et al., 2018).

The original framework (Duan-Porter et al., 2022) is extended by the author with three additional aspects identified during the literature search (Van Houdt et al., 2013c; Van Houdt et al., 2014). The added aspects are shared goals, knowledge, and need for coordination (Figure 4.3). This ensures relevant aspects of other frameworks are also included in the conceptual framework. Other papers (Peterson et al., 2018) corroborate that the list of aspects is exhaustive. The domain of the newly added aspects is defined by the author and her supervisor based on the categories and whether the aspects already included in the framework relate to care coordination in a similar way.

Weaver et al. (2018) do not define or explain the aspects included in their model. Describing each aspect ensures a consistent interpretation and addresses potential ambiguity. Moreover, a description of the content assists the development of associated measures, improvement suggestions and interrelationships between the aspects. Therefore, the description of the key aspects identified in other papers (Duan-Porter et al., 2022; Van Houdt et al., 2013c; Van Houdt et al., 2014) were used to shape and articulate the aspects included in the framework.

4.4 Including measures and coordination supporting actions

The framework is extended by categorising potential measurement methods and potential improvement actions for each aspect. These are directly linked to the framework to allow an overview of the relevant elements related to each aspect of coordination (Schultz et al., 2013). Therefore, in this section, the concepts of evaluation measures and improvement actions are explained before the framework is described in detail including the definition of each aspect and the related measures and improvement actions (section 4.5).

Measures of care coordination could give insights into the experienced care and the overarching goal of high-quality care by obtaining insights and feedback on intermediate outcomes about coordination (Donabedian, 2005). Sharing and comparing measures of performance within oncology networks can be useful in assessing the effectiveness of improvement initiatives (Siegel et al., 2014). The measures could be used as a tool to evaluate, support and guide care coordination and reveal improvement areas. First, by identifying the current situation including deficits. Reporting data and providing insights into the situation may raise awareness among healthcare professionals, fostering a willingness to deliver high-quality care and promoting improvements (van Hoeve et al., 2023). Secondly, the corresponding improvement possibilities could be selected based on the current state (Figure 4.1). The Plan-Do-Check-Act (PDCA) cycle could be completed by evaluating the effectiveness of the implemented actions afterwards by using similar measures (van Hoeve et al., 2015).

The regional oncology network organisation has initiated several successful pilots and projects to improve collaboration within regional oncology networks over the past few years (Citrienfonds, 2023). The status of these projects will be described by the corresponding aspect of the framework in section 4.5.

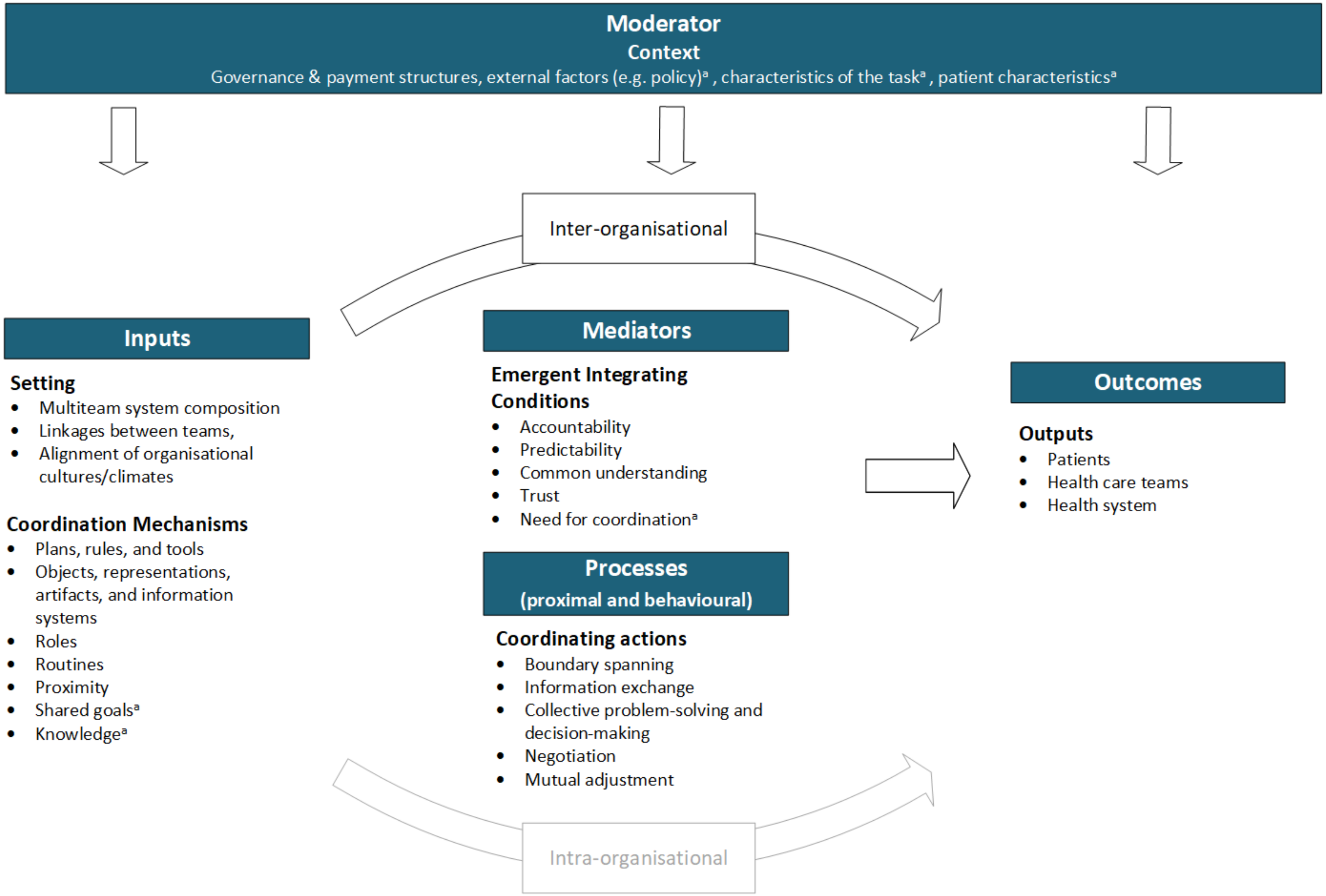


Figure 4.3 Adapted Framework of Care Coordination in Chronic and Complex Disease Management ((Duan-Porter et al., 2022) based on the original framework of Weaver et al. (2018)). [a]added aspects identified by Van Houdt et al. (2014). Visual representation of the framework is adapted from Verhoeven et al. (2021).

The current landscape of care coordination measures

Many measure instruments are available to evaluate care coordination, integrated care and care pathways. The heterogeneity and links in definitions, mediating aspects of coordination and differences in settings/contexts result in a large pool of potential measures (Bautista et al., 2016; Latina et al., 2020; Schultz et al., 2013).

Generally, two categories of measures could be distinguished based on the way the data is collected: 1) Tools that are filled out by individuals such as questionnaires, checklists, self-assessment forms or observation forms; 2) Indicators retrieved from already available quantitative data such as the EMR or higher-level public databases or national quality registers (Latina et al., 2020; Strandberg-Larsen & Krasnik, 2009). Many existing measures are survey-based (McDonald et al., 2014; Schultz et al., 2013) including the validated RMIC measurement tool (Valentijn et al., 2017; Valentijn et al., 2023) assessing how care providers and patients perceive the delivery of integrated care. Survey questions are not chosen to be a focus as a potential measurement instrument in this thesis, because earlier systematic reviews have already assessed the large pool of surveys (Bautista et al., 2016; McDonald et al., 2014; Schultz et al., 2013) for coordination and the division of the questions in different aspects of the framework will reduce the validity and reliability of the questions. Additionally, the surveys turn out to address the healthcare professional perspective partly and are not able to cover the system representative perspective (Bautista et al., 2016; Schultz et al., 2013).

Several systematic literature reviews have aimed to assess the current landscape of measures to identify gaps in measurement opportunities and define areas of high density of measures (Bautista et al., 2016; Latina et al., 2020; Schultz et al., 2013). Within the healthcare professional and system perspective most instruments cover the aspects of communication (healthcare), information transfer (healthcare and system), teamwork focused on coordination (healthcare) and establishing accountability or negotiating responsibility (healthcare) (Schultz et al., 2013). The use of IT systems, like the EMR and other tools to coordinate and communicate among healthcare professionals, is a domain in which more measures should be developed (Schultz et al., 2013). Moreover, instruments covering the aspects of alignment of organisational goals and resource allocations are demanded (Suter et al., 2017).

While many measures have traditionally focused on individual hospital data, a shift in literature towards indicators that could be determined at the regional network level is observed (Guarneri et al., 2020). The SONCOS standardisation report (2023) has contributed by recently incorporating guidelines regarding oncology networks. The guidelines intend to stimulate and guide movement towards professional regional oncology networks. Standardisation of components such as governance and quality of care is desired to guarantee a minimum standard. However, these standards still allow an own identity of each CCN by allowing space for differences between the networks in for example composition (Platform Oncologie - SONCOS, 2023).

Data sources for measures and indicators of coordination

In this section, the different sources to obtain information and data for the evaluation measures will be explained by outlining their main advantages and challenges. Since the focus is mainly on administrative data like data coming from the EMR system and national quality registers only these will be explained in more detail. These sources allow measures from the system-representative perspective, but encounter challenges in covering aspects such as communication and teamwork that consider the healthcare provider perspective (McDonald et al., 2014).

Data from the EMR system includes information from the patient's records. This data is rich and includes the clinical context including times, task orders, and imaging results. This data may provide insights into when, how and by whom information is used (Schultz et al., 2013). Additionally, the data is already registered which lowers the burden of data collection when automatic extraction is possible. Barriers to the use of EMR data mainly lay in a lack of data standardisation which is illustrated by non-structured data being reported, data being reported in different fields, and the differences between hospitals (Guarneri et al., 2020; McDonald et al., 2014). The non-standardised data cause the process of validating and retrieving data from the EMR to be labour-intensive (Regionale Oncologienetwerken, 2023b). Before the data is used the registered data should be checked for availability, reliability, accuracy, and completeness (Guarneri et al., 2020).

Differences in data collection and registration practices among organizations make it challenging to establish a universal method. Coupled with the limited interoperability of EMR systems, measuring processes spanning multiple hospitals is challenging.

In the Netherlands, hospitals are obligated to report several national indicators to monitor the quality of oncology care by benchmarking against standards and comparing among hospitals. Much of the data reported is obtained from the EMR system. The advantage of using indicators stated in these registers is that the information for these measures is structured and gathered. Additionally, benchmarks are determined on a national level giving guidance when a hospital is performing well. In theory, the data could be shared with partners in and between networks facilitating transparency of information, however legal rules and fears of competition by the hospitals cause holdups (Regionale oncologienetwerken, 2023a). The data is still reported on the level of the individual hospital, but they are looking to extend this to the inter-organisational level and include measures regional oncology networks could include in their contracts (Platform Oncologie - SONCOS, 2023). The interviewees endorsed these statements by considering the SONCOS standards and other national standards as the main potential indicators measuring care coordination. Most hospitals monitor these standards for their own hospital but wish to expand this monitoring to the network level.

Some of these quality measures are published for all Dutch hospitals to allow comparison (Zorginstituut Nederland). The SONCOS standardisation report (2023) records (accessory) conditions high-quality oncology care should meet and how a (regional) healthcare pathway should be organised. Secondly, the Dutch Institute of Clinical Auditing (DICA) registry collects data about resections and medical outcomes, compares these with other hospitals and reports the outcomes back to the hospitals weekly (DICA, 2018). However, their focus on surgery causes specialisms like medical oncology, GE, radiotherapy and palliative care to be insufficiently covered (Regionale Oncologienetwerken, 2023b). The third register, the Netherlands Cancer Registry (NCR), is population-based and mainly includes outcomes about the prevalence and incidence of disease, which makes it not pertinent for measuring coordination (2024a).

Selection of measures and improvement initiatives relevant to regional oncology networks

The list of relevant indicators and measures to monitor the level of care coordination and the accompanied improvement actions were retrieved from a literature search expanded by the interview results. The literature search consisted of targeted searches and also included Dutch policy papers assessing the current state of oncology networks (Citrienfonds, 2023; Zorginstituut Nederland, 2023a) and the national registers.

All measures and improvement possibilities were reviewed on the following criteria to be included:

- Attributes of the measure/improvement initiative show a logic model or causal linkages to care coordination or one of the care coordination aspects as mentioned in the theoretical framework (Figure 4.3) (Weaver et al., 2018);
- The measure/improvement initiative relates to coordination among hospitals in an RCP. The measure/initiative does not focus on the interactions between healthcare professionals and patients like providing clear clinical summaries to the patient;
- The measure/improvement initiative should be applicable in the setting of oncology care pathways including adult patients;
- The outcome measure should be clearly defined including instructions, elements or calculations to come to the measure.

Measures are described on a general level on main outlines, which allows an overview in a condensed way that could be translated to the situation and context of the specific RCP. The measures are categorised as either a structure or process measure based on the structure-process-outcome framework (Donabedian, 2005).

The SONCOS standardisation report (2023) describes more general recommendations and criteria about the organisation of a (regional) care pathway or network. These do not directly relate to care coordination and are not included. However, these standards should always be considered by hospitals in the organisation, development, and evaluation of an RCP. So, these standards of both SONCOS and DICA should be monitored besides the measures outlined below.

Considerations on how to choose appropriate outcome measures and other insights about the measures are outlined in section 4.6 and the discussion.

4.5 Detailing the Care Coordination Framework

Each of the aspects of the defined framework (Figure 4.3) will be explained in the following sections. Together these aspects give shape to the concept of care coordination and describe the enabling factors and coordination activities. The aspects retrieved from the literature are enriched by concepts commonly considered key for coordination according to the interviewees. Moreover, identified measurement tools and potential improvement possibilities are described by combining literature research with the results of the interviews. Together these present an overview of how care coordination in an RCP could be achieved and which aspects should be present to a certain extent.

The currently experienced challenges by hospitals within regional oncology networks are discussed as well, including current barriers to coordination. Knowledge about the experienced difficulties is needed first before an appropriate solution can be developed. In the next chapter 5. Monitoring of care coordination in regional care pathway, these insights are used as a base to explore options for patient monitoring and dashboards.

The results from the interviews can be distinguished by the results being separately presented in text boxes. Insights and information described in the textboxes only reflect the phrases of the interviewees and do not include any personal interpretation of the author. An orange text box represents a challenge and potential barrier for care coordination as identified in the interviews. The author's interpretation of the interview results is described underneath the corresponding text boxes.

Context

Context refers to the external or environmental conditions in which coordination of the network should take place, which are typically out of control of the people trying to coordinate care like policy and patient characteristics. Context factors can promote or detract the adoption, implementation, or effectiveness of care coordination actions and are considered as moderators of the care coordination process (Peterson et al., 2019; Verhoeven et al., 2021). These factors influence the strength and direction of the interrelationships of the other aspects of the framework. Identified context factors include governance and payment structure, external factors (e.g. policy, regulations, economic situation), characteristics of the task, and patient characteristics.

Governance and payment structure

Governance determines how the coordination within a regional oncology network is organised and evaluated. Governance often concerns the decision-making structure regarding the network like the strategic direction and contact with external partners like insurers. Networks need effective governance structures to align the different independent organisations and coordinate the interdependencies, while simultaneously having effective mechanisms for accountability (Valentijn et al., 2013). In the Netherlands, hospitals are often organised in a regional oncology network with specific tumour boards for each medical condition. On both levels policy and improvement initiatives should be formulated which also fit the policy of the hospitals organised within the network (Visserman et al., 2014).

However, the way agreements are formalised between the hospitals differs between the CCNs, ranging from informal, oral agreements up to detailed, written collaboration agreements and shared protocols. For example, some hospitals have formalised information such as the division of roles of healthcare professionals and the concentration of surgical treatments in detail within a shared protocol (Middelveldt et al., 2018).

A "*captain on the ship*" like a network office is a success factor in coordination according to the interviewees. They have a role in facilitating and enhancing collaboration within the oncology network. They need to bring together the different interests of the stakeholders and discuss issues on a broader scale with less involvement of each stakeholder's perspective. A good captain can also facilitate discussions, balance stakeholders' interests, and make sure a final decision is made. Moreover, he should also make sure all stakeholders are heard and included in the process.

Beyond governance, payment structures influence care coordination by limiting potential initiatives and close collaboration between organisations weakening the coordination. It is believed that the current payment methods in the Netherlands do insufficiently facilitate the development of network care, since payments are fragmented and focus on institutions rather than the patient care pathway (Citrienfonds, 2023). Additionally, most financing structures are linked to production, meaning transferring care to a partner could result in revenue loss (Regionale oncologienetwerken, 2023a). Financing of the regional MDM or nationwide expert panel is still not organised in a sustainable solution (Regionale oncologienetwerken, 2023a).

Currently, administrative tasks are performed to fund network care resulting in high transaction costs. Moreover, investments in actions related to coordination and support within oncology networks like regional case management and digital information transfers differ among regions/ partners, while more can reap the benefits. Therefore, there is a call for a new payment structure with a focus on shared network care, so that network-related administration and coordination initiatives, e.g. regional case management and digital information transfer, can take off (Citrienfonds, 2023).

Measures

A way to monitor the governance structure of the network is to evaluate whether collaborative agreements between the institutions at a managerial and professional level are present (Platform Oncologie - SONCOS, 2023). These agreements should include items like the durability of the network, tasks within the network, support of the network, information transfer, financial agreements, and accountability within the network.

The benchmark states network consultations in which the care pathway is evaluated regarding new research insights should be held regularly with a minimum of twice a year (Platform Oncologie - SONCOS, 2023). Besides the norms formulated within the SONCOS standards, the consultation should also include assessments to identify areas for improvement in the way the RCP is organised. Self-assessment forms for CCNs are not yet developed, but could guide CCNs in assessing these elements by providing a list of elements that should be considered.

Table 4.3 Summary of the evaluation measures for the aspect governance and payment structure

Measure	Type of measure	Data source	Reference
Whether collaborative agreements at the managerial and professional level are present	Structure	Self-assessment form	Platform Oncologie - SONCOS (2023)
Number of network consultations per year	Structure	Self-assessment form	Platform Oncologie - SONCOS (2023)

SONCOS = Stichting Oncologische Samenwerking

Improvement possibilities

Based on the interviewee's responses, leadership is important to incorporate within the network. A network office facilitates this role with an independent network organizer ("*captain of the network*") enabling alignment between the partners which facilitates coordination.

A new payment structure focused on shared network care could overcome the current challenges in financing. Several pilots with different ways to finance network care are conducted and several tools are developed to show the cost-effectiveness of care in networks (Citrienfonds, 2023). Quality and effectiveness data can ensure good quality care within the network (Regionale oncologienetwerken, 2023a). However, a challenge is the difficulty of getting to know the quality and costs over the whole patient care pathway, because technical barriers such as connecting databases and legal barriers should be overcome (Citrienfonds, 2023).

External factors (Van Houdt et al., 2013)

External factors refer to the way care coordination is influenced by policy, economic factors and its dependency on regulations and availability of resources (Van Houdt et al., 2013).

The payment structure as explained before could be considered as an external factor since the way network care is financed is mainly based on policy.

Measures

No specific measures were identified.

Improvement possibilities

No specific improvement possibilities were identified.

Characteristics of the tasks (Van Houdt et al., 2013)

The characteristics of the tasks expected to be performed by the professionals also influence care coordination (Van Houdt et al., 2013c; Van Houdt et al., 2014). This includes:

- Degree of variability and standardisation of the tasks;
- Degree to which team members depend upon each other for completing their own tasks;
- Simplicity or complexity of the tasks;
- Degree of certainty of the outcome;
- Importance and length of the task;
- Workload;
- Time pressure;
- Familiarity with the tasks.

The characteristics of the tasks expected to be performed, determine which level and types of coordination mechanisms are suitable. For example, think about the degree of variability and standardisation of tasks. When interdependence, complexity and/or uncertainty of the situation are relatively minimal, guidelines and documented care pathways may suffice in coordinating care effectively. However, as these three aspects increase, such as in situations of heightened interdependence, complexity, and uncertainty, face-to-face meetings, case managers or even redesigned healthcare systems may be warranted for optimal care coordination (McDonald et al., 2007).

Managing task interdependence in RCPs involves not only completing tasks sequentially but also crossing the boundaries between the organisations. Task interdependence management is challenging in cancer care, because there is a lack of tools to coordinate the tasks across hospitals and professionals (Trosman et al., 2016).

Measures

No specific measures were identified.

Improvement possibilities

No specific improvement possibilities were identified.

Patient characteristics (Van Houdt et al., 2014)

Patient characteristics may influence the way care services and coordination are perceived by the patient. This depends on the patient’s coping strategies, social network, and family history. Additionally, factors such as personality traits, generational differences, and patient’s expectations towards healthcare and other personal characteristics such as education and motivation are factors influencing the way the care services are perceived by the patient (Van Houdt et al., 2014).

Measures

No specific measures were identified.

Improvement possibilities

Some patient characteristics could not be influenced like their level of education and family history. However, patients can be given guidance through the care pathway influencing the way they deal with their disease. For example, in the 4R model, the patient discusses the personalised care plan with the clinician using a template (Trosman et al., 2021). This allows the patient to have improved self-management and coordination, but also influences the timing and sequencing of the care planning from the healthcare professional perspective thereby improving coordination via both sides (Liu et al., 2023).

Setting

Setting could be described as the place and level at which care coordination takes place (Peterson et al., 2019). These could be categorised as input variables such as the multiteam system composition influencing the quality of the coordination between the interdependent teams.

The aspects in this section are especially important to be considered at the start of an oncology network or RCP by sketching the conditions outlining the collaboration. Once the structure and governance are organised the focus is likely to shift towards other aspects of the care coordination framework, because the setting is less easily influenced.

Multiteam system composition

A multiteam system refers to two or more independent teams being organised in a governance structure making them work together. Each team has a specific role contributing to the overall goal (Davison et al., 2012; Luciano et al., 2018). The variable characterises the composition and organisation of the interdependent groups (Verhoeven et al., 2021). The concept of *"structure of the team, organisation or inter-organisational network"* (Van Houdt et al., 2013c) referring to the physical and organisational aspects supporting and directing the provision of care, relates to this concept. The factors influencing the structure include (Van Houdt et al., 2013c):

- Number and specialisation of the teams;
- Ways participants are grouped (e.g. collocated or dispersed);
- Amount of information needed to manage the care of the patient successfully;
- Existing mechanisms for coordinating the care provided by different participants. E.g. leaders or structural links across the boundaries of the team, units, or organisation.

In the context of RCPs, this relates to both teams within and between the hospital. The professionals are embedded within a team within their hospital, but also within the structure of the network creating an intricate network of hierarchies and task interdependencies (Luciano et al., 2018). Within a cancer care pathway, usually multiple specialists are involved in diagnosis, staging and treatment delivery increasing the number of teams. Furthermore, comorbid conditions may exist , further increasing the number of teams involved (Verhoeven et al., 2021).

Evaluation measures

Volume norms are related to the multiteam system composition since they are the main reason for network formation and determine the number of hospitals that should be organised within the network. The volume norm describes the number of surgeries per location per year that should be conducted. For both oesophagus and gastric cancer, the standard is 20 surgeries (Guarneri et al., 2020; 2023). The measure could not be seen as an evaluation measure for how well multiteam system composition is working, but should be used as a base for the organisation of the multiteam system composition.

Additionally, the level of integration and linkages could be evaluated to determine whether the optimum level of integration and coordination in networks is realised according to the scale of segregation to full integration (Valentijn et al., 2013). However, to enable this comparison first the optimal level of integration should be determined by the oncology network and preferably further research or policymakers.

Table 4.4 Summary of the evaluation measures for the aspect of multisystem composition.

Measure	Type of measure	Data source	Reference
Number of surgeries (should meet the defined volume norm)	Structure	DICA registration	(Guarneri et al., 2020; 2023)
Degree of integration and linkages between the hospitals on the scale of segregation to full integration (section 2.3).	Structure	Self-assessment form	Ahgren and Axelsson (2005)

Improvement possibilities

The ways participants are grouped within the organisation is part of the multiteam system composition. Within hospitals, departments are often organised based on specialism instead of the related oncology care pathway. A different way of organising healthcare professionals and having one dedicated secretary for oncology patients can facilitate a more efficient care pathway facilitated by proximity (see section Proximity).

The case study hospital is working towards an oncology centre within their hospital. This includes one secretary planning all appointments for oncology patients at the different departments. In the current situation, the gastro enterology (GE) secretary needs to communicate to the secretary of internal medicine to schedule chemotherapy. The locations being separated within the hospital complicates communication between the professionals.

Grouping individuals within an oncology centre near each other will increase Proximity between the professionals lowering communication barriers. Moreover, a new division of tasks will lower the number of steps and individuals involved in the care process reducing the risks of oversights.

Linkages between teams

Linkages between teams refers to the number of linkages or relationships between the participants of a team (Van Houdt et al., 2013c). Relational coordination theory (Gittell, 2002) and proximity deepen this aspect by strong relationships/linkages enabling participants to embrace the connections, positively influencing coordination.

Evaluation measures

Measurement tools within the team domain could be a valuable tool to assess the interdisciplinary cooperation and linkages between teams in RCPs.

A social network analysis is a potential way to map relationships and connections among certain participants within the care pathway (McDonald et al., 2014). A link exists when people have interacted with each other giving an idea of the actual care coordination mechanisms. Measuring the number of links between certain actors across organisations could be used to get to know the distance between certain individuals and compare this to the care pathway and protocol. The collection of this data might be burdensome since many actors are included in the networks and might also require specific software, but the care pathway could be used as a starting point.

Table 4.5 Summary of the evaluation measures for the aspect linkages between teams.

Measure	Type of measure	Data source	Reference
Social network analysis	Structure	Self-assessment	McDonald et al. (2014)
A survey including questions regarding: • Team satisfaction • Level of inter-professional relationships • Integration between care teams	Structure	Survey	Lemmens et al. (2008) and Latina et al. (2020)

Improvement possibilities

No specific improvement actions were identified.

Alignment of organisational cultures/climates

Cultural factors refer to attitudes, beliefs, norms and values of the healthcare professionals working in the team towards each other and the patients (Van Houdt et al., 2013c; Van Houdt et al., 2014). These and the interests of each collaborator should be aligned both within and between the hospitals. Willingness to collaborate is affirmed by cultural factors relating to the attitude of healthcare professionals towards each other. This is mainly reflected in for example physicians who focus on their own expertise and do not pay attention to other aspects and professionals in the care pathway (Van Houdt et al., 2014).

The principles of altruism, ethics and respect are also linked to organisational cultures which is reflected in collaborators having mutual respect for each other's expertise, contributions, and perspectives (Van Houdt et al., 2014). This relates to normative integration of the integrated care framework (section **Fout! Verwijzingsbron niet gevonden.**).

According to the interviewees alignment in RCPs also extends to having similar working methods and a uniform care pathway, synchronising current processes and logistics, and agreeing on the way the collaboration is organised. The program office of oncology networks has an important role in achieving this.

Regarding working methods, alignment refers to creating similar and uniform working methods regarding e.g. which medical information should be included in the request of an MDM. Additionally, all hospitals should create a synchronised health care pathway by all including similar steps. These alignments and joint arrangements should be outlined in working agreements and/or protocols (see section Plans and rules) .

The importance of alignment at the start of the collaboration was also illustrated by the examples given by the interviewees. *Some healthcare professionals were amazed or even a bit upset about the way patients are treated in the other hospital they are referred to. This is illustrated by having for example differences in prehabilitation phase, visits to the physiotherapists or whether the patient is called before their first visit.*

One patient suspected some medical investigations and imaging were repeated when he was transferred for all treatments and further investigations. He did not receive sufficient explanation why this was needed to be able to state whether indeed duplicates are present and stated that he needed assurance as "he is not a physician". Another patient enrolled in a regional care pathway stated the opposite appreciating the medical investigations did not have to be conducted again in the other hospital.

The importance of alignment in care processes and creating synchronised RCPs was also illustrated by the patient interviews. Patients mentioned that the diagnostic imaging sometimes was or was not needed to be conducted again when visiting the other hospital.

In line with other guidelines describing integrated oncology care pathways (Integraal kankercentrum Nederland, 2016), the interviewees mentioned the importance of aligning resources and the availability of facilities.

Especially, at the start of the collaboration, alignment also involves synchronising the schedules and logistics of the different hospitals, but also the availability of resources, facilities, and time. These are often based on the current processes within the hospitals and since some related elements will change due to the collaboration processes and resources likely need to be reallocated. The multidisciplinary meeting (MDM) is a moment allowing alignment between the hospitals by meeting with all relevant healthcare professionals of the three hospitals. The MDM is often one of the central pillars around which the care pathway, appointments, actions, and processes within the hospital are organised. For example, the timing of the MDM influences when the consultation with the patient is planned, because these are generally planned on the day of the MDM or the day after to discuss the treatment plan determined at the MDM. Moreover, scarce facilities like a conference room including a video connection should be available at the planned time to connect to the online MDM. Therefore, aligning processes, logistics at the start of a collaboration is important since it could have a large impact on other processes within the hospital as well.

It is also important to not forget about the impact and consequences of the collaboration for related healthcare professionals like dietitians and physiotherapists. Additionally, moving the expertise of a certain surgical procedure to another hospital might also influence other departments (like the intensive care unit) within the hospital.

Measures

The alignment of resources could be assessed in the beginning by assessing whether the day the MDM is scheduled could be optimised or how the processes and schedules with interdependencies of the MDM could be changed. The assessment of alignment might especially be present in the development and implementation of the care pathway, because once it is organised in a certain way the setting is determined and is less easily changed.

The way cultural factors are aligned could probably be assessed best via a survey or interviewing professionals about their experiences.

Improvement possibilities

The programme office of the oncology network has an important role in aligning the different organisations within the network according to the interviewees. They can keep an overview of the bigger picture and have fewer personal interests that should be aligned. Therefore, they could be considered as a mediator in this process by advocating the interests of all involved organisations and professionals.

Alignment could also refer to “*being on the same page*” on how the collaboration should be organised (who does what and when). This could be achieved by talking with each other and looking at how the changes impact everyone. The programme office of the oncology network could play a part in the alignment of the hospitals. It is important to have the right people at the table to achieve this by involving the most important stakeholders such as physicians, nurses and administrative staff having tasks within the RCP.

However, it is also important to not forget about the impact and consequences of the collaboration for related healthcare professionals like dietitians and physiotherapists. Additionally, moving the expertise of a certain surgical procedure to another hospital might also influence other departments (like the intensive care unit) within the hospital.

Coordination mechanisms

Coordination mechanisms are the approaches, methods, strategies or tools used to time, align and integrate information, decisions, and actions to synchronize care (Okhuysen & Bechky, 2009). These aspects addressing an operational level become more important as the degree of task integration increases (Van Houdt et al., 2013c). The coordination mechanisms could be considered as relational coordination and agreements with all partners which are formalised at the start of the collaboration. This forms the base of the cooperation and are the first steps towards alignment and coordination, which might be sufficient in less interdependent situations (Gittell, 2002). When designed well they will ensure less interaction among the participants is needed via coordination actions.

Plans and rules

Plans and rules assist coordination by defining responsibilities for tasks via e.g. a documented healthcare pathway explaining the actions; aligning the allocation of (scarce) resources to complete the task and avoid disruptions via schedules (e.g. operation room planning); support agreement and cooperation via e.g. plans on group-level or working agreements; and influencing perceptions of justice and equity via e.g. unwritten norms or explicit rules (Okhuysen & Bechky, 2009; Weaver et al., 2018). Plans and rules mainly describe the impersonal methods for standardisations or adaptation of the care process receiving minimal feedback (Van Houdt et al., 2013). Care pathways stimulate relational coordination by providing task agreements, giving insights into the care process as a whole, roles, and the importance of the tasks (Gittell, 2002). Thereby, plans and rules relate to other aspects such as (cultural) alignment, roles, and accountability.

The importance of aligned plans and rules between the different organisations is outlined in the sections on Improvement possibilities

No specific improvement actions were identified.

Alignment of organisational cultures/climates and Objects, representations, artefacts, and information systems.

Guidelines and protocols were mentioned as one of the most important factors enabling good collaboration and coordination by the interviewees. The protocols in most regions were based on the guidelines of the federation of medical specialists for the corresponding specific illness. Besides the treatment steps, the protocols and agreements should include who does what and when (clearly defined roles and responsibilities) and be unambiguous to avoid confusion. A mentioned reason for having clearly defined protocols was the importance of individuals doing what was agreed upon and having the opportunity to address to individuals when agreements are not honoured.

The importance of clearly defining the tasks and responsibilities within care protocols is illustrated by examples mentioned by interviewees. An unclear or incomplete description could cause physicians to not conduct the tasks as described or as they are expected to do by the other professionals.

One interviewee mentioned a situation in which the protocol is insufficiently defined. "*Sometimes based on the MDM discussion additional tests like laboratory or imaging must be completed to ensure the determined treatment plan. When these are in line with the expectations, the patient can be referred as planned. However, currently no healthcare professional receives a message when these investigations are completed to initiate the next steps of the care pathway.*"

Also, according to the literature, plans and rules should be based on national guidelines and standards of oncology networks. These are filled in and specified in protocols and are care pathways specific for the region (Visserman et al., 2014). RCPs including clear agreements about quality of care are crucial for lowering variation among hospitals (Regionale oncologienetwerken, 2023a). Additionally, the elements of the appropriate care plan should be aimed to be integrated within the care pathway (Citrienfonds, 2023). Appropriate care focuses on the patient by considering their preferences and needs, overall health, and social context and facilitates shared decision-making. Ideally, the care plan anticipates tracking up-to-date progress toward patient goals (McDonald et al., 2014; Schultz et al., 2013).

The interviewees stated the wish to include more about the social history of the patient in the information transfer. However, they did not consider this as a bottleneck in the current processes.

Also, two of the interviewed patients mentioned the focus during the treatment process should also be on the social context of the individual and consider "*the person behind the disease*".

A condition to facilitate patient-centred care is systematically retrieving (via rules being implemented in the care pathway) and documenting the information in a way it could be accessed and supplemented by all healthcare professionals in the network (Citrienfonds, 2023). That these aspects are insufficiently covered is illustrated by the results from the interviews.

At the start of an RCP, plans and rules can include the development of and having agreements about joint planning with the project team including a project plan, timelines and setting milestones together (McDonald et al., 2014; Schultz et al., 2013). Once the care pathway is established, these project management-related plans might still be relevant in the implementation process of improvement activities.

Measures

First, it could be established whether protocols are documented for the RCP. These protocols and care pathways should include standardisation by describing which examinations should be performed, recording roles and responsibilities, agreements about referrals, information provision to the patient, transfer of patient('s information) and feedback to the attending physician (Visserman et al., 2014). Additionally, in the care pathway hospitals should try to cluster the (diagnosis) treatments as much as possible and minimise the throughput times (Integraal kankercentrum Nederland, 2016).

Pathway audit tools, like the Integrated Care Pathway Appraisal Tool (ICPAT), could be used to evaluate pathways uniformly (Vanhaecht et al., 2006).

Evaluating the state of the plans and rules could be done by evaluating the adherence. The occurrence of recommended care activities relates to whether the received care of the patient is in line with the prescribed protocol. These measures do show links with other aspects like roles and information transfer. For example, when the protocol describes how certain information should be transferred. Additionally, the occurrence of the care activities should be determined for a subgroup of patients who were planned to receive the treatment. The adherence towards the protocols, however, does not show how the negotiations and collaboration between the different partners took place to manage the care process and by whom the care is delivered (roles) (McDonald et al., 2007). Adherence and compliance to the developed standards and protocols could be based on several measures including medical information of the DICA registration like:

- Proportion of patients who preoperatively underwent a specific diagnostic procedure like (PET-)CT scan (Computed Tomography (CT) scan), histologic evaluation, EUS (could be determined for each separately or combined);
- Proportion of cases for which prognostic/predictive parameters have been recorded that are needed to make a treatment plan like grading, histological type, pathological stages, size, lymphatic metastasis;
- Proportion of patients (with a specific condition) undergoing a certain type of treatment or not receiving certain care (to indicate whether there is no overtreatment or wrong treatment). E.g. surgery, neo-adjuvant chemotherapy or post-operative radiotherapy;
- Proportion of patients referred for geriatric or physiotherapist;
- Proportion of patients discussed at MDM before primary treatment and for patients undergoing surgical treatment also post-operatively;
- Regarding palliative treatment patients receiving treatment for palliative care or patients receiving no treatment;
- Proportion of asymptomatic patients undergoing routine clinical evaluation in the first X years after operation which could indicate whether appropriate follow-up is given. Just as during the treatment pathway, there should also be a measure that indicates when inappropriate intensive follow-up is taking place like unnecessary screenings or imaging.

Interviewees expressed the wish to monitor and measure how often the process is not going as arranged.

The protocols and guidelines should also describe throughput times (Platform Oncologie - SONCOS, 2023). These could also be used to monitor how the coordination in the process is going. When knowledge about the times is known between different stages in the process especially when several institutions are involved, problems in coordination might be noticed. Lower throughput times are important to have the lowest and best treatment for the patients. However, sometimes waiting between two types of treatments is for the sake of the patient (e.g. waiting between chemotherapy and operation). So, it is not the case waiting- and throughput times should always be as short as possible.

Interviewees mentioned throughput times as an indicator for coordination by being able to detect bottlenecks within the system. Especially, when the duration of different parts of the treatment process were analysed like duration of chemotherapy or the time between diagnosis till start of the treatment.

Throughput times include times between different care activities in the pathway which makes a lot of different measures possible. They could be determined either in median or mean days depending on the number of patients and the influence of outliers. It could also be determined by the proportion of patients meeting a benchmarking norm. Examples of times that could be determined are:

- Time between diagnosis (confirmation of laboratory) or first diagnostic examination and first treatment with curative intent;
- Time between PA examination or surgery and publication of pathology report;
- Time between surgery and first adjuvant therapy;
- Time between first biopsy and MDM;
- Time from first MDM until first treatment (could be used for all patients with a treatment date determined or already crossing the norm);
- Proportion of patients receiving a certain type of treatment (e.g. radiotherapy) within a certain number of weeks after another event (e.g. surgery)

The times could be distinguished into two parts: the time for the administrative tasks to schedule the appointment/treatment and the time to wait till the first available opportunity. There are some moments in which waiting between the treatments increases the patient’s outcomes (e.g. between chemotherapy and surgery). When trying to improve waiting times, the focus should be on waiting that adds value to the patient.

Table 4.6 Summary of the evaluation measures for the aspect plans and rules.

Measure	Type of measure	Data source	Reference
Whether protocols with the typical aspects of a healthcare pathway are present.	Structure	Self-assessment	Guarneri et al. (2020); Platform Oncologie - SONCOS (2023)
Evaluating care pathway with a pathway audit tool.	Structure	Self-assessment	Vanhaecht et al. (2006)
Compliance with the developed standards and protocols.	Process	DICA registration and EMR	van Hoeve et al. (2014) Altini et al. (2019); Del Turco et al. (2010); Guarneri et al. (2020) van Hoeve et al. (2023) Bonomi et al. (2002) Platform Oncologie - SONCOS (2023)
Throughputs- and waiting times	Process	DICA, SONCOS and EMR	Platform Oncologie - SONCOS (2023) Del Turco et al. (2010); van Hoeve et al. (2014). van Hoeve et al. (2015)
Proportion of patients repeating diagnostic examinations within the same treatment phase either in the same hospital or another institution.	Process	EMR	Guarneri et al. (2020); Kern et al. (2009).

Measures regarding whether the described tasks are conducted correctly, complete and on time	Process	Self-assessment or EMR	Determined by author

DICA = Dutch Institute of Clinical Auditing; EMR = Electronic Medical Record; SONCOS = Stichting Oncologische Samenwerking;.

Improvement possibilities

Plans and rules are improved when these are recorded on paper and adherence to the plans and rules is evaluated regularly (Visserman et al., 2014). Adherence to protocols might also be improved by describing checklists with the corresponding tasks which professionals could use, which also links to the supporting action of incorporating the protocol within the EMR (see Objects, representations, artefacts, and information systems). In the care pathway of the case study hospital some of these checklists are already included. The region North-Holland and Flevoland also have developed a mobile application in which the RCP is explained which allows professionals to easily access the same information contributing towards lower variability within the region (Citrienfonds, 2023; Regionale oncologienetwerken, 2020, 2023c).

Elements of patient-centred care could be included in the care pathway and EMR by using the standardised "*gegevensset passende zorg*", which can facilitate in registering (and sharing with disciplines and other hospitals) the (social) contextual information about the patient in the EMR (Citrienfonds, 2023). This data set describes the most important elements for appropriate care. However, this information is often recorded fragmented in the EMR making it difficult to gather and share this information.

The wish for signals when tasks are completed, as mentioned by the interviewees, could improve adherence to the protocols. This topic is elaborated on in the section on the aspect Objects, representations, artefacts, and information systems.

Objects, representations, artefacts, and information systems

Objects, representations, artefacts, and information systems could be described as instruments facilitating coordination. Representations and objects are tangible or intangible entities used to convey information across boundaries and offer a common referent to interact, align work and create a shared meaning between the collaborators. Objects and representations mainly serve the following mediating actions (Okhuysen & Bechky, 2009; Weaver et al., 2018). Representation technologies help to direct information sharing to the right group, person, and place at the right time, e.g. the relevant patient information. They ensure each component of a task or process is clear and the process is aligned to prevent unnecessary duplication or wasted efforts. Additionally, they support in monitoring the process and knowing where the patient is located at a given time and assist in which tasks still need to be conducted and by who. Objects and representations also assist in creating a common perspective around the collective goals by for example sharing the notes of the visit to have a common sense about the condition of the patient and the treatment possibilities (Okhuysen & Bechky, 2009).

Regarding RCPs, the healthcare pathways and protocols are discussed in the section on Plans and rules. In this section, the tools that could facilitate coordination besides these will be discussed. In CCNs establishing these instruments together is important to reduce variability by having the same documents and save time. However, as mentioned by the interviewees the invested time to align information should weigh the improvements in quality and efficiency.

The development of shared documents within the regional care pathway saves time for the development and revision of these documents and protocols. When patient information materials are collaboratively developed, it may not only enhance similar communication towards patients but also lead to time savings in the future. However, the organisation of a regional care pathway, especially at the start of the collaboration, takes time to align the care pathway between the hospitals and develop comprehensive guidelines and arrangements (see section Plans and rules and Improvement possibilities

No specific improvement actions were identified.

Interviewees stated there is a lack of overview of where the patient is located within the care pathway. Objects and representations should facilitate this aim by creating an overview of the tasks that need to be completed and grasping a sense of the current progress.

Each secretary and case manager has developed their own way to create an overview of tasks and know where actions are still needed. Either by sending orders to themselves to create a to do list or marking patients as favourite in the EMR since separate lists in Excel are not allowed by all hospitals. The lack of this overview also causes the secretary to look for each individual record to check whether for example enough time has passed to set-out specific actions and whether these actions could already be started. This costs a lot of time since they do not know whether the tasks, they are waiting for are completed in the meantime when they check and look up the medical record of the patient. This makes an individual is multiple times checking the record of a patient which makes the process inefficient.

Additionally, the lack of overview also causes difficulties to know which actions should be outlined and which actions have highest priority to start with.

In an RCP, the knowledge about the status of the patient is challenged by the different hospitals with separate systems. Therefore, besides the lack of progress within the same hospital, interviewees also experience a lack of overview when their patient is transferred to the “surgical” hospital. This concerns both the state of the patient, but also the routes and processes within the other hospital.

There is low insight in the routes, processes, and status of the patient between the hospitals. This includes in which step of the process the patient is in the other hospital and how the process is going on there. Interviewees want to know this information to know when something is tending to go wrong (check if right process is going on) or something did not go as planned like a readmission. This information is now often lacking at the non-treatment hospital which gives an uncomfortable feeling according to the interviewees. This makes interpersonal communication and information transfer even more important.

The secretaries also mention it does not take a lot of time to look up this information about a patient themselves, but they do not have this opportunity right now. Currently, they should ask the other hospital which causes delays because this person might also be busy with other tasks instead of checking patient statuses.

Measures

The identified measures related to this concept are mainly focused on the information systems, which in an RCP mainly refers to the EMR. The improvement actions could be identified by assessing the current possibilities of the system. The measures underneath describe a developed situation hospitals could work towards.

Table 4.7 Summary of the evaluation measures for the aspect objects, representations, artefacts, and information systems.

Measure	Type of measure	Data source	Reference
Several aspects related to the clinical information system could be assessed. This includes the extent to which: • The register of patients is linked to the protocols and guidelines. • The system provides prompts and reminders about the required services and guideline adherence (or, when less well developed, allows queries to sort on the clinical priority of patients). • The information about patients needing services is routinely available or included in reminders.	Structure	Self-assessment	Bonomi et al. (2002)
The extent to which information is directly loaded into the EMR e.g. laboratory tests or imaging results. Or, how often the EMR system is used to track diagnostic test results	Structure	Self-assessment	Bonomi et al. (2002) and determined by author

EMR = Electronic Medical Record.

Improvement possibilities

As stated by measures the improvement possibilities mainly lie in tools such as tracking and monitoring functions, alerts, shared electronic records and health indicator logs (Antonelli et al., 2009; Weaver et al., 2018).

In an optimal situation, the protocols and guidelines are linked towards the patient's records. This allows healthcare professionals to see the following steps of the care pathway directly in the EMR, which reduces the chances of missing out on certain steps. Interviewees related to this by describing the roles and tasks that were ideally included in the EMR system. A way this could be implemented is by organising automatic sets of orders and tasks within the EMR system.

One organisation had an example of how they organised the automatic sets of orders and tasks in their EMR. They experienced the throughput time of the process was lower and less orders were forgotten to be sent. This was only for their internal pathways within their own hospital. For each step in the care pathway subdivided into the specific condition based on staging of the disease, they determined an order package. The order sets make sure after a step all relevant orders are sent in the EMR system e.g. asking for imaging or a consultation with a physiotherapist. One check is inserted by asking the physician to check whether the correct orders are selected. This automatic ordering after a certain step, for example first consultation, was only available for steps until the MDM and did not include the treatment, because the treatment is more patient-centred and less standardised. Some of these aspects of ordering are also already built in the EMR of the case study hospital like an automatic order for diagnostic imaging when the care pathway starts. However, they wish to expand this to the whole care pathway.

Pop-up reminders for the care planning and follow-up of patients help to monitor patients by displaying information about the guideline adherence of a patient at a specific time (Bonomi et al., 2002). The suggestion of reminders was also mentioned by the interviewees.

Alarm signals could help to check the medical records of each patient less often by sending a message when the needed information is present. Reminders can also signal when delays are likely to occur in the process by sending a message certain information is still missing.

Chapter 5 will elaborate on methods of monitoring patients including the way pop-up reminders could be included.

Shared EMR systems were also reported by the respondents as one of the ways to improve the overview and monitoring of patients for patients being transferred to another hospital. Even though, some of the intra-hospital challenges like a lack of alarm signals and the way the EMR is organised will still exist, it will improve the monitoring possibilities for the referring hospital.

An option to improve the lack of overview of the positioning of the patient in the care pathway is being able to look in each other's EMR. This gives information whether there are complications or whether the patient is still admitted to the hospital. Now the status of a patient is occasionally communicated during the MDM (when complications are present), via email (often when asked by the non-treatment hospital) or at discharge via the discharge letter.

The ways to organise shared EMR systems are elaborated on in the section about the aspect of information exchange.

Roles

Knowledge, clarity and understanding of each role and the awareness of each other's roles in the health care process of the patient should be established. Roles also contribute to coordination by knowing the contribution of the individual and team to the overarching goals and the interdependencies between them (Okhuysen & Bechky, 2009). Additionally, efficient, and effective monitoring and updating about the current state is achieved often resulting from the hierarchy of roles allowing to keep participants accountable for their activities (Okhuysen & Bechky, 2009; Van Houdt et al., 2013). Additionally, it can also highlight opportunities for substitution or back-up behaviour (Okhuysen & Bechky, 2009).

The roles that should be established for each phase of the RCP are at least the following three roles: who is the attending physician, who is responsible for coordinating actions and who is the point of contact for the patient (Artsenfederatie KNMG, 2022; Visserman et al., 2014). The last two actions are often undertaken by a case manager who is preferably responsible for these tasks during the complete RCP. Care coordination also requires flexibility in defining new professional activities and roles when needed (Van Houdt et al., 2013).

According to literature when professionals start to collaborate more intensively, it is likely the autonomy of the individuals is affected and roles and autonomy will be defined to a lower extent caused by the shared responsibility for the patient's well-being (Valentijn et al., 2013). There were mixed responses by interviewees on whether the roles were clearly defined within the protocol. Although guidelines and procedures are present, sometimes unclarity exists about who must undertake action and which actions should be undertaken.

Most interviewees think there are sometimes moments that the protocols are unclear. On the other hand, some other individuals state they have the feeling the protocols and roles of everyone are clearly defined.

Examples mentioned related to the ambiguity in roles during the interviews were: *Situations in which it was not clear another person is waiting for information to arrive or unclarity about who should deliver information to colleagues. Secondly, unclarity between the partner hospitals who informs the patient about the next treatment step was noted.*

Challenges related to the unclarity of roles are also often related to the concepts of accountability/responsibility and plans & rules. Protocols can support in describing the roles and tasks of each individual.

Measures

Whether roles and tasks are clearly defined is most easily questioned via a survey or interview with healthcare professionals. Indication questions related to this topic are: "How often were you confused about your role or the role of other healthcare professionals?", or questions related to the presence of team leadership who ensures that roles and responsibilities are clearly defined or team-functioning related to clearly defined roles.

Table 4.8 Summary of the evaluation measures for the aspect roles.

Measure	Type of measure	Data source	Reference
Survey questions related to team functioning and the experiences of healthcare professionals.	Process	Survey	Determined by author

Improvement possibilities/suggestions

Roles and responsibilities should be outlined in written agreements or (in)formal role descriptions (Visserman et al., 2014; Weaver et al., 2018). In RCPs, this is often included in the healthcare pathway or protocol. Interviewees related to this by mentioning the tasks within the protocol should be clearly and unambiguous defined.

Possibilities for improving this situation include the development of clear and unambiguous protocols and healthcare paths on paper. The roles and tasks defined within the protocol should be shared with all involved stakeholders and professionals, which ensures everyone is aware of their tasks and could act in line with the prescribed roles. According to the interviewees, ideally these roles and tasks are clearly included in the EMR.

Communication and alignment were considered important to come to a clear division of tasks within the RCP. When the third hospital joined the case study network, the care pathways of the individual hospitals were compared on main points. According to one interviewee, this could have resulted in a less synchronised shared care pathway between the hospitals including a less distinct division of roles. Each hospital still having its own documents for the care pathway does not facilitate in defining roles among the hospitals clearly, because each hospital is responsible for updating its own care pathway documents. As mentioned earlier, it would be more efficient to work together and have a joint responsibility for the revision of the care pathway.

Communication and proximity aid in situations where roles are not as clearly defined as required.

Routines

Routines could be considered as repeated patterns of behaviour (Okhuysen & Bechky, 2009). Within RCPs, the most important routine is the regional MDM, which is considered as the "*backbone of network care*" (Citrienfonds, 2023) by combining (bi-)weekly information from all organisations to ensure the patient receives appropriate care. Routines, like the MDM, provide a moment of contact between interdependent groups to work jointly on determining a treatment protocol and creating a common perspective (Okhuysen & Bechky, 2009).

Routines also help coordination by making the completion (or a lack of completion) of tasks visible. The routines are a way for the professionals who are dependent upon each other to observe the progress of the task by for example regularly having contact (Okhuysen & Bechky, 2009).

Care pathways could be considered as a routine by prespecifying the tasks and their sequence (Gittell, 2002). Routines could therefore also facilitate the transfer of tasks from one group to another (Okhuysen & Bechky, 2009). Since care pathways are already discussed in plans and rules, this section will mainly focus on the routine of the MDM and the related challenges and improvement suggestions.

Measures

The identified measures related are more checklists and points that should be considered. The following list could be extended by formulating measures based on the improvement initiatives.

- The regional MDM is scheduled regularly (Platform Oncologie - SONCOS, 2023)
- Inclusion criteria for which patients are discussed in the MDM are documented (Smits et al., 2020b).
- The minutes of the MDM include all relevant elements as agreed upon. They should at least include a unanimous conclusion/advice and when needed the considerations about the treatment (Platform Oncologie - SONCOS, 2023)
- The extent to which the information required as a minimum for discussion within the MDM is present (Platform Oncologie - SONCOS, 2023)
- The number of MDMs a person is being registered for before moving towards the next step in the treatment process (interview). This could indicate whether the process of registration and preparation is going as planned.

Improvement possibilities

In the past years, several projects for regional MDMs have been conducted resulting in documents facilitating hospitals in the efficient organisation of the regional MDM (Regionale oncologienetwerken, 2023a; Smits et al., 2020b). This is especially important since the number of MDMs and the number of patients discussed during an MDM has increased in the last decades (Smits et al., 2020a). The MDM concerns more than the discussion with all healthcare professionals, because the following steps are related to the MDM: registration, preparation, documentation, and reporting back towards the referring hospital and the general practitioner (GP) (Figure 4.4).

Figure 4.4 Overview of the MDM (Multidisciplinary Team Meeting) process. GP = General Practitioner.

In the optimal situation, the MDM is echeloned meaning the level of the MDM (regional is based on the complexity of the condition e.g. towards the larger regional oncology network when the case is more complex (Regionale oncologienetwerken, 2023a). The most important improvement opportunities for RCPs based on the interviews and literature will be discussed, an overall overview can be retrieved via the published blueprints (Smits et al., 2020a). Especially, regarding the registration process of the MDM success factors are formulated by having clear registration criteria and one uniform registration form/process (Smits et al., 2020a, 2020b). A registration form supports the information being complete and easily processed in the MDM form and EMR of the "surgical" hospital by being able to copy the information.

The standardised MDM data set could support knowing which information is needed for the MDM (Citrienfonds, 2023; Regionale oncologienetwerken, 2022a). These national basic data sets are developed and can be incorporated into the EMR which lowers the administrative burden of looking and copying information from different places in the EMR.

The diagnostic imaging and results of the referring hospital often need to be delivered via a different platform and it is important someone (often a secretary) checks both for internal and external patients this information is complete and on time.

The MDM discussion should be organised efficiently and effectively so that healthcare professionals do not lose time. Both from the interviews and success factors identified in the literature, the clustering of patients comes forward as an improvement suggestion (Smits et al., 2020b).

The MDM currently takes more time of healthcare professionals than needed according to the interviewees. During the MDM efficiency could be achieved by having a time scheme when the patients of each hospital are discussed. This allows hospitals in the collaboration to enter the meeting when their patients are discussed and leave when the patients of another hospital are discussed. The treatment hospital will always be present to have at least two hospitals discussing each patient. However, the interviewees mentioned this is also sometimes difficult to organise, because of differences in complexities of cases.

The improvement opportunities around the MDM are also focused on the exchange of digital information exchange via e.g. the MDM portal (Regionale oncologienetwerken, 2022b). This lowers the administrative burden of the "surgical" hospital by not needing to copy the registration forms with information from a different EMR into MDM forms. More details about these methods are explained in the section on information exchange.

Proximity

Proximity could be explained as the (physical or cultural) distance between individuals which influences the amount of interaction and communication. When professionals are co-located communication and keeping each other up to date facilitates proximity. Proximity is mediated by visibility which is often created by physical co-location allowing one to see the work of others facilitating knowing who knows what or who can help with a particular problem trust (Okhuysen & Bechky, 2009). This also enables individuals to see the progress, adjust their work, and anticipate the other's tasks. The concept of *quality of relationships* as described by Van Houdt et al. (2013c) includes having a high-quality collaboration and having mutual respect which is related to proximity. Proximity creates familiarity by individuals better understanding each other. Proximity supports monitoring, more timely updating, and information sharing, but also in having trust (Okhuysen & Bechky, 2009).

Personal relationships were mentioned as a key concept facilitating coordination during the interviews. Personal relationships relate to the importance of getting to know your collaborating partners. Understanding and having an idea of the situation of colleagues (also in other hospitals) likely also reduces annoyance about these colleagues when tasks are not completed correctly.

According to the interviewees, personal relationships help to find each other when needed, but also facilitate in knowing and understanding each other's way of working. This links towards creating a feeling of a joined team and having a shared responsibility. Everyone involved should feel responsible for the regional care pathway. Good relations will make it easier to speak to each other when something is not going as agreed upon. This results in a positive atmosphere enhancing the collaboration.

The patients also stated the positive impact of the healthcare professionals knowing each other well even when working in different hospitals on the way the care pathway is experienced.

Patients had the impression proximity was present which also increased the feeling of being "*a patient who is known*".

Measures

No specific measures regarding proximity were identified.

Improvement possibilities

A way to achieve proximity is meetings in person among physicians who are distributed among separate organisations (Weaver et al., 2018). Low-threshold contact and being on good terms with each other creates a feeling of proximity.

The interviewees mentioned personal relationships and low-threshold contact will be built by meeting each other, preferably in person, and visiting each other to gain a better understanding of their working methods.

Low-threshold contact is already experienced within the hospitals but to a lower extent between the hospitals. Another enabler is having each other's contact information through, for example, a contact list and ensuring everyone is easy to reach.

Sharing contact information within the EMR could be possible when an integrated regional EMR is available (Visserman et al., 2014). For now, the example of the OncoNovo+ region could be followed. They developed a mobile application in which the care pathway is explained and contact information of the healthcare professionals is included (Regionale oncologienetwerken, 2023c). Since it is a mobile application, it is easily reached by everyone.

Shared goals (Van Houdt et al., 2013)

It is important to have shared visions and goals, knowledge of these goals and collective ownership of achieving the goals within the regional oncology network (Van Houdt et al., 2013). The goals, mission, vision, and objectives should be aligned for the collaboration to also allow collaborative evaluation of the success and achievements. Regarding improvement actions, shared goals within the regional oncology network should be developed and explicitly committed by each organisation (Citrienfonds, 2023). The concept of shared goals could therefore also be related to commitment, because the hospitals collectively state their aims on which they all agree (Nezami et al., 2023). This concept relates to normative integration of the integrated care framework (section 2.3).

The goals, mission and vision should also reflect the needs of the patient and the collaborating hospitals should have similar views on the way the patient should be treated (Schultz et al., 2013; Valentijn et al., 2013). This includes the need for care and coordination including the physical, emotional, and psychological health and need for support services.

Measures

The only measure identified on this topic is that it could be checked whether a joint vision and ambition are arranged, recorded, and guaranteed (Latina et al., 2020; 2023). This vision should be established at the level of the network regarding care outcomes, but also for each organisation in the way they contribute to the shared goals.

Table 4.9 Summary of the evaluation measures for the aspect shared goals.

Measure	Type of measure	Data source	Reference
Whether a joint vision and ambition are determined and recorded (at network and organisational level).	Structure	Self-assessment	Latina et al. (2020); Platform Oncologie - SONCOS (2023)

Improvement possibilities

There are no specific improvement possibilities identified to guide the process of developing shared goals. The network office likely should play a role in this process by balancing the interests of the different stakeholders. Regarding meeting the set goals, the different efforts and attitudes should be evaluated in light of the joint vision and how they contribute towards these goals (Antonelli et al., 2009).

Knowledge (Van Houdt et al., 2013)

Knowledge refers to the availability of (communication) skills, experience, and expertise (to do for example the procedure of the treatment) (Van Houdt et al., 2013). This aspect also includes the transfer of this knowledge and the availability of training and information technology. Knowledge about the services and expertise of others relates to this topic by being able to refer an individual with a certain question to the right expert (Van Houdt et al., 2014).

In the interviews, the aspect of knowledge was mainly illustrated by their statement the knowledge about the process should not be known by one or two individuals. This illustrates the importance of these individuals with a lot of knowledge, but there seems to be a lack of possibilities to transfer all information to others.

Interviewees stated the processes should not depend on a too limited number of individuals that has expertise and know the process well. Stability should be created by multiple people knowing the process.

This is also something the hospitals experienced problems with due to higher staff turnovers. This also includes that the information about the patients and medical records should be recorded digitally and placed in a location everyone could enter. One secretary also stated the feeling "*she had everything in her head and keep track of every patient since there is no good monitoring system*".

Measures

No specific measures were identified.

Improvement possibilities

No specific improvement suggestions were identified.

Emergent integrating conditions

Integrating conditions are shared states of mind of a team that may help to explain why different coordinating mechanisms impact team behaviour and, ultimately, outcomes. These are reestablished over time and developed from the coordinating mechanisms and the interactions among team members (Okhuysen & Bechky, 2009). They include accountability, predictability, common understanding, trust and the perceived need for coordination.

Accountability

Establishing accountability is about creating a common understanding and agreement about the responsibilities of each specific element in the care pathway (Okhuysen & Bechky, 2009; Schultz et al., 2013). It makes clear where responsibilities lay by describing who or which role is responsible for which tasks, to what extent and when the responsibility is transferred to other individuals or teams. Establishing and assigning responsibilities is important for teamwork with interdependent tasks, which is how RCPs are organised.

Accountability could be explained as how responsibilities are managed and the mechanisms for holding individuals or teams accountable, which could be described by expecting individuals to answer for failures for elements that were their responsibility (McDonald et al., 2014; Schultz et al., 2013).

Accountability for the coordination within the process should also be established by having a person responsible for this aspect. The interviewees mentioned that coordination can take place on the level of the patient and on the level of the regional network.

Coordination can take place on different levels: 1) on the level of the patient, largely through case managers, nurses, and secretaries by communication between them (see boundary spanning); 2) on the level of the overall collaboration of the oncology network at a higher level, largely through the oncology network office or tumour board. The latter is often shaped by an assembly of all stakeholders once or twice a year discussing changes in the care pathways, new insights and scientific research (see 591101200.425 Governance within regional oncology networks in the

According to the interviewees clarity about the responsibility for certain tasks and steps, but also in the overall patient care pathway is occasionally missing at the moment. Challenges related to unclarity of responsibilities are also often related to the aspect of plans & rules, because this often relates to the fact the protocols are not sufficiently defined regarding responsibilities.

The lack of clarity about the responsibilities might be partly caused by the protocols not being defined clearly enough, protocols insufficiently aligned, or the protocols not being known by everyone. This is also illustrated by interviewees stating it should be more clear who does what and when they can expect to start with their own activities.

The individuals stating it should become more clear when their activities should start illustrates the interdependency of tasks being a characteristic of situations in which care coordination is needed as is included in the definition of care coordination (section 4.1).

Measures

The measures related to responsibility mainly describe whether a description of responsibilities is included in the documented healthcare pathway protocol and the experiences of the healthcare professionals. The description within the protocol should describe who is at which moment and for which aspects of the examination and treatment plan responsible (Platform Oncologie - SONCOS, 2023). Survey questions could for example focus on how professionals experience the way responsibilities are organised or how they expect and experience others to answer to failures for tasks under their responsibility.

Table 4.10 Summary of the evaluation measures for the aspect accountability.

Measure	Type of measure	Data source	Reference
Whether a description of responsibilities is documented	Structure	Self-assessment	Platform Oncologie - SONCOS (2023)
Survey questions assessing the way accountability and predictability are experienced by professionals.	Process	Survey	Vanhaecht et al. (2006)

Improvement possibilities

Many of the improvement suggestions overlap with those described in the sections roles, and plans and rules. It is mainly important to clearly state the responsibilities within the protocol and guarantee everyone is aware of their responsibilities. Additionally, it could help to engage stakeholders in the way accountability is established to ensure everyone agrees upon the way the responsibilities are divided.

Moreover, when responsibilities or tasks are transited to another individual it is best to record this either via email or in the EMR (Visserman et al., 2014). Thereby, the transition happens explicitly, and the other party is again reminded of their responsibilities. Preferably this explicit transition happens on time.

Predictability

Predictability describes an understanding of the tasks, the elements/subtasks and the sequence in which these tasks should be completed, to allow interdependent professionals to anticipate on these. This knowledge allows individuals to plan and perform their own tasks, because they know what they can expect others to do and when they will do their work. A high level of predictability enhances coordination by individuals being able to count on the execution of tasks of others (Okhuysen & Bechky, 2009).

The lack of predictability is also illustrated in some examples of the interviews shown earlier indicating individuals do not always have a clear understanding of the tasks the other hospital is performing regarding informing the patient. A second example is that interviewees stated it was not clear when they could start with their tasks.

Measures

No specific measures were identified.

Improvement possibilities

Proximity between partners facilitates predictability by having better knowledge about your collaborators, and their preferences and tasks. Additionally, a common understanding of the actions required to perform a task and how each individual or team contributes towards these, is crucial for predictability. Clear protocols could support this by defining the tasks and timing of tasks (Okhuysen & Bechky, 2009).

Common understanding

A common understanding of the actions to perform a task and how each individual or team contributes towards these should be established. In addition, knowledge about the broader context can help by creating a shared understanding of the overarching goals of the network collaboration (Okhuysen & Bechky, 2009).

The aspect of shared goals is related to a common understanding by establishing an overarching goal but is separately described because that is more described on a general network level.

Measures

No specific measures were identified.

Improvement possibilities

A common understanding could be created by handing down the plans created on a higher hierarchy level towards the healthcare professionals or facilitating a bottom-up approach. Boundary spanners (see section boundary spanning) translate and link different parties having a role in creating a common understanding (Okhuysen & Bechky, 2009).

Trust

Building and maintaining mutual trust and respect among the individuals, teams and organisations collaborating facilitates coordination. Interviewees considered trust important to achieve a high-level quality collaboration, so that they can rely on other professionals to do their jobs appropriately.

Trust on a personal level is partly based on being reliable and executing the tasks asked at the expected level according to the interviewees. At a higher level this also refers to trusting the processes and agreements and that these are correctly executed. Trust should grow over time by executing tasks correctly which lowers the need for the other party to check or correct.

In the regional care pathway, a lack of trust is illustrated by individuals monitoring whether action is undertaken by another party, and by individuals keeping track of their own patients after referral.

Healthcare professionals explained they would act differently when their level of trust in another colleague drops by starting to check information more often.

Situations with an ambiguity of roles, misunderstandings, or tasks that are not executed in line with the protocol, creates frustrations according to the respondents. Often these are between the different hospitals and result in poorer personal relationships (see proximity) and trust. Individuals might start acting according to this by checking whether everything is going well at the other hospital. This could start a kind of spiral in which these checks increase frustrations by healthcare professionals in the other hospital. These frustrations might not be expressed towards each other, but they likely influence how the collaboration is experienced.

Measures

No specific measures besides survey questions were identified.

Improvement possibilities

When trust and respect between colleagues is considered low several conflict or mediation techniques could be used. An example is identifying and addressing conflicts among healthcare professionals and starting a resolution process to handle the debates that arise. These are generally, quite intensive tools and open communication towards each other could also increase trust.

Need for coordination (Van Houdt et al., 2013c)

Need for coordination describes the perceived or evaluated importance of information exchange or care coordination (McDonald et al., 2007). This need for coordination experienced by healthcare professionals depends on the available organisational coordination mechanisms (Van Houdt et al., 2013a).

Interviewees noticed different preferences for the intensity of coordination between colleagues resulting in different working methods.

> Interviewees described there are differences in communication and working methods between healthcare professionals. Some, for example, give a signal towards the secretary or the colleagues next in the care pathway e.g. when the neo-adjuvant chemotherapy finished, while others do not give this signal.

Overall ambiguity is increased by the different ways of communication, because not everyone has the same working methods and now it is not always known whether the treatment was finished.

The relation to the concept of the need for coordination could be explained by some healthcare professionals who might see the need for the signal to improve coordination, while others do not feel this need. These messages are often used to inform individuals everything went as planned, which might not always be needed. This is also closely related to the plans & rules, because if it is described within these, it is about the adherence towards protocols.

The wish for coordination is also differently perceived by individuals. Some interviewees mentioned they were quite concerned about their patients and wanted to know a lot of details to ensure coordination was going well. This is a difference in personalities. Some even described they will call patients regularly to ensure the care pathway continues correctly once the patient is referred, because they believe they receive insufficient updates from the partner hospital.

Measures

An evaluation question asked could be whether the perceptions of fragmented care delivery are similar for the different collaborators (McDonald et al., 2007).

Improvement possibilities

Explainability may enhance need for coordination by creating a shared understanding among individuals why certain coordination activities should be undertaken.

Coordination actions

Coordination actions could be described as activities or initiatives that could be implemented to improve care coordination. Coordination activities build upon the coordination mechanisms and give more shape towards the earlier mentioned aspects. Especially when uncertainty, variability or interdependence of the tasks increases the need and effectiveness of coordination actions grow, because they have a higher capability of information processing than mechanisms such as routines and protocols (Gittell, 2002). In situations when a challenge occurs, or the coordination mechanisms are insufficient, coordination actions including more communication between partners are needed. They include boundary-spanning behaviours, information exchange, collective problem-solving and decision-making, negotiation, and mutual adjustment.

Boundary spanning

Boundary spanning behaviours facilitate information flow and relationship management between different collaborators (Long et al., 2013). Often these involve individuals with a task to integrate the tasks crossing functional boundaries such as different teams (Gittell, 2002). This could be designed as a designated coordinator role like care managers or patient navigators to improve coordination (Weaver et al., 2018). Also, MDMs can serve this role by bringing the multidisciplinary team together. This case manager is often a nurse who operates as a gatekeeper by checking the information is received and sent. Patients see boundary spanners as individuals who have direct linkages within the healthcare pathway and simultaneously know the personal situation of the patient (Carroll et al., 2010). From the patient's perspective, case managers perform actions to assist patients in managing more effectively and efficiently their medical, social, and mental health conditions (McDonald et al., 2014; Schultz et al., 2013). They keep in contact with the patient and reassess their situation when needed (Antonelli et al., 2009).

A case manager should network and connect with the different collaborators and coordinate all aspects of a patient’s care (Gittell, 2002; McDonald et al., 2007). They could provide information to multiple providers, foster a shared understanding, and monitor that the patient receives services promptly (McDonald et al., 2007). However, it often stays by addressing the issue since they rarely have the authority to change the workflow or power to overrule certain processes. Therefore, individuals within the care pathway must realise themselves the interdependencies between their tasks (Trosman et al., 2016).

Case management appears to improve patient outcomes and overall performance by facilitating interactions. Like the other coordination actions, boundary spanners are increasingly effective when the care pathway includes more uncertainty (Gittell, 2002). The patient federation has a current area of focus to improve case managers by having a case manager during the whole care pathway including the period in which chemotherapy and/or radiotherapy is received (Regionale Oncologienetwerken, 2023b).

From the interviews, the following insights were retrieved. Coordination of the individual patient pathway is the role of the case manager, nurse specialist and secretary in most hospitals. Although specifications of the role of case managers differ between hospitals, they tend to oversee the care pathway of the patient and thereby have a central role in coordination. They do this by for example arranging the patient is discussed in the MDM and keeping an eye on where the patient should move next in the care pathway. In this role, they often signal challenges in the way the pathway is organised or when misfortune is looming.

Interviewed patients appreciated having a case manager, especially due to his/her approachability.

The patients experienced when a case manager was assigned, he was the first point of contact for potential questions, had oversight of and initiated steps of the care pathway. This ensured the patients had a contact person during their treatment and follow-up, which was experienced as pleasant. The patient who had a surgeon instead of a nurse specialist as first contact for a period experienced the contact with the surgeon being less approachable.

Measures

No specific measures were identified. The interviewees mentioned it is an important aspect to measure, because they stated to be interested in the number of times a patient is not monitored well within the process. The boundary spanner could be seen as having responsibility for monitoring, but often these moments will come to light when delays in the process occur.

Improvement possibilities

Several initiatives for regional case management, even connected to first-line care, have been piloted and could be described as good practices (Citrienfonds, 2023). Between regions differences in the ways regional and network case management is organised exist. The final aim should be that the patient has an informed and approachable point of contact during the whole care pathway. This is facilitated by creating a network of case managers within the oncology region (Kuiper, n.d.). The points of contact can switch during the treatment process, however, within the network agreements about the needed information including medical and social context and the preferences and needs of the patients should be shared. The ideal situation is often described to be one in which the case manager follows the patient while he receives treatment in another hospital (Kuiper, n.d.).

Information exchange

Exchange of information includes transferring information, ideas, goals and experiences among the different collaborators (Van Houdt et al., 2013c). Information should be exchanged frequently, accurately, timely and in a problem-solving, standardised manner (Gittell, 2000; Van Houdt et al., 2013a). Efficient information exchange asks for a shared language and communication becomes more efficient when it is easy, fast, and contact is possible when needed. Within an RCP, communication is needed with the referrer (often GP), care providers (within the hospital and partner hospital) and the patient (Integraal kankercentrum Nederland, 2016).

A variety of channels could be used for information exchange or communication that could be distinguished into two general modes: interpersonal communication and information transfer (Schultz et al., 2013).

- **Interpersonal communication** is characterised as an exchange of knowledge through personal interactions in two ways between care providers such as face-to-face conversations, telephone conversations, emails, or letters (Schultz et al., 2013; Van Houdt et al., 2013c).
- **Information transfer** is defined as a transfer of data and does not necessarily involve direct interaction between sender and receiver. Information transfer could take place orally, in writing or electronically (Schultz et al., 2013). Examples of information transfer are information flows such as medical history, medication lists, test results, medical images, and other clinical data. The data should be transferred from one professional in the care process to another (or the patient).

Information transfer should aim to ensure the right care information is always available within the network (Citrienfonds, 2023). This requires arrangements around personal communication, infrastructure, information transfer and feedback (Platform Oncologie - SONCOS, 2023). Transferring relevant patient information that could be used in the other hospital is crucial for the care process and facilitating good and appropriate care (Citrienfonds, 2023). Accessing information is only useful if the information is registered uniformly and standardised, because harmonising data and realising data accessibility could be considered two sides of the same medal (Regionale oncologienetwerken, 2023a).

Information transfer and communication was described as one of the key aspects of coordination by the interviewees.

In line with the defined measures information transfer should include having the right information at the right time in the right place. Respondents stated ideally most information is transferred via the EMR and a signal should be activated when the information is not received in time. They considered information exchange especially pivotal in case of: 1) transfers; 2) the MDM which is organised to communicate and coordinate the pathway; and 3) when things do not go as expected.

At the higher level of the oncology network communication should be present when changes in the care pathway occur.

Uniform communication towards the patient from all partners should also be considered, including the extent to which the information is aligned, complete and correct. Interviewees recommend well-defined protocols to define which information is sent at which moment and by which hospital.

In line with the interviewees, the literature states there should be plans and rules defined about how information is transferred, by whom, and which information is relevant to include (Visserman et al., 2014). The effectiveness of the different channels for communication should be assessed with the aim and kind of information transferred.

Information transfer and communication are much related to the concepts of ambiguity and unclarity discussed in the concept of “roles” and “accountability”. Interviewees mentioned communication is sometimes disrupted by misunderstandings, which increases ambiguity in coordination. It implies that messages or signals are not being accurately transmitted or received, leading to a breakdown in communication. This can happen due to various factors such as misinterpretation or unclear messaging.

Currently, various interviewees feel insufficiently facilitated in the exchange of information.

Multiple individuals mentioned they did not like the fact they now had to rely on others to get to know the information about a patient. Information and medical information are now often sent by email which increases the chance of mistakes and costs lots of time. The information from the email is retrieved from the EMR and when received again copied into the EMR system of the other hospital. The email is also vulnerable concerning privacy of the EMR information. The radiology images are sent via another system and should be requested by the radiology department before use, which also requires additional steps within the process.

Also, in the intra-hospital communication when something is communicated towards another department it is not always known if they completed their task. Issues might especially arise when the individuals see another prioritisation of the task (meaning they do not complete the task with enough urge), when tasks are not completed, or when communication is poor, and the other party has no up to date information.

The privacy of the patient should be guaranteed when information is transferred. As stated by the interviewees concerns around the transfer of patient information exist by the patient having permitted to share the data and secondly, the method via which the information is transferred. In most situations, the patient should explicitly give permission to share information from the EMR with the partner hospitals to cover the first challenge (Bloemendal et al., 2017).

Illustrative of the different stages regions and hospitals are in regarding information transfer is the situation described by one of the patients: "*I had to bring a letter from one hospital to the other, because they were not able to look in each other's EMRs*." He did think it was a bit old-fashioned but did not mind performing this action.

Measures

Several measures related to information exchange for both interpersonal communication and data transfer can be developed. Regarding interpersonal communication it might be able to monitor when this communication took place and if this is in line with the agreements within the protocols. Moreover, survey questions are useful by asking questions about whether professionals experience the information to be clear and accurate, and how often they need to contact the sender for clarification.

For data transfer multiple elements could be assessed as described above. The list is quite extensive and therefore not all mentioned measures should be assessed, but a certain focus area could be chosen. Whether the described information is indeed received and sent could be assessed by (McDonald et al., 2014):

- Proportion of referred patients for whom the referring provider receives a report including critical information from the surgical hospital;
- Number of patients for which the referring hospital provides a summary of the care record (within X days).
- The hospital laboratory sends the clinical lab results to the right individual informing the laboratory results are ready.

Other elements are whether the data is complete, clear, unambiguous and the quality of documentation sent. A last element is that the information regarding EMRs, treatment plans or MDM submissions should be sent on time. This could be assessed by the proportion of MDM submissions that are sent within the minimum notice period; or the proportion of patient records available in advance of the scheduled appointment or sent back to the referring hospital within two days after hospital discharge (McDonald et al., 2007).

Table 4.11 Summary of the evaluation measures for the aspect information exchange.

Measure	Type of measure	Data source	Reference
Whether the shared data is in line with the agreement, on time, complete, accurate, clear, and of good quality.	Process	Self-assessment and EMR	Latina et al. (2020)
Whether the information is indeed received by the person who needs to receive it.	Process	EMR	McDonald et al. (2014)
Timely sharing of information regarding EMRs, treatment plans or MDM submissions.	Process	EMR	Platform Oncologie - SONCOS (2023); determined by the author

EMR = Electronic Medical Record; MDM = Multidisciplinary (Team) Meeting.

Improvement possibilities

Communication could potentially be improved by using a format of closed-loop communication (Verhoeven et al., 2021). Closed-loop communication includes the following pattern: receive a message, interpret, and follow up from the sender to ensure the message is received and appropriately interpreted. In this way, a shared understanding is created, and it is known the other has received and appropriately interpreted the information and which actions will be undertaken. However, closed-loop communication increases the administrative burden and therefore hospitals should outweigh the advantages and disadvantages themselves.

Giving regular updates about the progress and challenges might also handle some of the currently experienced doubts about whether indeed the process is going as planned. This could also include agreements about when one seeks contact with colleagues to ensure a similar need for coordination is established.

In addition to information exchange between organisations, the interviewees also mentioned improvement opportunities in the communication between healthcare professionals and patients. For example, network partners should use the same information folders for patients.

Interviewees illustrate the interpersonal communication by giving examples of moments in which they have to give an additional phone call to align the process, check whether something happened or if everything regarding the patient is going well. According to them, this is needed because the information transfer is insufficient by for example not including when the date of operation is or other information the other party is interested in.

Regarding communication towards the patient some individuals state patients experience differences in how the communication with the patient takes place. Caused by the different position of the case manager, and the possibilities to contact the hospital.

Ideally, it is reported that the information transfer took place to lower the chances of misunderstandings and when healthcare professionals can look into the same EMR, they can directly see the progress (McDonald et al., 2007).

Health information technology includes electronic tools used to communicate information (about patients and their care) among collaborators or the tool is used to manage patient's information over time. This could include electronic medical records, patient portals or databases, which could facilitate information exchange.

A good IT infrastructure to exchange data digitally between collaborating hospitals is lacking and hinders the collaboration of regional oncology networks. Exchanging patient information is cumbersome and time-consuming (Gijsen et al., 2022). Transparent requirements regarding interoperability and compatibility should be stated to suppliers on a national basis to facilitate digital information transfer (Regionale oncologienetwerken, 2023a). Regional oncology networks are trying to work towards a solution to have shared medical records. One integrated EMR will ensure all involved healthcare professionals have access to the same information creating uniformity (Visserman et al., 2014). When this is not possible at least agreements about how relevant information by involved care professionals could be retrieved should be made. The projects for improvements in IT are challenging due to different EMR systems and financial costs to develop infrastructure as region yourself.

Different initiatives for information exchange are explored. Digital information exchange is a complex and heterogeneous topic. Cross Document Sharing (XDS) is one of these environments that allows data exchange. The XDS is considered the standard for secure data exchange in regional networks internationally. It uses its own network on existing infrastructure (Bloemendal et al., 2017). A toolkit on how to implement this as a network is developed including a basic data set of data that could be exchanged (Citrienfonds, 2023). However, the case study network has not chosen to work with XDS but will likely start working with another tool, which is a transmural portal.

Transmural portal is developed by the EMR designer HiX which provides all three hospitals in the case study network (ChipSoft, n.d.-b). The transmural portal facilitates authorised physicians to see the original EMR of the other hospital allowing a complete and actual overview of information. Via this platform, direct access to the EMR environment of the other hospital is facilitated. This functionality is only available when both hospitals have an EMR of HiX and includes only access rights. The care platform developed by HiX elaborates on these functionalities by allowing the coordination of tasks, notifications for important activities and communication between providers in different hospitals (ChipSoft, n.d.-a). Additionally, sharing data between hospitals, even with another EMR, is supported by the care platform.

Another initiative to improve information transfer around the MDM is an MDM portal. This allows to transfer of information among the EMR systems of the hospitals. In the MDM portal, there is a kind of cloud in which all hospitals register their patients for the MDM. This allows all collaborating hospitals to have the medical history, imaging, and reports. Two regions have implemented an MDM platform yet and some options to expand it nationwide are being explored (Citrienfonds, 2023).

The website *Kennisplatform Digitale uitwisseling in de zorg* facilitates regions by creating a community and online forum including good practices related to digital information transfer, where individuals can ask questions and share best practices (Citrienfonds, 2023; XenForo, 2024).

When asked for their ideal situation interviewees mentioned their wish to have insights into each other's medical records. These wishes are in line with the initiatives that are currently being explored in different oncology regions.

To enable sharing medical records each patient should give permission to share this information with others. Therefore, this should be structurally included in the processes of each hospital. Currently, differences between the hospitals exist in how they ask patient's permission. Another challenge in the past was that in the other hospitals only individuals involved in the care of that particular patient can access the information.

Collective problem-solving and decision-making

Collective problem solving and decision-making are promoted when professionals need to work more closely together (Valentijn et al., 2013). This aspect relates to collaborative sensemaking in which a shared meaning about the information or situation is established (Duan-Porter et al., 2022; Weaver et al., 2018). For example, translating information and checking the understanding of the other. Problem-solving interactions are generally carried out by a designated care coordinator like eliciting needs and matching these with resources (Duan-Porter et al., 2022). The MDM tends to provide a platform for this by determining the treatment plan for the patient during the MDM.

One interviewee underlined the importance of collective decision-making with an example in which clinicians in two collaborating hospitals had different interpretations of a patient's imaging.

The regional hospital mentioned a positive treatment advice for the surgery after neo-adjuvant therapy towards the patient without first obtaining the opinion of the treatment hospital. The surgeon turned out to have a different interpretation of the imaging, calling the need for additional chemotherapy before surgery.

In the meantime, the intravenous line of the patient was already removed, and an additional medical intervention was needed to place it back for the chemotherapy. The patient described this as very unpleasant since the first placement had been traumatic.

This example illustrates the importance of interpersonal communication and collective decision-making between the hospitals. In situations with larger consequences, such as a new medical intervention, collective decision-making is especially important.

Measures
No specific measures were identified.

Improvement possibilities
Decision support software could support collective decision-making. One initiative to support decision-making is the development of a decision tree called *Oncoguide*. It includes all relevant guidelines and will therefore support the MDM in decision-making, but is not yet available for GE oncology. Pilot projects are also working towards integrating this tool within the EMR (Integraal kankercentrum Nederland, 2024b).

Negotiation
No specific definition for negotiation could be defined based on the literature. Based on my interpretation, this aspect could include negotiations between the partners about who should conduct a certain task when the documented healthcare pathway is not applicable or does not describe the situation. This might also include the concept of back-up behaviour by anticipating on the other’s needs and shifting workload among members if appropriate (Verhoeven et al., 2021).

The negotiation between different professionals was described by one patient who experienced the different professionals pointing towards each other.

A patient mentioned sometimes the different healthcare professionals like the GP, dietitian and surgeon point towards each other. She experienced this especially after the surgical treatment and during the follow-up. She asks herself who should make the final call and determine the policy, “*do I have to decide myself as patient?*”.

Measures
No specific measures were identified.

Improvement possibilities
No specific improvement possibilities were identified.

Mutual adjustment
Mutual adjustment refers to adjusting the pace and sequence of tasks based on updates, information, and feedback from the other teams (Duan-Porter et al., 2022). Once the tasks are aligned and timed, mutually adapting these tasks might be needed (Weaver & Jacobsen, 2018). This is related to adapting plans and strategies based on the evolving needs of the collaboration, but also adapting these to changing circumstances and external factors (Antonelli et al., 2009). It mainly refers to interactions

among participants rather than mechanisms for supporting or replacing those interactions (Gittell, 2002).

Mutual adjustment might especially be needed when coordination failures are addressed and the care should be changed correspondingly (McDonald et al., 2007). Individual performance feedback or team meetings will facilitate the ongoing assessment and adjustment of roles, responsibilities and decisions among multiple participants (McDonald et al., 2007).

One patient mentioned two different situations in which delays in the healthcare pathway occurred due to not adjusting according to the situation.

> Although it was not related to the inter-hospital coordination, the mentioned aspects relate to the intra-hospital coordination and are therefore described. The first situation is one in which the results of the gastroscopy were not present when the consultation with the physician took place. This was not communicated in time amongst the healthcare professionals to be able to cancel the consultation and ensure the patient did not come to the hospital.
>
> The second situation was when the patient was admitted in the hospital after surgery and had received contrast fluid for medical imaging. Back at the ward he received food, but he was not able to tolerate in combination with the surgery and contrast fluid which caused a relapse and the need for a feeding tube for several days.

Measures

No specific measures were identified.

Improvement possibilities

A methodology like debriefing could be useful to offer a learning opportunity and improve performance after a situation in which mutual adjustment was needed. Debriefing could include a structured process of obtaining feedback or information and involves discussing and analysing what happened, identifying strengths and weaknesses, and discussing lessons learned or areas for improvement.

Outcomes

Outcomes describe the overall outcomes on the level of the different perspectives of patients, healthcare teams, organisations, and healthcare system. In the proposed framework, well-organised care coordination leads to improved outcomes for all levels.

Patient outcomes

Patient outcomes include medical outcomes, patient satisfaction, and patient experiences. Patient healthcare outcomes include health status, overall survival, quality of life and patient experiences (Duan-Porter et al., 2022; Weaver et al., 2018). Patient outcomes also refer to the importance of the continuity of care, safety, efficiency, efficacy, availability, accessibility, and compatibility of the provided care (Van Houdt et al., 2013c). Patient satisfaction with how they were treated and how their social and psychological context including the impact of cancer on the rest of their life is assessed (Regionale Oncologienetwerken, 2023b; Van Houdt et al., 2013b).

All four interviewed patients have an overall positive impression of the treatment process in all visited hospitals.

The transition between the hospitals went well and no lacunae in information transfer were experienced in general (exceptions are mentioned in the corresponding aspects above). Both patients enrolled in the regional care pathway also stated it was pleasant to decide the location of the chemotherapy and follow-up being either in the "surgical" hospital or in "their own" referring hospital.

The patients interviewed did not experience the travel distance as an issue (patients had 15- 60 minutes travelling time by car). As stated by an interviewee "*you want to be treated by the best physicians and for that, you accept a further travel distance*.". In contrast, some healthcare professionals mentioned an increased travel distance for the patient as a disadvantage of the regional care pathway.

These impressions also show the importance for patients to know the care professionals work together and have knowledge about the situation of the patient. The viewpoint about travel distance is in line with earlier literature findings that patients are willing to travel further if the outcomes are believed to be better (Bühn et al., 2020; Kugler et al., 2021).

Health care teams outcomes

Healthcare team outcomes include team satisfaction and outcomes of team behaviour within and between the teams (Van Houdt et al., 2013c). Besides satisfaction it is also important to relate to outcomes of team behaviour as well (Van Houdt et al., 2013a). On the level of inter-organisational networks, team outcomes could refer to comprehensiveness, accessibility, compatibility, conflict, and efficiency within the RCP involving multiple organisations. These include clinical practice guideline adherence, and the different steps in the care process succeeding smoothly and without long waiting periods (Van Houdt et al., 2013c; Van Houdt et al., 2014).

Health system outcomes

Health system outcomes include hospital-level outcomes such as efficiency (e.g. avoiding waste of equipment and time) and the number of re-admissions (Duan-Porter et al., 2022), but also broader outcomes such as lifetime care costs and value, public health outcomes and cost-efficiency of the care pathway as a whole (Weaver et al., 2018).

4.6 Considerations for choosing appropriate care coordination measures

Measures should preferably meet several conditions like validity and reproducibility to be considered an appropriate measure within an RCP. Some of these conditions are explained in more detail to facilitate a well-considered choice for the chosen measures.

First, each measure should preferably meet certain conditions regarding validity, reproducibility, and interpretability. Although the validity and reliability of measures are not often assessed, these could be determined by a checklist (Bautista et al., 2016; Uijen et al., 2012) covering different constructs of validity and reliability. Especially measures with a high content and structural validity show a relation with coordination of care and are therefore regarded as superior. Combining various measures or survey questions into a new tool alters its validity and reliability, necessitating the validation of the new tool.

Secondly, each measure should be clearly defined including a definition, description, from whom or where data is obtained, the timeframe of the data, and when applicable how the outcome is calculated/determined (Guarneri et al., 2020). The underlying assumptions and consequences for interpretation should be considered by the interpretation of the results. During interpretation, other factors influencing the outcome of the measures should be considered, such as revisions in national guidelines or other quality improvements (van Hoeve et al., 2014). Changes in norms and guidelines might especially have a strong effect on waiting- and throughput times and other medical outcome measures (van Hoeve et al., 2015). The impact of these factors could be evaluated by interviewing professionals about their experienced impact and their interpretation of the findings distinguishing the influence of the different factors (van Hoeve et al., 2015).

Third, a benchmark or assessment criteria assists interpretation in determining whether improvements are needed or scale the current performance. The benchmark could either be a value or criteria for whether a condition is met or a comparison among hospitals. Benchmarks, particularly comparisons between hospitals, will promote knowledge sharing among hospitals and reduce variation between the organisations (Guarneri et al., 2020; van Hoeve et al., 2023). Benchmarks could be determined by national guidelines or could be determined by tumour workgroups creating consensus on the chosen value. It is important to exercise caution when using benchmarks, as there may be valid reasons for deviations from the guidelines like confounding effects, and these reasons may be inferred from the values (Guarneri et al., 2020; van Hoeve et al., 2023).

A final measurement instrument for care coordination should be comprehensive and include several elements from coordination. The list of measures is extensive and not all aspects might be relevant to know for a hospital, which also means that not all mentioned measures should be used. Some aspects might be well integrated into the current workflows which makes one can ensure these steps happen within the process and do not need any monitoring. An example could be the email sent after the discussion in the MDM. Another way to reduce monitoring of these kinds of working agreements is ensuring healthcare professionals note each other when something does not happen in line with the protocol. A final list of measures relevant to the RCP could be determined based on the experienced challenges and problems, and in cooperation with the involved healthcare professionals determining the important aspects and related measures according to them (Guarneri et al., 2020; van Hoeve et al., 2014). This will allow a smaller selection of measures, making the measurement instruments more practically applicable.

To conclude, a targeted tool should be designed by combining current measures enabling an overall overview of care coordination. Coordination-related indicators within the SONCOS standards could be used as a starting point since these are already available and regarded by the interviewees as important. Measures assessing adherence to the agreements of the care pathway seem to be most valuable at first. This will ensure the communication and data exchange is on time, complete, clear, and accurate. A complete overview of coordination can only be established when measures for all three perspectives (patient, healthcare professional and system) and different measurement approaches (surveys, checklists, administrative data) are included in the final instrument. The instrument should be structured in a way that can deal with personalised care and differences among healthcare professionals or organisations by combining disease and setting specific outcome and process indicators with broader applicable structural measures (Guarneri et al., 2020; Latina et al., 2020). Measures of coordination should always keep an eye on the overall goal of high-quality care for the patient and keep potential confounding effects in consideration (e.g. differences in population characteristics).

4.7 Considerations by choosing improvement actions

In line with the measures, a lot of improvement actions are possible to perform and not all have the same relevance for each RCP. The improvement possibilities are influenced by factors such as availability of time, financial resources, and workforce. Some actions have more dependencies between the hospitals and other specialisms like IT (e.g. information transfer) than others for success (Antonelli et al., 2009). Evaluating the current situation and identifying "quick wins" might be most beneficial as a starting point. These might lay in creating standardised formats for the MDM or synchronising certain elements of the care pathway in more detail. By sharing information and best practices from several projects and initiatives, regions are likely to benefit and learn from each other (Citrienfonds, 2023).

4.8 Summary of main interview results regarding care coordination

Coordination can take place at two levels: 1) on the patient's level involving boundary spanners to monitor and coordinate the care process; 2) on the regional network level by the network office or tumour boards ensuring the RCP is evaluated and improvement actions or new insights are implemented.

When discussing coordination with the interviewees, six main aspects of coordination emerged: alignment between hospitals, (synchronised) care pathways and protocols, information transfer and communication, personal relationships, network organiser, and trust. Most challenges described related to ambiguity and unclarity about roles and responsibilities which were caused by imperfect communication, misunderstandings, or undefined steps in the protocols. The theme of information exchange relates to the previous theme by sometimes the communication not being present, but also good methods for information sharing are lacking causing more administrative work. The interviewees experience checking information at other hospitals as something that goes along with collaborations in RCPs. Lastly, a lack of overview of the tasks that should be performed, whether certain tasks are performed, and the position of the patient within the care pathway (especially in the other hospital) is experienced. Reminders within the system and having good interpersonal communication are described as potential actions to overcome these challenges.

Patients were generally satisfied with the way the care pathway and transfers were organised mainly because of the good proximity between the healthcare professionals by knowing each other well. No major differences or "*gaps*" between the hospitals were experienced. The case manager has an important role in coordinating the care pathway and allows a low-threshold contact opportunity during and after treatment for the patients.

4.9 Proposed framework for care coordination in regional oncology networks

The adapted framework of Care Coordination in Chronic and Complex Disease Management is updated based on the insights from the interviews to support coordination within RCPs. None of the identified aspects in the original framework turned out to be inapplicable in RCPs. Some aspects show overlap or are of less importance, but they could be applied in the setting of an RCP.

Based on the interviews, two additional aspects were identified, namely alignment of resources and processes, and leadership within the network. Both aspects are added to the framework (Figure 4.5**Fout! Verwijzingsbron niet gevonden.**). Alignment in the original framework only included cultures and climates, but the interviewees also mentioned the importance of aligning the healthcare pathways and processes within the different hospitals. This ensures the hospitals have a similar view about the treatments given, ways of communication and for example the registration process for the MDM. The schedules, logistics and facilities should also be aligned, especially around the MDM.

The second aspect is the role of a network organizer within the network to facilitate and keep an overview of the RCP. It could be considered as part of the multisystem composition or governance of the network. Since the importance was emphasized by the interviewees, it was chosen to define the aspect separately in line with the boundary spanners in the framework. This coordinator should be the *"captain of the network"* and the network organizer between the hospitals, evaluate the RCP and lead improvement actions from a top or overall level. This also allows us to bring improvements and share ideas from one tumour type to another. The coordinator in this role should act interdependent to represent the different interests. The importance of leadership is also included in care coordination models in other sectors besides care (Nezami et al., 2023).

Moreover, including the related evaluation measures and improvement actions per aspect assists in the use of the framework as a guide to improve coordination in RCPs. The final framework shows a complete overview relating the aim of coordinated care to the coordination mechanisms and actions and the related measures and outcomes ( ). Feedback loops and learning abilities are included in the framework by showing a cyclical pattern in which the outcomes and improvements of a cycle influence the coordination of the next cycle. This feedback can be reported at the individual or team level either formally or informally. Besides improvement initiatives and feedback from others, the professionals might also engage in self-correction and modify their behaviours and attitudes without an intervention from outside (Verhoeven et al., 2021).

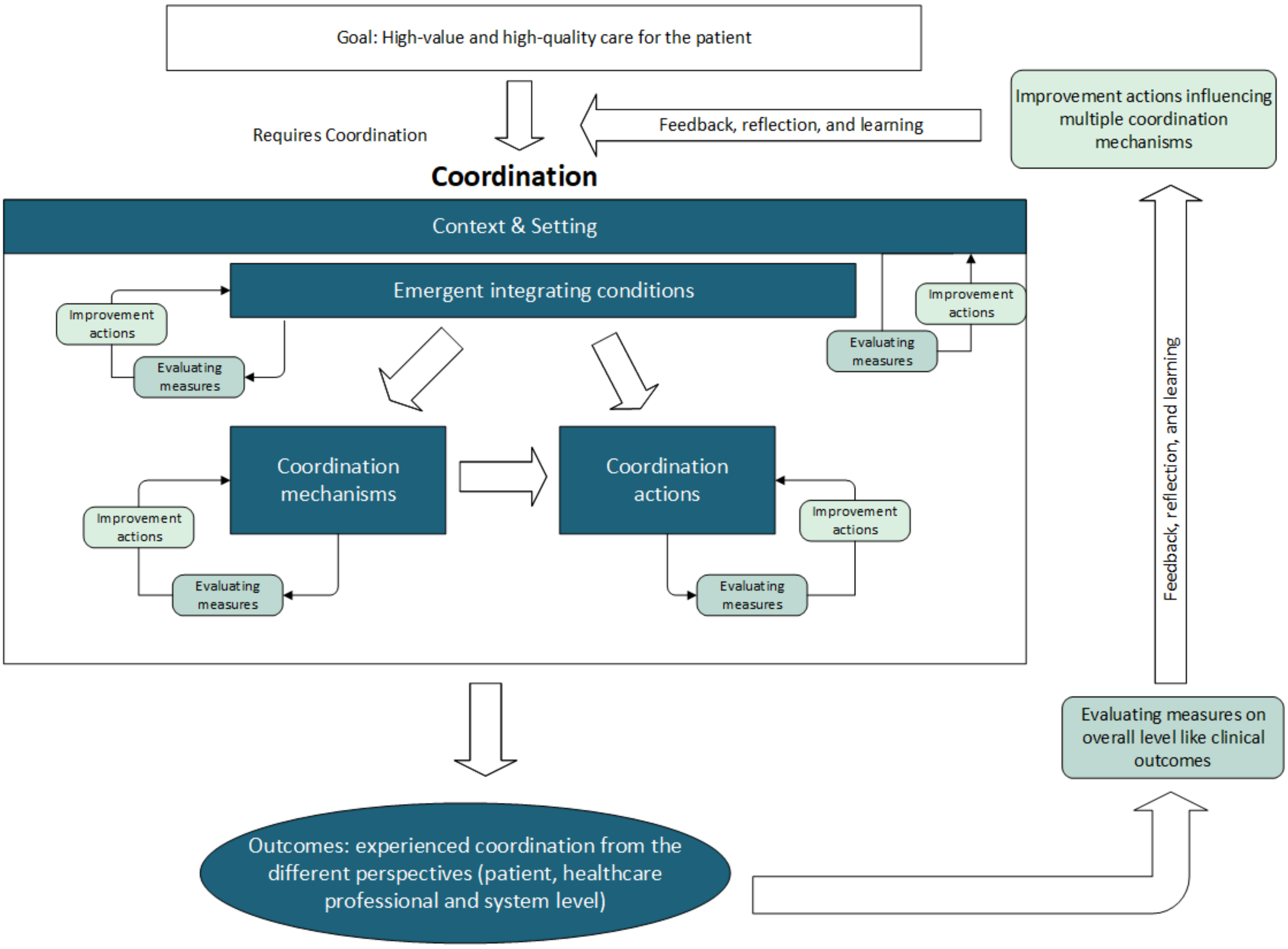


Figure 4.5 Overview of the relationships within the proposed framework.

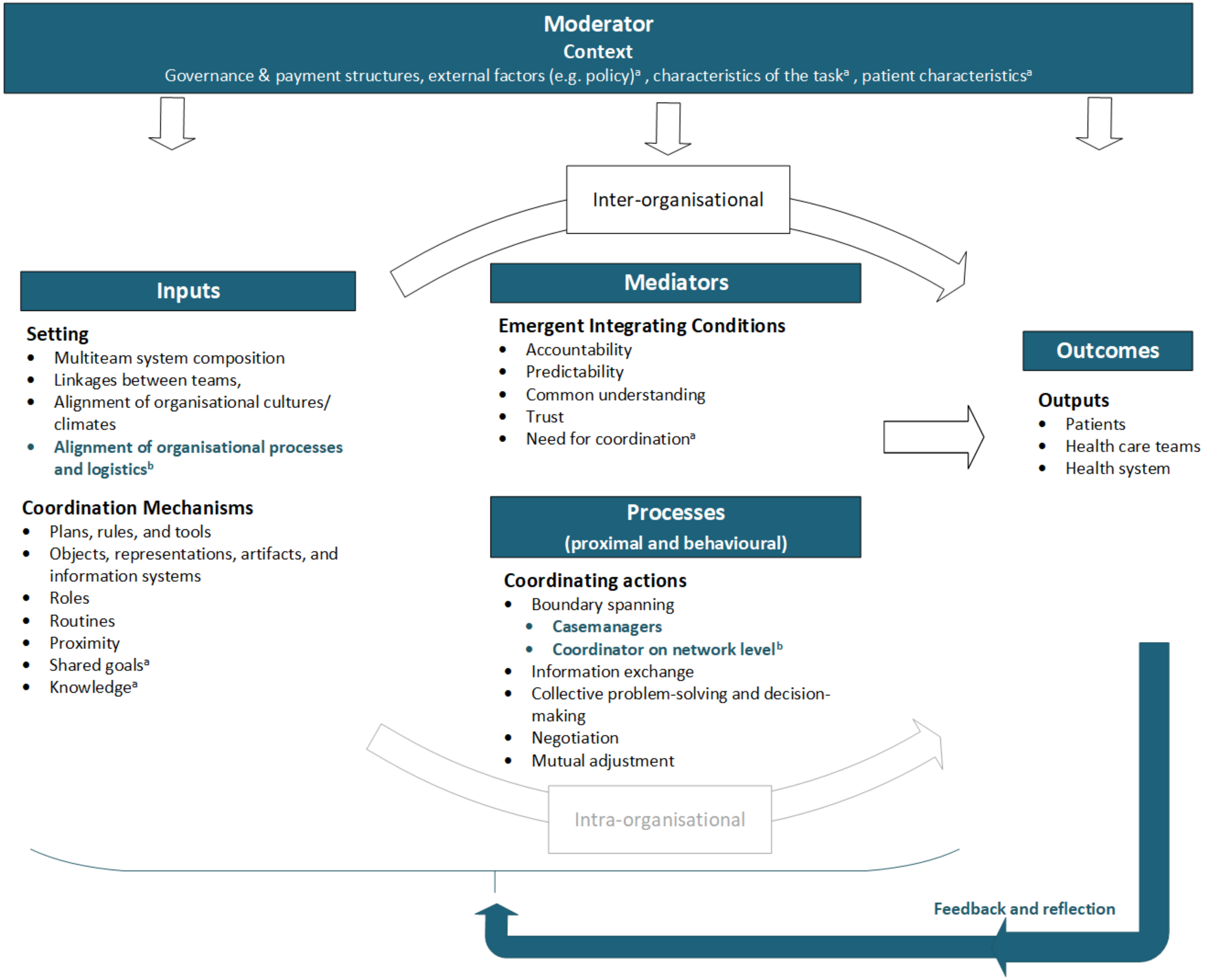


Figure 4.6 Proposed framework of Care Coordination in regional oncology care pathways. [a] aspects added to the original framework of Weaver et al. (2018) during literature search. [b]aspects added based on the interview results. Visual representation of the framework is adapted from Verhoeven et al. (2021).

5. Monitoring of care coordination in regional care pathways

Monitoring of patients and processes of the care pathway facilitates care coordination. This chapter outlines how monitoring could be organised within RCPs and highlights the role of dashboards. And, the recommendations and challenges of the development of dashboards within the setting of RCPs are discussed.

Monitoring is described as an important activity for coordination in literature (Kianfar et al., 2019). Monitoring includes reviewing and evaluating the progress of activities, detecting errors, and scheduling follow-ups to review the status of the patient (Kianfar et al., 2019). It facilitates the timely assembly of information regarding the delivery of care to ensure when the situation changes, timely adjustments can be made (McDonald et al., 2007). Monitoring could be established via various methods which often include communication but occurs without communication when the patient's records are reviewed (Table 5.1.). Monitoring could be divided into three main categories: reviewing the patient's symptoms; reviewing the services and detecting errors; and scheduling follow-up of the patient status (Kianfar et al., 2019). Within this thesis, the focus will be on the latter two methods of monitoring which are relevant to the process of coordination between healthcare professionals.

Both methods of monitoring were mentioned during the interviews. Monitoring by follow-up of patient status is currently employed by administrative staff and case managers to avoid delays and check whether new tasks can be conducted. The reviewing of services and detecting errors is currently not often performed, but is envisioned by the interviewees as a success factor for coordination by giving insights into the care processes of patients. These insights will especially help the case manager to keep an overview of the care process of the patient, also when he visits a partner hospital, and the administrative staff to keep an overview of the services and appointments that should be planned.

According to the interviewees, monitoring through an automated system has several potential advantages. They mention monitoring can cause fewer delays in the process, increase fluency within the processes, and will also lower administrative work for employees by having less own developed lists which should be updated. Additionally, this system will reduce the time needed to communicate with others to align and receive updates about the processes. According to them, in the end this will hopefully ensure less time is spilled, lowering throughput times, increasing efficiency, and probably also increasing quality of care.

A well organised operational monitoring system will also give ideas when alignment and moments of coordination are needed according to the interviewees. They hope this will lower the number of errors and tasks that are forgotten by creating an overview of the tasks needed supporting proactive behaviour of the healthcare professionals. For example, after the third chemotherapy a CT scan should be planned, and monitoring allows to create the overview when the scan should be planned and whether this scan is indeed planned and performed.

Monitoring could be divided into two main categories. The difference between these categories is relevant, because both aim for a different type of monitoring requiring different elements. Both types were pointed out by the interviewees.

1. **Retrospective monitoring** is mainly used as steering information to know how has been performed compared to standards such as waiting times. These might be relevant for managers or network organizers. "*Monitoring could assist in evaluating the process to identify areas of strength and areas requiring improvement*." – quote by project coordinator.
2. **Operational monitoring** mainly includes the monitoring of health care services provided to the patients and detecting errors within the care pathway of the individual patients. This could also include the expected next care services and tasks to be performed, the location of the patient within the care pathway, and assess whether the healthcare pathway is going smoothly and as planned.

Retrospective monitoring is more present within CCNs than real-time monitoring of patients. Retrospective monitoring methods currently used are mainly the registered SONCOS and DICA standards including some throughput times. Additionally, retrospective monitoring is also done when the pathway or the process is evaluated. Patient journey mapping or process mapping could also be used by detailing the patient's process through the care services (Davies et al., 2023). Patient journey mapping could be compared with describing and documenting the care pathway, but is reported from the perspective of the patient often by including the experiences of the patient. A lower number of papers use these mapping approaches to identify gaps between different health services, identify delays in the care process, or compare the pathway with standards of care. However, these are examples of how patient journey mapping could be used (Davies et al., 2023).

One example indicating the potential benefits of monitoring mentioned during an interview was that the evaluation of the care pathway in more detail revealed that individuals were on average three times registered for the MDM before the treatment was determined. When further deepened the underlying cause turned out to be that imaging was often not available at the MDM.

Operational monitoring will be the focus for the remainder of this chapter[8], because especially this type of monitoring is wished for by healthcare professionals when a single hospital care pathway is transformed into an RCP. The current trend of moving towards RCPs makes monitoring of patients more important, because more coordination and communication is needed to outline the care pathway between the hospitals and each interaction increases the chances of errors and misunderstandings. Monitoring methods will support these aims by offering an overview of the status of the patient. Moreover, within the same hospitals, all related care providers can look within the patient records of the patient to monitor the process themselves. However, in RCPs the professionals in the other hospitals often have no access to these records highlighting the need for other monitoring methods within RCPs.

The different operational monitoring methods based on the literature and the interviews are outlined in Table 5.1. These methods could be used to follow the patient throughout the care pathway.

Within monitoring systems, alerts and reminders will support and reduce the need for the third type of monitoring of scheduling follow-up of the patient status, because an alert will ensure when delays or errors are at risk of happening or results are not received within a predefined timeframe a reminder/alarm is sent (Kianfar et al., 2019; McDonald et al., 2014). Additionally, alerts could support monitoring by sending a signal when a professional can start with tasks reducing the need for the follow-up of patients when they are not sure whether they could perform a task. Interviewees confirmed pop-ups or reminder alerts would be a useful element in monitoring systems.

---

[8] Although some details about retrospective monitoring will be shared as well.

Table 5.1 Methods for operational monitoring within RCPs.

Monitoring method	Description
Communication	Communication is a method to get an idea of the process of the patient by asking and informing others about the status of certain processes within the care pathway (Kianfar et al., 2019).
EMR system	The EMR includes all relevant patient information and the scheduled treatments and appointments. Thereby, it would be a useful way to monitor the process of the patient. However, most EMRs are not able to create an overview within a kind of timeline and the information is often scattered in different places lacking an overall overview. Within the EMR system, one interviewee created a monitoring system by selecting the important patients as favourites.
Own developed lists	This is the most used method by the interviewed professionals often by creating lists in Excel. These lists include the position of where each patient is approximately located in the other hospital[1]. This is a method currently giving them an overview, but when a connection between the EMR systems is available some overviews will no longer be needed according to the interviewees.
Dashboarding methods	Separately developed dashboards can give an overview based on the information from the EMR. It will potentially also be easier to integrate the information from the different hospitals within the dashboard.

[1] Lists often include the following information: date of referral, referral to which hospital, whether the medical record is sent and when the surgery and appointment in the other hospital were planned, after the surgery this also includes the date of letter of resignation and the MDM date. Another case manager created a document outlining a kind of timeline of treatments like chemotherapies with dates to have an improved overview the EMR was not able to generate according to her. EMR = Electronic Medical Record

5.1 Dashboarding to improve coordination of care

Dashboards are a reasonable option for both operating and retrospective monitoring in RCPs supporting the already existing communication (Table 5.1). A dashboard can standardise the developed lists by healthcare professionals, is scalable to other tumour types and RCPs, and if advanced can connect the different partner hospitals. A dashboard could therefore in the long term be a good way to monitor patients.

The type of dashboards could be defined in line with the two types of monitoring being either a retrospective or an operational dashboard. These two types will be separately discussed and afterwards, the challenges of both dashboards will be jointly discussed.

Retrospective dashboarding

Retrospective dashboards mainly include data for strategy and evaluations on performance and are often used for steering information. These dashboards could be used to evaluate the RCP and compare the performance to standards to identify areas of strength and areas requiring improvement.

Based on the interviews, it could be concluded that there is almost no steering information available at the network level due to a lack of dashboards on the regional oncology network. This makes it difficult to show how the current care pathway is going and identify areas for improvements within the network.

Outcome measures included in retrospective dashboards

Preferably a retrospective dashboard includes different tumour types and offers the possibility to filter per type of treatment (palliative, curative, and within the curative group filter on surgery).

The outcomes, that could be included within a retrospective dashboard, that were mentioned during the interviews were the total number of patients, the number of patients treated within the times defined by the SONCOS norms and the median time in days. Additionally, other measures mentioned in the theoretical framework (section 4.5) could be included like the percentage of timely sent referral reports. Measures which are self-assessed or include surveys are less suited to be included in a dashboard, because they include a human element and will likely not be reported multiple times a year.

Best practices of retrospective dashboards

CCNs currently mainly use the data registered for national registries like SONCOS and DICA to retrospectively evaluate the process. These registration tools are also moving towards tools to support CCNs to share information among their collaborating partners through tools like Codman Connect, which allows benchmarking based on the average of the collaborating hospitals instead of the individual hospitals (MRDM Support, 2024).

Only one of the interviewees mentioned a retrospective tactical dashboard that was used by managers.

> The retrospective tactical dashboard referred to in the interview included the total number of patients, the percentage treated within the SONCOS norms and the median time in days. They had the possibility to select certain care pathway, type of treatment (palliative, curative), and type of throughput time.

Operational dashboarding

The interviewees noted an operational, real-time dashboard giving an overview of the healthcare pathway of each patient would be a first step to support them in keeping track of the care processes of each patient. This is done by displaying where a patient is located in the care pathway and which care activities are expected in the near future. The healthcare professionals will be aware of the progress and observe any indications of potential issues arising in the process. Additionally, one interviewee mentioned that the dashboard should also support the administrative staff by giving an overview of the priority of each task. The most important tasks are the tasks with unplanned care for the coming days or preparing the MDM on the day of the MDM.

Outcome measures included in operational dashboards

In operational dashboards, interviewees frequently expressed a desire for an overview of each patient's pathway, resembling a timeline that encompasses all steps within the care process. This will include the date of each treatment step (e.g. of each chemotherapy treatment, consultation with a physician). It will also give an overview of the planned activities. For RCPs it would be useful to also include the date of referral, and whether the medical record or letter of resignation is sent and/or received.

Other indicators indicated by the interviewees to be interested in an operational dashboard are:

- Which patients are transferred, the date of referral, and where are the patients located in the pathway of the other hospital;
    - Knowledge about if after surgery a person is readmitted to the hospital.
- Which treatment pathway and the date of each treatment step
- Which steps are completed e.g. planning of the appointment, and which tasks still need to be completed.

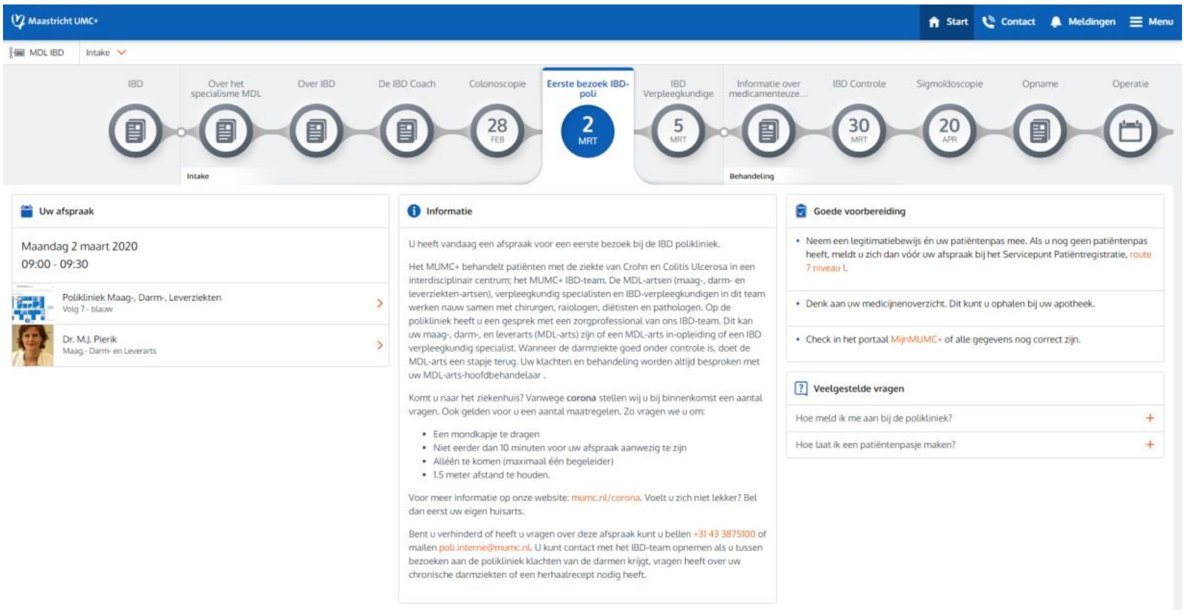
Within operational dashboards, it is important to have an overview of multiple patients at once to have an overall overview of the status of each patient. However, when more details are needed for example about the exact timing of events, a detailed overview (e.g. a timeline of events) for each patient is preferably created.

When interviewees are asked for the indicators that should be included, they mention it would be best to use the current registered data as basis. Additionally, project leaders stated the needs as expressed by the employees and direct users (secretary, case manager and physician) should be leading in the choice for indicators.

The RCP protocols include certain norms determined by the hospital which should also be included in the operational dashboard to allow in-time treatments. The protocol of the case study hospital for example includes that the follow-up consults should be scheduled on the day of the gastroscopy, the patient is called on the day of the MDM, or that certain imaging should take place within 3-5 days after the gastroscopy.

Best practices of operational dashboards

Two best practices were identified from the interviews. One situation included a developed dashboard in a dashboarding tool using data from the EMR, while the other situation described a less advanced way of monitoring the patients in Excel.



Uw afspraak

Maandag 2 maart 2020
09:00 - 09:30

Polikliniek Maag-, Darm-, Leverziekten
Volg 7 - blauw

Dr. M.J. Pierik
Maag,- Darm- en Leverarts

Informatie

U heeft vandaag een afspraak voor een eerste bezoek bij de IBD polikliniek.

Het MUMC+ behandelt patiënten met de ziekte van Crohn en Colitis Ulcerosa in een interdisciplinair centrum; het MUMC+ IBD-team. De MDL-artsen (maag-, darm- en leverziekten-artsen), verpleegkundig specialisten en IBD-verpleegkundigen in dit team werken nauw samen met chirurgen, raiologen, diëtisten en pathologen. Op de polikliniek heeft u een gesprek met een zorgprofessional van ons IBD-team. Dit kan uw maag-, darm-, en leverarts (MDL-arts) zijn of een MDL-arts in-opleiding of een IBD verpleegkundig specialist. Wanneer de darmziekte goed onder controle is, doet de MDL-arts een stapje terug. Uw klachten en behandeling worden altijd besproken met uw MDL-arts-hoofdbehandelaar .

Komt u naar het ziekenhuis? Vanwege **corona** stellen wij u bij binnenkomst een aantal vragen. Ook gelden voor u een aantal maatregelen. Zo vragen we u om:

- Een mondkapje te dragen
- Niet eerder dan 10 minuten voor uw afspraak aanwezig te zijn
- Alléén te komen (maximaal één begeleider)
- 1,5 meter afstand te houden.

Voor meer informatie op onze website: mumc.nl/corona. Voelt u zich niet lekker? Bel dan eerst uw eigen huisarts.

Bent u verhinderd of heeft u vragen over deze afspraak kunt u bellen +31 43 3875100 of mailen poli.interne@mumc.nl. U kunt contact met het IBD-team opnemen als u tussen bezoeken aan de polikliniek klachten van de darmen krijgt, vragen heeft over uw chronische darmziekten of een herhaalrecept nodig heeft.

Goede voorbereiding

- Neem een legitimatiebewijs én uw patiëntenpas mee. Als u nog geen patiëntenpas heeft, meldt u zich dan vóór uw afspraak bij het Servicepunt Patiëntregistratie, route 7 niveau 1.
- Denk aan uw medicijnenoverzicht. Dit kunt u ophalen bij uw apotheek.
- Check in het portaal MijnMUMC+ of alle gegevens nog correct zijn.

Veelgestelde vragen

Hoe meld ik me aan bij de polikliniek? +
Hoe laat ik een patiëntenpasje maken? +

Figure 5.1 MediMapp showing the healthcare pathway for the patient including important information (MUMC)

In the literature, a limited number of operational dashboards can be found. The company MediMapp[9] managed to develop operational dashboards for healthcare professionals from their main goal of giving patients better insights into their care pathway. They were able to include the care pathway structure within their near-time dashboards for patients and healthcare professionals (). Like the other dashboards, they use information from the EMR for their dashboards (MediMapp, 2021). Additionally,

---

[9] MediMapp has requested bankruptcy end of December 2023 van Leeuwen, M. J. C., & Klomp, C. G. (2023). *Openbaar faillissementsverslag rechtspersoon (ex art. 73A Fw.), kenmerk 05_gel_23_432_F_V_02*. There was an interview planned with them, but due to their financial situation the interview did not take place.

MediMapp also developed a dashboard for care providers giving insights into the number/percentage of patients within each treatment step, the percentage of patients discussed at the MDM, and the throughput times[10] (Figure 5.4). However, these dashboards are made per healthcare professional and do not offer the opportunity to show throughput times for individual patients as the dashboard mentioned in the interviews could.

Another dashboard that could support hospitals is showing the number of days from the last activity in the EMR for each patient and the number of days till the next activity of the RCP. This will include less detail but when benchmarks are included based on the stage and phase in the RCP, these could identify patients that are potentially missed in the process. For example, when a consultation has a benchmark of thirty days, the dashboard could display the number of days between the last activity and the date of the consultation. Also, for patients transferred to the surgical hospital, this dashboard could provide insights by showing the latest date of contact with the other hospital about the patient.

Examples of best practices identified from the interviews

1. An Excel outlining the patient pathway including (planned) dates and the patient's location for certain treatment steps (also for the steps in the "surgical hospital". This Excel was developed and used by a case manager.
2. Operational dashboards being updated every day based on information from the EMR. The dashboard includes dates of appointments and whether these were on time according to the norms (Figure 5.2). For each individual patient the treatment steps for past and future events are outlined in a timeline (Figure 5.3). This information is mainly used by the planners of care and allows to see why a patient is not on time according to the norms.

Patient number	Care pathway	Stage of disease	Date first consultation	Treatment date according to SONCOS norm	First treatment date	Description treatment	Date last event
987630	Cardia-carcinoma	II	27-12-2023	26-01-2024 (30 days)	05-02-2024	Immunotherapy	05-01-2024

Figure 5.2 Illustration of the dashboard used by one of the hospitals that was interviewed (including pseudo data). Not included in this image are the norms shown on the right whether the first treatment date is in line with the norm (green when in time and red when too late including the number of days).

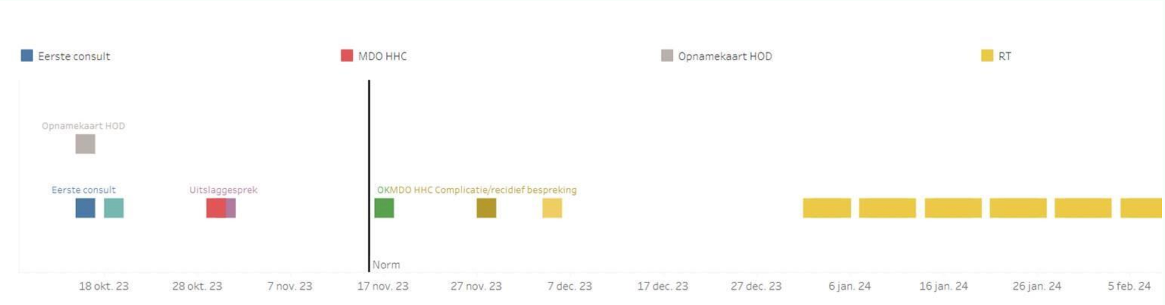
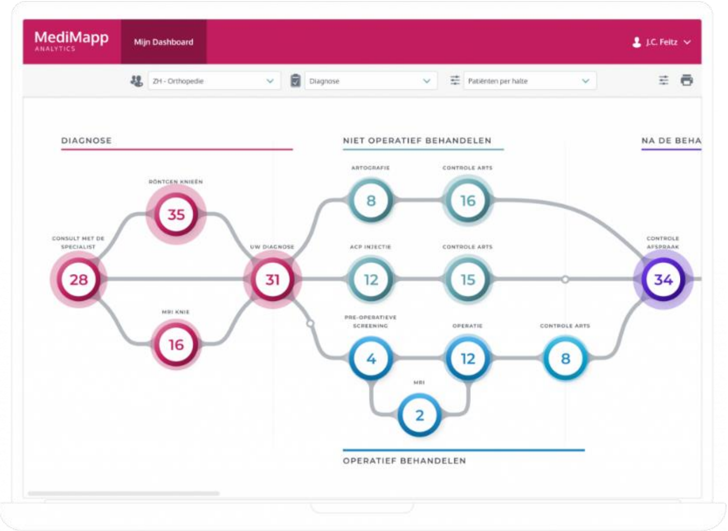


Figure 5.3 timeline of treatment process of the patient including the planned consultations in the future. Screenshot of the real-time dashboard of the interviewed hospital. RT = radiotherapy; MDO = MDM

---

[10] The image showing the dashboard with throughput times is not sharp and therefore not included. The image could be retrieved from page 9 of the product brochure Soulve Innovations. (n.d.). MediMapp Producten. In.



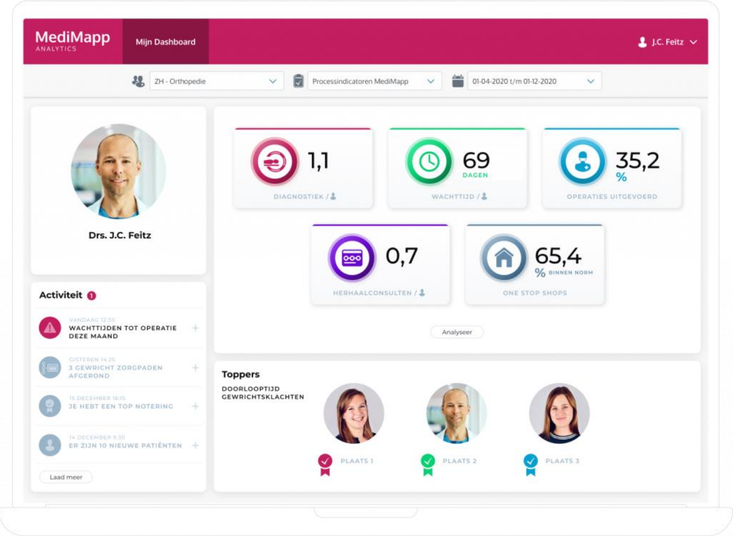


Figure 5.4 Overview of the patient flow within a care pathway into the MediMapp application (MediMap, n.d.).
Figure 5.5 Overview of the outputs in MediMapp for care providers (MediMapp, n.d.).

Challenges in the development of dashboards

Operational dashboards will need to include real-time, or near real-time information (maximum delay of a day) to be useful. These kinds of dashboards are currently not included in national databases and registers (Regionale Oncologienetwerken, 2023b). For some hospitals, refreshing the data timely might be difficult to achieve due to limitations in the way data is structured. However, some real-time dashboards have been developed on a single hospital level, like MediMapp, although retrieving information from their own EMR systems is complex and labour-intensive (MediMapp, 2021; Regionale Oncologienetwerken, 2023b).

Obtaining data, and especially real-time data, on a network level is difficult and time-intensive because of several reasons. First, sharing data for a shared dashboard is difficult to realise (Regionale Oncologienetwerken, 2023b). All partners should feel the urge for a shared dashboard and allow data links from the EMR towards the dashboard. Privacy issues are also considered a barrier by the interviewees which even complicates sharing dashboards from a single hospital within the network. Secondly, the data, dashboards and data warehouses in hospitals are differently organised which makes copying dashboards difficult (interview outcome). Therefore, custom-made dashboards or data links for each hospital should be developed which also requires time investments from supporting departments like Business Intelligence (BI) in both the development and maintenance of the dashboard (Regionale Oncologienetwerken, 2023b).

The use of data from the EMR in dashboards often requires structural changes within the EMR which costs a lot of time and is also hospital-specific. For example, the systems are often organised by specialism instead of the medical condition which causes barriers in the collection of the needed data (Regionale Oncologienetwerken, 2023b). Nationwide, the Netherlands is working towards standardisation and harmonisation of registrations in EMR by using a standardised data set (Citrienfonds, 2023). These data sets are aimed to be used in all hospitals and avoid free text fields to structure data. These sets have the primary goal for one-time, standardised registration of information within the EMR and could be used for multiple purposes (e.g. for the national registers) and facilitate easier sharing of information between hospitals. However, this data set might also facilitate hospitals in the first steps of data structuring for the development of dashboards.

"*Although it took almost 1,5 years by first structuring and standardising input for the dashboards by implementing health care pathways and standardisation into the EMR. It was worth the effort in the end*" – quote by the hospital who have developed the operational and strategic dashboards mentioned in the best practice sections.

Many care pathways are standardised, however when a patient is an exception it might be more difficult to cover his results in the dashboard to the same extent. The trend towards appropriate care might increase the number of exceptions complexifying the development of dashboards.

Once a dashboard for one condition or specialism is designed, it is easier to implement this for other specialisms. Although it is suggested by the best practice hospital to develop standardised the dashboards for all specialisms creating uniform dashboards, but these dashboards should be able to be slightly adapted to the specific situation by for example including additional disease specific variables.

Requirements for dashboards

An overview of the most important requirements for monitoring dashboards could be summarised to the following points:

- Operational dashboards include the provided and planned services for each patient and give an overview of the tasks that need to be completed in the near future.
    - Preferably the dashboard includes the care pathway of a patient like a timeline.
- The dashboard provides an overview if things are going as planned or where errors and delays occur.
- The dashboard (or EMR) includes reminders and alarming signals for the following situations:
    - When certain processes take too much time (not planned or exceeding the norms), deviations of the standardised care pathway occur, or other errors are noticed;
    - When an individual receives new information which he should process, or the new information allows the person to complete his tasks. E.g. the consultation with the physician has taken place.

  This will also require knowledge about the roles and responsibilities within the RCP to determine the professional receiving the alert.
- The EMR should undergo structural changes to standardise and harmonise the data for use within the dashboard. This requires time investments of the data departments like BI.
- Each hospital should have an individual involved in the development of the dashboard to ensure the data of each hospital is included in the correct way within the dashboard of the network.

It should be noted that a monitoring dashboard is not able to cover all aspects of coordination within an RCP. The experiences and opinions of professionals and patients are also important to include and cannot be covered within a dashboard. Additionally, the data shown within a dashboard is based on certain underlying choices and definitions, which means the data should be interpreted in a certain way and also with care. It is desirable to support the users of the dashboards by analysing and interpreting the data (Regionale Oncologienetwerken, 2023b).

6. Case study: coordination within RCPs

The situation of the oesophagus and gastric cancers in the case study hospital (hospital A), which is part of a case study oncology network with two other hospitals (hospitals B and C), is used to apply the proposed framework of care coordination (Figure 4.5**Figure 4.3**) in the context of an RCP. The data from the semi-structured interviews, observations within the case study hospital (visiting administrative staff twice and a visit to the MDM), and agreements recorded formally on paper, and the DICA data were used to analyse the extent to which aspects of the care coordination framework are present within the RCP. This analysis will allow the development of targeted improvement initiatives.

First, the organisation of the oncology network and the experienced challenges regarding coordination are outlined for the case region (the general situation in the Netherlands is described in 2.2). A detailed overview of the RCP for oesophagus cancer is made to display moments requiring care coordination and create an overview of the current processes. Thereafter, the framework of care coordination is applied to both the case study network and the general situation in the Netherlands. This is followed by recommendations for both situations, based on the current situation, best practices, and literature.

6.1 Description of the collaboration in the case study network

The collaboration in the case study network includes three peripheral hospitals (A, B and C) and a radiation therapy centre for the care process of several oncology types in their region in a regional oncology network (*Oncology Network Case Study (anonymous)*, 2023). From March 2024 onwards the oncology region has joined forces with other oncology networks to become organised within a larger oncology network. This allows the smaller scale networks to share knowledge and together develop RCPs for cancer patients to deliver high-quality care and keep above the volume norms.

As in other oncology networks for each tumour type, a tumour working group is arranged. These tumour working groups meet twice a year to share knowledge about treatments and scientific research and evaluate the current RCP (Case Study Oncology Network (anonymous), 2023). The oncology network is managed by a board discussing ongoing matters and monitors the process of the network.

For oesophagus and gastric (stomach) cancer the case study hospital, hospital A, has had a shared care pathway with hospital B since 2016. Since August 2023 hospital C has joined the tumour working group and the RCP has been aligned within the oncology network. The collaboration originates from the need to collaborate to reach sufficient surgical treatment to improve the quality of care and meet the volume norms.

The diagnosis and treatment plans are set with all three centres during a weekly regional MDM. Within the oncology network, patients receive (diagnostic) examinations and pre- and post-surgical treatments in their “own” hospital. When a specific intervention or surgical procedure is needed, the patient is transferred to another hospital that acts as a “surgical” centre for that cancer type within the oncology network. Hospital A is the “surgical” centre for oesophagus and gastric (stomach) cancer in the network. Besides multidisciplinary consultation for all patients, the collaboration is mainly focused on transfers of patients in need of a resection.

Problem statement according to the case study hospital

The case study hospital wanted to organise improvements within the RCP, because they experienced the coordination and communication between the hospitals could be optimised. The basics of the RCP are well organised, however, the nurses and administrative staff experience difficulties in practical situations such as the preparation and reporting processes around the MDM being inefficient. The RCP protocol including the roles and responsibilities of each individual seems to be incomplete and unclear, leading to situations in which professionals expect each other to conduct certain tasks which do not happen. They mainly state to miss overview in the status of patients, and tasks that should be conducted. Their ideal improvement suggestion (from the beginning onwards) is a dashboard providing an overview of the location of the patient and who is responsible. Ideally, the dashboard also gives insight into steering information about standards like waiting times, because these insights are also currently not available for the healthcare professional and manager. These could be used to evaluate and improve the processes within the RCP.

They would like to develop tools, recommendations and advice based on the RCP for oesophagus and gastric cancer that is also applicable to other RCPs.

6.2 Care Pathway of Oesophagus and Gastric Cancer in the case study hospital

In the following paragraphs, the care pathway of patients with oesophagus or gastric cancer in the case study network is described. The care pathways of both cancer types show many similarities, therefore only the oesophagus cancer care pathway is explained in detail below (Figure 6.1).

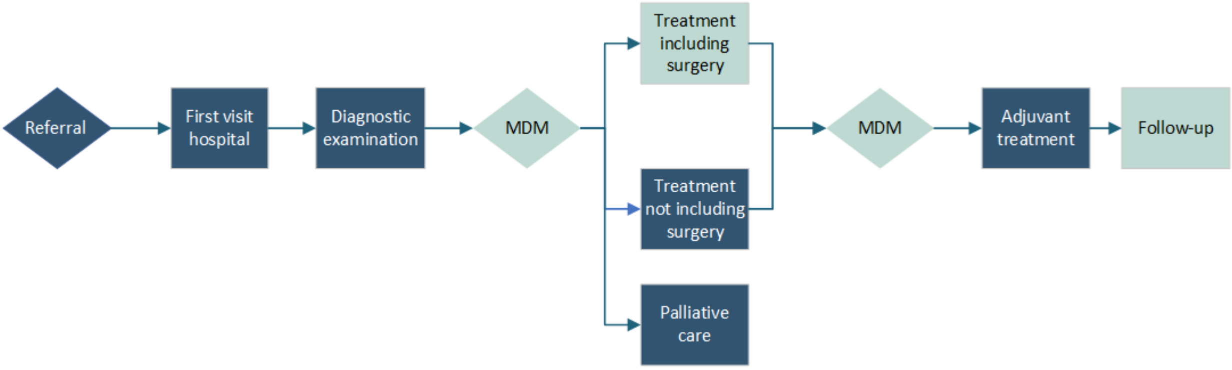


Figure 6.1 Simplistic overview of the care pathway for oesophagus cancer. The moments in which coordination between the hospitals is required are coloured green.

The RCP could be defined in three general phases: diagnosis, treatment, and follow-up. The phase from the first visit until MDM includes diagnostic examinations including laboratory, imaging and a gastroscopy which are conducted within the "own" hospital of the patient. This also includes visits with the nurse, dietary and GE physician to discuss the intermediate outcomes.

The patient is registered for the MDM when all laboratory and imaging results are available. These registrations are made within the EMR system of hospital A by the administrative staff, and the other two hospitals send the relevant patient information via email to hospital A. During the MDM, the proposed treatment plans are discussed among all three hospitals. After the MDM the administrative staff of hospital A documents the conclusions of the MDM in the MDM letter and sends these back to hospitals B and C.

After the MDM, the treatment phase starts. In this section, the treatment plan including surgery is explained because this includes transfers of patients within the RCP. The patient is first informed about the treatment plan via their "own" hospital, and it is indicated the patient will be referred to radiotherapy/chemotherapy/surgeon (surgeon in hospital A). The steps to organise care for the patient are either completed by the case manager or administrative staff of the patient depending on how this is organised within the hospital. One week after the MDM, surgical patients are seen by the surgeon to explain the process of neo-adjuvant (treatment before surgery) and the surgery. Patients of hospitals A and C are seen in hospital A because they will stay in follow-up after surgery in hospital A. Patients of hospital B will be in follow-up in their own hospital and will see a surgeon in hospital B[11]. Physiotherapy, radiotherapy, chemotherapy, and case management during these treatments are organised by each hospital for their own patients. After the neo-adjuvant treatment, each patient is again discussed in the MDM (same process as earlier described) to determine whether surgery can take place. Hospital A schedules the surgery date in line with the protocol for all patients, which is communicated to the patient and other hospitals. Hospital B sends an overview of which patients need surgery with the corresponding time range every two months to hospital A.

After the MDM, the patient meets the surgeon and nurse to prepare for surgery. From the moment of admission for surgery including surgical follow-up, hospital A is responsible. After the surgery, another MDM is scheduled via the physician in hospital A. After the MDM and the first follow-up visit in hospital A, patients of hospital B will be referred backwards to hospital B. Then when adjuvant treatment is given after surgery, this care is provided by the "own" hospital of the patient.

6.3 Care coordination situations assessed with the developed framework

The framework is used to evaluate care coordination within the case study and of the oncology networks in the Netherlands in general. The results of this analysis are summarised in Table 6.1. A detailed description per concept can be found in Appendix C.

Table 6.1 Analysis of care coordination within the case study network and generally in the Netherlands.

	General in the Netherlands	Case Study network
Multiteam system composition	Different locations of healthcare professionals	The third hospital joined recently; within hospitals, it is generally organised per specialism;
Linkages between teams	Some collaborations already exist before formalisation in networks.	Surgeons of hospitals A and B perform surgeries together;
Alignment of organisational cultures/climates	Collective agreement and meetings ensure the goals are aligned	Still growing by getting to know each other; shared belief to deliver the best care
Alignment of organisational process and logistics	Collective agreement and meetings at the start of collaboration	At start processes around MDM were aligned. Still, some improvements around the prehabilitation phase are possible.
Governance & payment structures	Network office and tumour boards; financing determined by policy and insurers.	Similar to other regions; agreement for network on paper; tumour-specific agreement could include more details.
External factors	These factors are difficult to influence by the CCN.	Financial situation of hospital A
Characteristics of the task	No specific observations	No specific observations
Patient characteristic	No specific observations	Guidance and explanation during the pathway are perceived as good by patients.
Plans, rules, tools	Many CCNs have a shared RCP protocol including roles and actions for each step	No joint RCP protocol; checklist of tasks included in EMR; protocol includes throughput time standards
Objects, representations, artefacts, and information systems	Investigating opportunities for information transfer; no dashboards at the regional level	Investigating the transmural portal of HiX; multiple methods used to track processes, tasks, and patients

---

[11] The surgeon of hospital B and A will perform the surgery together.

Roles	Related to well-defined protocols	Roles do not seem clear in all situations
	General in the Netherlands	**Case Study network**
Routines	MDM with treatment hospital; network/tumour board meetings	Weekly MDM which is clearly defined; routinely check/monitor patients' records
Proximity	Enhanced by low-threshold contact and knowing each other.	On-site visits and meeting in person; low-threshold communication can be improved
Goals	Standards state agreement should include shared goals	Agreement includes shared goals.
Knowledge	No specific observations	Some knowledge is concentrated on one individual
Accountability	No specific observations	Accountability is documented; mechanisms for holding accountability are limitedly defined
Predictability	No specific observations	No specific observations
Common understanding	No specific observations	Generally, a common understanding is created between the partners
Trust	No specific observations	Ambiguity and misunderstandings reduce trust, while smooth-running processes enhance trust
Need for coordination	No specific observations	Different preferences in communication between professionals
Boundary spanning	Case manager and role of network office	Case managers have slightly different roles in each hospital
Information exchange	Lack of integrated IT systems; Opportunities for easier and enhanced data exchange	Lack of integrated IT systems; transmural portal of HiX is explored
Collective problem-solving and decision-making	Facilitated during MDM and in some regions by low-threshold contact.	Facilitated during MDM
Negotiation	No specific observations	No specific observations
Mutual adjustment	No specific observations	Is generally observed to be present

CCN = comprehensive cancer network; MDM = multidisciplinary team meeting; RCP = regional care pathway; IT = Information technology.

6.4 Strategies and recommendations for the case study network

Based on the earlier outlined improvement initiatives and the analysis using the care coordination framework, key recommendations and strategies for the case study network are drawn. The advice for the case study hospital could be summarised in the following points. These could guide the hospital and region in improving care coordination.

- A quick win could be designing a structured MDM format with one registration form for all hospitals. This ensures all relevant information is included and easily copied within the EMR.
- Some interviewees stated it is difficult to develop a shared documented RCP protocol because of the differences in software which does not allow sharing the protocol. Moreover, differences in the roles of the healthcare professionals and processes between the hospitals exist. However, it is still suggested to develop a shared document including the most important agreements. The already existing agreement documents (personal communication, 2024) could be used as a basis but should be extended.
    - Include moments of communication and transfer of patients to other hospitals within the RCP protocol. For example, the RCP protocols of hospital A could be extended by including

    when communication is needed towards the other hospitals and which information is expected to be received from the other hospitals.
    - Since no shared documented RCP protocol seems to fit the current organisation cultures it is more important to regularly align the pathways and communicate about changes.
    - If with this RCP protocol misunderstandings arise it is important to address them with each other so that the other party is aware, and together, create a solution to prevent it from happening again in the future.
    - Including parts of the protocol within the EMR systems like certain checklists could help, but might be too difficult to realise in the near future due to financial and time constraints.
- Currently initiatives for access to each other's EMR system are investigated via HiX transmural portal. Since this only facilitates gaining insight but does not offer an opportunity for data exchange, it is suggested to also research other opportunities for data exchange.
    - The transmural portal will still require agreements about when a patient is monitored, and the record is opened (alarms will reduce this need). Otherwise, the professionals will still regularly look into the patient's records. Agreements on when hospitals are updated, or emails are sent about the status of a patient might also facilitate this goal.
- Assess the current status of collaboration using aspects of integrating teams and open communication culture. These assessment criteria could guide a conversation about coordination and to further strengthen interpersonal relationships. These could facilitate stronger feedback processes and self-correction mechanisms within the RCP.
- More dedicated staff for the RCP:
    - The step towards an oncology centre, in which administrative staff is organised at one location within the hospital, is a first step to allow shorter lines of communication. When tasks are also re-arranged among the administrative staff, this also likely reduces the number of times alignment is needed. For example, when the administrative staff is also able to plan chemotherapy, it is no longer needed to send this task to another secretary.
    - Another possible line of thinking, which is less straightforward, is creating a dedicated back office for the entire care pathway within the network. This will primarily ensure more proximity and improved communication between the administrative staff. However, it may also lead to greater distance between hospital staff and the secretary. This potential improvement direction requires more research before well-founded advice can be provided.

Related to monitoring and dashboarding; The following advice is based on a dashboard. However, it should be weighed whether a dashboard is the most suitable tool. Most likely, it is better to focus on improving the current methods employed within the EMR system and wait for national initiatives for further data sharing and data standardisation.

- Signals within the EMR are crucial to avoid repeatedly accessing the same patient's file.
- Moreover, there needs to be a way to view the status of all patients, so it's clear which patients still require action, and which tasks should be performed. The current method with orders on the worklist does not adequately facilitate this.
    - Until then this is the role of the case manager, and it should be clearly outlined who monitors which processes of the patient. E.g. administrative staff schedules the appointments of the patient and monitors if the registration forms for the MDM are received. The nurse could monitor whether appointments or imaging are indeed planned in line with the RCP protocol and the treatment plan of the patient.
- An overview of patients and their status primarily to ensure no deficiencies or delays occur within the healthcare pathway. This can potentially be accomplished with alarm signals as well.

7. Discussion

In care coordination literature mainly three categories of papers could be recognised: explicit definitions or theoretical frameworks; studies describing the development of measures of coordination process; and empirical studies evaluating the effectiveness of interventions. This study links to all three by extending and validating a care coordination framework for RCPs. The interviews with different stakeholders of CCNs aimed to enrich the literature-based framework and give an overview of the state of coordination within RCPs in the Netherlands. Evaluation measures and potential improvement actions are included in the framework for each aspect of coordination, thereby also covering the other two categories of papers.

The development of a care pathway facilitates coordination, but inter-organisational collaborations within an oncology network introduce new challenges compared to intra-hospital collaborations. This raises the need for coordination actions. This thesis aimed to give insights into the way care coordination within regional oncology pathways can be improved. Answers to the research questions are described in the conclusion (chapter 8). In this discussion section, the results of the sub-questions are discussed in the light of other literature including research recommendations. Thereafter, research limitations, related recommendations for further research, and the scientific contribution are discussed. Lastly, recommendations for CCNs are noted including suggestions on how the developed framework could be used.

The distinction between organisational and system integration made in the RMIC model is likely interesting to make when evaluating coordination in RCPs.

The three perspectives of care coordination (patient, healthcare professionals, and system) could be extended by a fourth level. Namely, organisational integration is described in the RMIC model for integrated care (Valentijn et al., 2013), Appendix C. This organisational level is of added value in the analysis of RCPs, because it describes the delivery and coordination of services in inter-organisational relationships. This links to the hospitals in RCPs that deliver shared care by integrating information and resources. The system level describes a higher level and does not fully cover these types of collaborations. The system level could be described to be more related to ICPs by defining the whole patient journey including the stakeholders within the care sector.

Further research could explore whether the developed framework should be extended with additional teamwork processes.

The proposed framework in this thesis seems extensive by including the aspects mentioned by the other identified frameworks for inter-organisational collaboration In contrast to the frameworks of Gittell (2002); (2004), also cultural and external factors are included in the proposed framework (Van Houdt et al., 2013c). (Peterson et al., 2019). Still, in literature, some frameworks (McDonald et al., 2014; Schultz et al., 2013) include different aspects of coordination (e.g. “facilitate transition”) that are not addressed in the proposed framework. Nevertheless, these aspects are outside the scope of this thesis, as they either focus on the patient perspective or are inapplicable to the setting of RCPs. Unfortunately, no standardised tool exists to assess the validity of the proposed coordination framework to ensure its quality (Peterson et al., 2019).

Effective teamwork processes between and within teams also lay a foundation for coordinated care delivery (Verhoeven et al., 2021). Coordination and teamwork are interrelated as coordination is often described as a process or input element in teamwork-related frameworks. The employed Weaver et al. (2018) framework includes teamwork-oriented behaviours such as communication. However, teamwork processes and factors include more than these behaviours (Verhoeven et al., 2021). Further research could refine the proposed framework by including aspects of team functioning from the clinical multiteam system framework (Verhoeven et al., 2021). This framework describes teamwork processes affecting care delivery within and between teams in the cancer care setting. Based on the results of the interviews, teamwork processes like situation monitoring, cohesion, and psychological safety appear to fit best. Therefore, it is suggested to start by investigating the influences of these aspects.

The results of this thesis could be linked to the Mintzberg model (1979), an inter-team coordination model that is influential in other sectors (Wagner, 2023). This model consists of four mechanisms being: lower-order mutual adjustment, direct supervision, standardisation, and higher-order mutual adjustment (Mintzberg, 1979). These are related to the aspects of information exchange, plans & rules, and mutual adjustment in the proposed framework. The mechanisms could be described as methods to achieve mutual adjustment at the level of the patient (lower-order) and at the level of the network (higher-order). Standardisation is achieved by the documentation of the RCP in protocols and agreements, and the routines within the RCP such as the MDM. The mechanism of direct supervision has a limited role in RCPs as most coordination takes place via horizontal communication between the healthcare professionals, and no clear leadership or hierarchy is generally observed between the healthcare professionals[12].

It is suggested to develop a targeted tool to evaluate coordination within RCPs together with healthcare professionals.

Earlier studies show measures of care coordination are heterogeneous and limited to certain settings, perspectives, aspects of coordination or have limitations regarding their psychometric quality (Bautista et al., 2016; Valentijn et al., 2023). Literature states the best method for measuring coordination is not always clear and only a few of the earlier frameworks have led to initiatives to improve care coordination (McDonald et al., 2007; Peterson et al., 2019). As the proposed framework identifies improvement actions for each aspect it is expected the mentioned evaluation measures will lead to improvement initiatives. This thesis also outlines measures for almost all identified aspects, but the feasibility and psychometric quality of the measures should be explored in further research.

Preferably, further research could work towards designing one integrated evaluation tool combining current tools and measures enabling an overall overview of the current state of care coordination of the CCN by using one tool. It is suggested to divide the newly developed tool into separate elements allowing users to select the relevant aspects for their context. A measurement tool is most comprehensive when different perspectives and methodologies such as surveys, self-assessment forms, and quantitative data are included. However, not each aspect needs to be measured from each perspective and with different methodologies, e.g. measuring trust from a system perspective is likely not useful. It is suggested to start with a systematic search[13] for relevant measures and link the identified measures to the aspects of the coordination framework. In the next phase, healthcare providers could be involved in selecting the most important and appropriate measurement tools by ranking a selection of measures using methods like the Q-methodology (Nezami et al., 2023). The healthcare professionals could also indicate the validity and assess whether the tool will be generalisable for most RCPs (Guarneri 2020). As the last step, the tool should be validated and researched in practice.

---

[12] I do not consider the relation between surgeon/nurse and administrative staff as hierarchy, because they mainly cooperate. The nurse does not provide direct orders or tasks towards the administrative staff.

[13] This thesis did identify measures but did not search for these measures systematically.

Moreover, evaluating each aspect of coordination in detail is too time-consuming. Therefore, developing a self-assessment checklist including some general guidelines is suggested to give a quick impression of the state of coordination within a CCN.

Further research is needed to determine the best way to incorporate operational monitoring methods in RCPs.

The results show monitoring of patients at an operational level enhances coordination within RCPs, but is difficult to achieve. Even within a single hospital, it is challenging to standardise and harmonise data and restructure the EMR system to allow this data collection. Some initiatives, such as collecting critical RCP indicators on the level of CCNs, focus on steering information (e.g. quality) and do not yet cover operational information for care professionals (Zorgconcepten, n.d.). In literature, to my knowledge, no operational overview dashboards on the patient level are available combining information from multiple hospitals. The development of regional dashboards is challenged by the different data structures, unstructured data within the EMR and limited options for data exchange. Researching opportunities to standardise and harmonise data from different EMR systems could help to overcome these issues.

Additionally, further research could investigate different other potential solutions, besides dashboards, to create a monitoring overview of patients. This could include optimising the current task lists within the EMR system or process or workflow mining. Process mining evaluates care pathways by identifying trends and patterns and could therefore be used to detect whether the patient is following the described care pathway or deviates from it. When evaluating the different monitoring methods the following things should be considered: 1) the extent to which data should be restructured in the EMR; 2) challenges regarding regional sharing of data, e.g. privacy and data warehouse differences; 3) monitoring method should be accessed by all collaborating partners. Further research could explore the feasibility and cost-effectiveness of the different options against dashboards and should consider the regional character of RCPs.

The recommendations for operational monitoring dashboards are identified to create lists of tasks and screen for potential deficiencies and errors in the process. Further research could build on the recommendations of this study by designing dashboards or other monitoring methods that include alerts and meet these recommendations. When designed these tools could be verified with healthcare professionals.

7.1 Research limitations and recommendations for further research

Strengths and limitations

The current coordination framework and its various aspects likely have relevance to RCPs in other disease areas within and beyond the Netherlands. In the future, it is likely hospitals will start to collaborate more extensively, driven by ICA, emphasizing the relevance of researching coordination in the context of RCPs. RCPs are already observed in for example vascular surgery (Zorginstituut Nederland, 2023b). Also, a trend towards the organisation of oncology care in collaborative care networks akin to ICPs is observed (OncologieZorgNetwerken, n.d.). The findings suggest the existing knowledge and understanding of care coordination in ICPs and RCPs should be integrated to enhance the understanding of coordination in the whole patient journey.

The organisation of care and the use of terminology differ substantially between countries and settings. As a result, it turned out to be challenging to identify literature, because of the heterogeneity in terms used for coordination and network collaborations. For example, Italy is known to have regional cancer networks (Guarneri et al., 2020), but a limited amount of literature was found on coordination within these networks. Therefore, important information might be missed.

The interview questions focused on getting a general overview of the topic of coordination and monitoring within RCPs. They focused on the challenges and best practices to allow an answer to the main research question. Thereby, the interviews did not offer the opportunity to appraise the identified frameworks and measures from the literature. Further research could validate the aspects within the developed framework and the use of the framework in practice with healthcare professionals.

Recommendations

Some aspects of the framework, like communication, have implicitly embedded other elements that should be met to achieve good coordination. Examples of these elements are timeliness, uniformity, completeness, explainability, clarity, and information by whom, when and how the task should be performed. For example, information exchange should be unambiguous and understood by both partners to ensure the content and implications of the information are grasped. Further research could explore whether these implicitly embedded elements should be added separately to the framework, while simultaneously considering potential duplications and the practicality of the framework.

The framework shows the general relationships between the different domains of coordination. However, a better understanding of how the different aspects interact and affect care coordination is needed. These relations could determine which aspects should receive priority to improve care. Statistical testing of the aspects could be employed for this purpose. It provides insights into which aspects could be influenced simultaneously and which aspects are predominantly influenced independently.

The differences in maturity between the CCNs call for different improvement initiatives. Subsequent research can address this issue in two ways. The framework could be refined by delineating the most important aspects for different phases of collaboration and tasks or stages within the RCP. This could be done by creating a roadmap for CCNs detailing various stages for each aspect. The roadmap could incorporate checklists and provide an overview of subsequent improvement possibilities, assisting CCNs in selecting suitable improvement actions. Secondly, case study research including cross-case comparisons can assess how differences in states of coordination aspects influence outcomes of coordination and care. This can help prioritise the aspects and improvement directions.

Lastly, it is hypothesized that organising both intra- and inter-hospital coordination in a similar way is most successful (Gittell & Weiss, 2004). Additional research could research this hypothesis for RCPs. Business model adaptation within CCNs could also be conducted to outline the experienced barriers in implementing the improvement actions in practice and assist in describing the processes of implementation within CCNs.

7.2 Scientific contribution

Overall, this study contributes to the current literature by combining the concepts of regional care pathways, oncology networks and coordination, which was not earlier done in scientific literature according to the author's knowledge. The identified existing research base about CCNs and the process within RCPs is small. In earlier research, few care coordination frameworks were composed focusing on inter-organisational collaborations or networks (Gittell & Weiss, 2004; Valentijn et al., 2013; Weaver et al., 2018). Only the framework of Weaver et al. (2018) has categorised the aspects of coordination in domains. The different relations between the aspects of coordination and the way they influence coordination processes and outcomes are outlined within the framework. This study extends this framework by first extending the framework with three other aspects of coordination identified in the literature search and linking the aspects of care coordination to RCPs. The interviews and literature about RCPs allowed us to identify which aspects of coordination are applicable and important for RCPs.

The interviews with different stakeholders in CCNs and literature searches allowed us to validate the aspects included in the framework in the setting of RCPs. Additionally, the framework was extended with aspects important for coordination in RCPs based on the interviews, but that were not included in earlier frameworks. The interviewees had various roles in CCNs which enabled the author to identify the current state of coordination and the main challenges encountered in CCNs in the Netherlands. This created the opportunity to highlight some aspects of the framework that are particularly important in RCPs. This knowledge about the RCPs could form a base for further research and the development of improvement directions regarding coordination in RCPs.

The developed framework can guide CCNs with which aspects should be considered regarding care coordination and gives a general idea about the prerequisites for good care coordination. The proposed framework differs from earlier care coordination frameworks by including a definition of each aspect and linking evaluation measures and improvement activities to each aspect based on literature and interviews. The insights and knowledge from earlier research show a lot of tools are available to implement and improve RCPs effectively (Citrienfonds, 2023). However, these were not linked to specific aspects of coordination which is done in this thesis. Moreover, the literature on evaluation measures is heterogeneous and not specifically focused on RCPs. This study provides a first step towards the development of a general assessment tool for coordination within RCPs by outlining potential evaluation measures from the healthcare provider and system perspective. Overall, the developed framework including evaluation measures and improvement actions can give guidance to improve coordination in RCPs.

7.3 Practical recommendations for CCNs and hospitals

Information exchange, communication, and shared RCP protocol turn out to be important coordination mechanisms and actions within RCPs. Together these cover the continuum of variability and complexity of processes (more complexity calls the need for coordination actions like communication besides a documented protocol). When enhanced, these aspects are likely to have the most potential to reduce instances of ambiguity, uncertainty, and misunderstanding. Moreover, particularly when ambiguity or deficiencies in the process arise, boundary spanning, proximity, and knowing each other well foster collaboration between healthcare professionals. The main improvement recommendations for the most important aspects identified by the interviews are summarised in Table 7.1. More details and recommendations for the other aspects are outlined in section 4.5. For most aspects, it is also important to take underlying elements such as explainability, understandability, completeness, uniformity, and timing into account to optimise coordination.

The recommendations in Table 7.1 are focused on CCNs who have already organised an RCP. When the CCN is at earlier stages and the RCP is still developed, the input aspects of the framework become more important. Especially the aspects of alignment in cultures and organisational processes, and the development of shared goals should receive attention at that stage in which the network organizer should take a role.

Monitoring of patients facilitates coordination by avoiding preventable errors or delays in the process and creating an overview of the outstanding tasks. The fastest option is probably to create ways of working within the current EMR system such as a shared tasks list for professionals with similar roles including deadlines. However, this still includes manual actions of creating the tasks which would be optimally automated by tasks popping up automatically at the right time (e.g. when a new CT scan should be planned for a patient). These kind of task lists and reminders should be based on the RCP protocol and will avoid errors and tasks being missed. Therefore, dashboards might be beneficial to develop by enabling the development of a shared regional dashboard including alerts for delays and errors and automatic creation of task lists between the hospitals. However, this should likely be developed on a larger scale with multiple CCNs to spread costs and resource-intensive tasks.

Table 7.1 Main improvement recommendations per aspect of coordination.

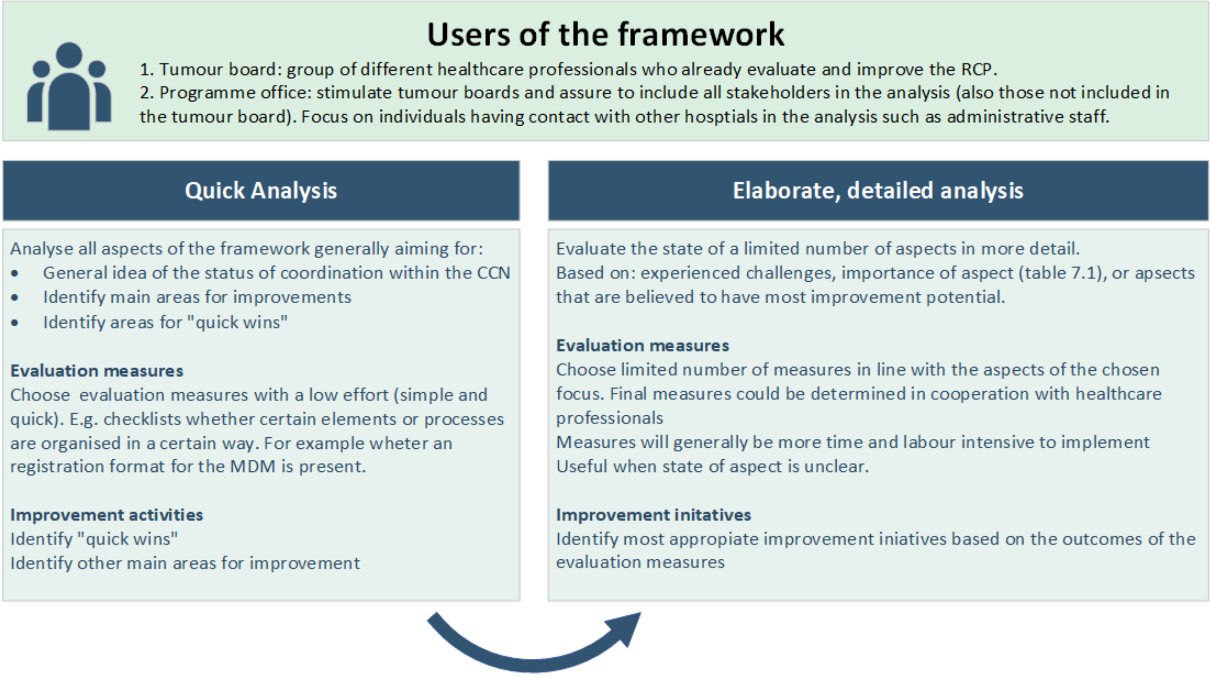
Aspect of coordination	Main improvement recommendations
Information exchange including communication	Create standardised formats and routines (also around the MDM) for information exchange and communication that are recorded within the RCP protocol. Explore methods and platforms for digital exchange of information. Ideally, solutions allowing easier information transfer of patient records that are currently investigated are implemented, such as an MDM portal or other EMR data-sharing solutions. Use nationally available standardised datasets (Citrienfonds, 2023). Potentially also include elements of appropriate care such as social context and preferences of patient.
Plans and rules, and Roles	Document shared standards with all partners in a shared RCP protocol. These should be in line with (national) guidelines and include roles, tasks (who does what and when), agreements, responsibilities, and accountability of each individual for each step in the RCP. Evaluate adherence towards the protocol and throughput times.
Proximity and Trust	Get to know colleagues by visiting each other and meeting regularly (e.g. twice a year) in person. Stimulate low-threshold contact by exchanging contact information. Focus on collective problem solving, self-correction and feedback mechanisms among healthcare professionals. These will lower the need for monitoring coordination in the RCP because of a culture of open communication and feedback.
Boundary spanning	Patient level: organise case management within and between the hospitals which keeps track of the care path of the patient. Network level: install a program office of the network to coordinate and enhance collaboration by aligning interests, evaluating RCPs, and introducing improvement actions Additionally, they should take a role in connecting different RCPs within the CCN and contact with other CCNs.

CCN = comprehensive cancer network; EMR = Electronic Medical Records; MDM = multidisciplinary team meeting; RCP = regional care pathway.

Strategies for use of the framework by CCNs and hospitals

The developed framework gives guidance towards CCNs in improving coordination by defining aspects of coordination and linking evaluation measures and potential improvement actions towards each aspect. The framework can assist hospitals and the programme office of CCNs by first making them aware of the aspects that coordination compromises. A general guide with suggestions on the use of the framework is outlined in Figure 7.1.

As the framework is extensive and includes 24 different aspects, these are too many aspects to assess in depth at once. At first, all aspects could be assessed with a kind of general scan on a higher-over level to identify “quick wins” and main areas for improvement. Based on this analysis, it could also be concluded that some aspects need to be evaluated in more detail (Figure 7.1). Of some aspects, it might already be known that these are well integrated within the current workflow, which makes these have less relevance to be evaluated in depth. The smaller selection of evaluation measures could be made in cooperation with healthcare professionals (Guarneri et al., 2020; van Hoeve et al., 2014).



Users of the framework

1. Tumour board: group of different healthcare professionals who already evaluate and improve the RCP.
2. Programme office: stimulate tumour boards and assure to include all stakeholders in the analysis (also those not included in the tumour board). Focus on individuals having contact with other hosptials in the analysis such as administrative staff.

Quick Analysis

Analyse all aspects of the framework generally aiming for:

- General idea of the status of coordination within the CCN
- Identify main areas for improvements
- Identify areas for "quick wins"

Evaluation measures
Choose evaluation measures with a low effort (simple and quick). E.g. checklists whether certain elements or processes are organised in a certain way. For example wheter an registration format for the MDM is present.

Improvement activities
Identify "quick wins"
Identify other main areas for improvement

Elaborate, detailed analysis

Evaluate the state of a limited number of aspects in more detail.
Based on: experienced challenges, importance of aspect (table 7.1), or apsects that are believed to have most improvement potential.

Evaluation measures
Choose limited number of measures in line with the aspects of the chosen focus. Final measures could be determined in cooperation with healthcare professionals
Measures will generally be more time and labour intensive to implement
Useful when state of aspect is unclear.

Improvement initatives
Identify most appropiate improvement iniatives based on the outcomes of the evaluation measures

Figure 7.1 Overview of the potential use of the developed framework.

The improvement activities could be based on the outcomes of the evaluation measure and the main areas of improvement. However, the choice for certain actions is also influenced by factors such as availability of time, financial resources, and workforce. Some actions have more dependencies between the hospitals and other specialisms like IT (e.g. information transfer) or are more difficult than others (Antonelli et al., 2009). The measures could also be used to evaluate the effect of implemented improvement activities. Moreover, some measures might be useful to include in a retrospective dashboard and monitor routinely.

Additional recommendations

Implementation calls for more than a right tool; it also concerns other resources like time, knowledge and skills, and financing combined with cultural and behavioural changes within the organisations. Implementing solutions calls the need for motivation, guidance and coordination which is currently often led by project leaders or via dedicated healthcare professionals resulting in a bottom-up approach (Citrienfonds, 2023). Networks should investigate whether these methods are indeed the best way to implement and embed improvement initiatives.

Each CCN has to determine which improvement actions are most wanted and how to organise the implementation of these initiatives (Regionale oncologienetwerken, 2023a). Hospitals and regions might have different agendas regarding the importance of certain improvement actions. For example, a hospital having financial difficulties will have fewer resources available to invest in improvement actions for the CCN like an MDM platform. As most improvement actions are time-intensive to implement it is suggested to first pilot initiatives on a small scale and scale up gradually (Citrienfonds, 2023).

The first steps of improvement initiatives made by the regions, most often from a bottom-up approach, tend to reach their limits (Regionale oncologienetwerken, 2023a). For successful further scale-up of initiatives, such as the MDM portal and regional case management, regions should be connected to align and harmonise ideas. This will facilitate sharing of knowledge and good practices between and within CCNs. CCNs could work towards a stronger sharing network by continuously bundling good practices and sharing tools among the regions. The alignment and harmonisation of initiatives could be guided by nationally aligned agreements, standards and guidelines jointly developed by all CCNs, probably guided by national policy from the government (Regionale oncologienetwerken, 2023a).

Some obstacles should be tackled nationwide by policy from the government such as the development of supporting financing structures and recommendations about the governance structures facilitating CCNs (Citrienfonds, 2023). Research on new payment structures should also incorporate a component to compensate networks focusing on innovating and improving CCNs (Citrienfonds, 2023). Networks are currently insufficiently stimulated to invest in larger improvement initiatives that could be adapted by other networks. Differences between CCNs exist, requiring unique efforts in implementation for each network based on their governance, organisation and other factors (Regionale oncologienetwerken, 2023a).

The first steps in data harmonisation and standardisation are made by the standardised data sets (Citrienfonds, 2023). Hospitals within a CCN should start researching opportunities to link and align data from their EMR systems into regional dashboards. Time investments and knowledge of departments like business intelligence will be needed to facilitate this, but in the future, this will facilitate the development of different dashboards and CCNs will reap the benefits of these investments. National guidelines and collaborations between CCNs will give support to these actions.

8. Conclusion

This thesis aimed to guide CCNs in how coordination within RCPs involving multiple hospitals could be improved. This is done by presenting, extending and illustrating an existing coordination framework, for use within regional oncology care networks. Coordination is important in CCNs, with transitions of patients between care organisations and a variety of care professionals being involved. Information exchange, communication and a clear healthcare pathway protocol with defined roles turn out to be the most important aspects to facilitate coordination. Together they cover the continuum of variability and complexity; more complexity calls for the need for coordination actions like communication besides a documented protocol. Additionally, emergent conditions, such as knowing each other well and trust, foster collaboration between healthcare professionals in RCPs. In this chapter, the answer to each of the sub-questions will be provided. Combined these will lead to the answer to the main research question of how coordination in RCPs could be improved.

SQ 1: Coordination in regional oncology networks differs from coordination in integrated care pathways and care pathways within a single hospital.

Like an intra-hospital care pathway, a defined RCP facilitates coordination by describing a uniform and standardised care process within the different hospitals. In an RCP, coordination during transitions becomes more important due to the increased "distance" between the professionals.

In contrast with RCPs, ICPs describe collaborations between different types of organisations/sectors across the health continuum often connecting the hospitals to the primary or social care sector. The main difference between these two types of collaborative networks is the extensiveness of the collaboration and the interdependency between the different partners. In ICPs the partners succeed each other, resulting in less strong interdependence. In RCPs, the professionals are more closely involved with each other since the tasks show more interdependencies (e.g. chemotherapy affects the chances of a successful surgery). ICPs encounter the challenge of balancing the autonomy of each organisation and professional while creating a similar way of working (Valentijn et al., 2013). This challenge applies to RCPs as well. Related to communication, coordination might be easier within RCPs than ICPs since the healthcare professionals in RCPs have similar roles and perspectives, and thereby "*speak the same language*".

SQ 2: The developed framework gives an overview of aspects important for coordination in RCPs.

Care coordination bridges "gaps" between healthcare professionals who have interdependent sequencing tasks in the care pathway of a patient. The aspects of coordination of the originally proposed conceptual framework (Figure 4.3) show some overlap in the context of RCPs but are all applicable. The interviews resulted in two extensions of the original framework by also including alignment of resources and processes, besides cultural alignment. and the importance of leadership/coordination at the network level besides the boundary spanning role of the case manager at the patient level.

Coordination takes place at two levels within RCPs: 1) on the patient's level involving boundary spanners to monitor and coordinate the care process; 2) on the regional network level by the network office or tumour boards ensuring the RCP is evaluated and improvement actions or new insights are implemented. The framework (Figure 4.5) outlines the aspects important for coordination in RCPs. The different domains of aspects influence coordination differently by being either an input, moderator, mediating or process factor.

SQ 3: No overall measure to assess the quality and state of care coordination exists and oncology networks appear to have little focus on evaluating the aspects of coordination.

The literature search revealed many evaluation instruments of care coordination and team performance. These measures are heterogeneous in setting and aspects of coordination. However, no general measure assessing the quality and state of coordination covering a majority of aspects was identified. For most aspects of the framework (Figure 4.5) potential evaluation measures from the healthcare professional and system perspective were identified.

Measures can be generally distinguished into two categories: 1) tools filled out by individuals e.g. surveys or observation forms; 2) indicators based on available data from the electronic medical record (EMR) or national register. The interviewees revealed most hospitals and CCNs appear to have little emphasis on coordination and evaluating coordination. Currently, mainly the SONCOS and DICA standards are used to obtain data for the evaluation of the RCP. These include some throughput times and adherence to the RCP, but it is useful to extend these with other measures focused on coordination to cover a larger continuum of coordination and identify areas for improvement. One of the interviewed CCNs also had experience with other measures by monitoring communication by checking the completeness and timing of a random sample of MDM registration emails.

SQ 4: Monitoring of patients facilitates coordination by creating insights into the patient's status, the tasks that need to be completed and assists timely detection of errors.

Two different types of monitoring could be distinguished: 1) retrospective/strategic monitoring, providing steering information to assess performance compared to standards; 2) operational monitoring, including monitoring the delivery of healthcare services and detecting potential errors or delays. Operational monitoring enhances coordination by reviewing the progress of activities, creating insights, and facilitating the timely detection of errors in the care pathways of patients. Healthcare professionals would like to use monitoring for two main purposes: 1) to give an overview of the tasks that still need to be completed (including the priority of the task); and 2) to screen for potential deficiencies or errors in the process.

A well-designed monitoring system will support healthcare professionals in the coordination. Current challenges in patient monitoring are mainly caused by having no access to the EMR system of the other hospital, a lack of overview within the EMR system, and insufficient communication.

Monitoring of patients could be organised via the EMR system which is currently often used by healthcare professionals by creating task lists within the EMR. This includes scheduling moments for patient follow-up at which they check the status of a patient and the outstanding tasks by searching for the patient's record. Communication is also currently used by healthcare professionals to get to know the status of the patient.

Dashboards are another way to organise monitoring of patients by creating an overview of the location and status of the patient within the RCP. Some healthcare professionals have created similar documents in programmes like Excel to monitor their patients, but this does not include automated data. Dashboards will have the advantage of using data from the EMR which is up to date, reduces the chances of errors and will take less time to obtain. However, the development of dashboards is time- and resource-intensive and might therefore not be considered the most cost-effective option in the short term. It is recommended to further research monitoring methods for the short term and determine whether developing dashboards allows better monitoring in RCPs and is worth the efforts in the long term.

SQ 5: Operational monitoring dashboards should include alert systems and reminders.

Dashboards are a useful tool to standardise and harmonise monitoring in oncology regions. An essential aspect of monitoring (dashboard) entails incorporating alerts to signal healthcare professionals when errors or delays in the processes of patients occur. This will allow timely adjustments and actions. A second type of reminder that will facilitate administrative staff is an alert when they can start completing a certain task (task orders within the EMR system are considered unsatisfactory). Besides the near-time operational dashboards on the patient's level, a retrospective strategic dashboard could facilitate evaluating coordination regularly.

Shared regional dashboards are wished by the interviewed healthcare professionals. However, CCNs are still looking for steering information and opportunities to create dashboards at the network level connecting all hospitals. The main challenges in developing a shared dashboard within the CCN lay in non-standardised data within the EMR, the different ways data and data warehouses are structured in the hospitals, and privacy regulations.

Main research question: information exchange, shared documented RCP protocols, good personal relationships, and boundary spanning are considered the most important aspects of coordination within RCPs.

From the interviews, six main aspects of coordination emerged: alignment between hospitals, (synchronised) care pathways and protocols, information transfer including communication, network organizer ("*captain of the network*"), personal relationships, and trust. Most challenges described by the interviewees related to ambiguity and unclarity about roles and responsibilities which were caused by imperfect communication, misunderstandings, or undefined steps in the protocols. For most aspects underlying elements such as understandability, completeness, uniformity, and timing need to be taken into account to optimise coordination. In existing RCPs, the following aspects could be considered most important to improve:

1. Information exchange and communication could be improved by setting standards for communication and information transfer. Standardised formats and routines could facilitate the complete, timely, uniform, and unambiguous exchange of information. Ideally, solutions allowing easier information transfer of patient records that are currently investigated are implemented, such as an MDM portal or other (EMR) data-sharing solutions.
2. Shared RCP protocols should be documented and aligned with all partners. The RCP protocol should clearly describe roles, agreements, responsibilities, and throughput times for each step of the RCP to ensure everyone knows their tasks.
3. Develop trust and proximity by getting to know each other, facilitate low-threshold contact, and meeting each other in person. This will facilitate a culture of open communication, collective problem-solving, and self-correction and feedback mechanisms among healthcare professionals.
4. Organise boundary spanning at the level of the patient via case management and at the level of the network via the network programme office (manager). They have a role in coordinating the processes and noticing potential deficiencies.

A well-designed monitoring system including alerts will support healthcare professionals in the coordination and adherence to the described protocol. Besides operational monitoring, the RCP and coordination should be evaluated with steering information such as throughput times and general adherence to the protocol. Regional dashboards are challenging to build due to non-standardised data and different data structures. Further research should investigate potential other monitoring methods besides dashboards.

The developed framework provides a first guide to CCNs in improving coordination by evaluating the current state of coordination and selecting appropriate improvement actions. It is suggested to start evaluating the four aspects mentioned above or aspects with room for improvement. Implementation of improvements calls for more than a right tool. Other resources like time, knowledge and skills, and financing could also limit improvements. Therefore, it is important to exchange useful tools and facilitate learning from each other within and between CCNs to tackle larger challenges such as digital information exchange or regional case management. The government should play a role by bringing the CCNs together to further scale-up initiatives and develop financing and government structures facilitating RCPs.

Care coordination is important to reach the overall aim of regional oncology networks and let patients experience the *"care provided by the network seamlessly. … no obstacles, no information slipping through the cracks, no duplicate diagnostics or repeating the same questions. Patients feel well taken care of; they don't need to wonder if they are with the right healthcare provider, and they know at all times who their contact person in the network is."* (original in Dutch) - (Citrienfonds, 2023, p. 8).

References

Agency for Healthcare Research and Quality. (2018). *Care Coordination*. Retrieved 07-01-2024 from https://www.ahrq.gov/ncepcr/care/coordination.html

Ahgren, B., & Axelsson, R. (2005). Evaluating integrated health care: a model for measurement. *International Journal of Integrated Care*. https://doi.org/10.5334/ijic.134

Allen, D. (2009). From boundary concept to boundary object: The practice and politics of care pathway development. *Social Science & Medicine*, *69*(3), 354-361. https://doi.org/https://doi.org/10.1016/j.socscimed.2009.05.002

Altini, M., Balzi, W., Maltoni, R., Falcini, F., Foca, F., Messori Ioli, G., Ricotti, A., Bertetto, O., Mistrangelo, M., Amunni, G., Gemmi, F., Bachini, L., Silenzi, A., Pastorino, R., Barbara, A., Pierini, A., & Massa, I. (2019). Key performance indicators for monitoring the integrated care pathway in breast cancer: the E.Pic.A. project. *AboutOpen*, *5*(1), 31-38. https://doi.org/10.33393/abtpn.2019.291

Antonelli, R. C., McAllister, J. W., & Popp, J. (2009). *Making care coordination a critical component of the pediatric health system: a multidisciplinary framework*.

Artsenfederatie KNMG. (2022). *Handreiking Verantwoordelijkheidsverdeling bij samenwerking in de zorg - herziening 2022*. KNMG.

Bautista, M. A., Nurjono, M., Lim, Y. W., Dessers, E., & Vrijhoef, H. J. (2016). Instruments Measuring Integrated Care: A Systematic Review of Measurement Properties. *Milbank Q*, *94*(4), 862-917. https://doi.org/10.1111/1468-0009.12233

Bettencourt-Silva, J. H., Clark, J., Cooper, C. S., Mills, R., Rayward-Smith, V. J., & de la Iglesia, B. (2015). Building Data-Driven Pathways From Routinely Collected Hospital Data: A Case Study on Prostate Cancer. *JMIR Med Inform*, *3*(3), e26. https://doi.org/10.2196/medinform.4221

Bloemendal, H. J., van der Brugge, D. I. R., & Witteveen, P. O. (2017). *Privacy van patiënten bij elektronische gegevensuitwisseling*.

Bodenheimer, T. (2008). Coordinating care--a perilous journey through the health care system. *N Engl J Med*, *358*(10), 1064-1071. https://doi.org/10.1056/NEJMhpr0706165

Bonomi, A. E., Wagner, E. H., Glasgow, R. E., & VonKorff, M. (2002). Assessment of chronic illness care (ACIC): a practical tool to measure quality improvement. *Health Serv Res*, *37*(3), 791-820. https://doi.org/10.1111/1475-6773.00049

Bühn, S., Holstiege, J., & Pieper, D. (2020). Are patients willing to accept longer travel times to decrease their risk associated with surgical procedures? A systematic review. *BMC Public Health*, *20*(1), 253. https://doi.org/10.1186/s12889-020-8333-5

Cancer Center Amsterdam. (2019). *Annual Review 2019*.

Carroll, J. K., Humiston, S. G., Meldrum, S. C., Salamone, C. M., Jean-Pierre, P., Epstein, R. M., & Fiscella, K. (2010). Patients' experiences with navigation for cancer care. *Patient Educ Couns*, *80*(2), 241-247. https://doi.org/10.1016/j.pec.2009.10.024

Case Study Oncology Network (anonymous). (2023). *Nadere overeenkomst gasteroenterologische tumoren*

Chiang, A. C., Lake, J., Sinanis, N., Brandt, D., Kanowitz, J., Kidwai, W., Kortmansky, J., LaSala, J., Orell, J., Sabbath, K., Tara, H., Engelking, C., Shomsky, L., Fradkin, M., Adelson, K., Uscinski, K., Vest, K., Lyons, C., Lemay, A., . . . Lilenbaum, R. (2018). Measuring the Impact of Academic Cancer Network Development on Clinical Integration, Quality of Care, and Patient Satisfaction. *J Oncol Pract*, *14*(12), e823-e833. https://doi.org/10.1200/jop.18.00419

ChipSoft. (n.d.-a). *Transmurale samenwerking en gegevensuitwisseling in de zorg*. https://www.chipsoft.com/nl-NL/hix-abc/artikel/112/Transmurale-samenwerking-en-gegevensuitwisseling-in-de-zorg

ChipSoft. (n.d.-b). *Transmurale zorg met Transmuraal Portaal*. https://www.chipsoft.com/nl-NL/hix-abc/artikel/267

Citrienfonds. (2023). *Eindrapportage naar regionaal oncologienetwerk*

Clarke, V., & Braun, V. (2013). Successful qualitative research: A practical guide for beginners. *Successful qualitative research*, 1-400.

Davison, R. B., Hollenbeck, J. R., Barnes, C. M., Sleesman, D. J., & Ilgen, D. R. (2012). Coordinated action in multiteam systems. *J Appl Psychol*, *97*(4), 808-824. https://doi.org/10.1037/a0026682

De Bleser, L., Depreitere, R., De Waele, K., Vanhaecht, K., Vlayen, J., & Sermeus, W. (2006). Defining pathways. *J Nurs Manag*, *14*(7), 553-563. https://doi.org/10.1111/j.1365-2934.2006.00702.x de Luc, K. (2000). Care pathways: an evaluation of their effectiveness. *J Adv Nurs*, *32*(2), 485-496. https://doi.org/10.1046/j.1365-2648.2000.01500.x

Del Turco, M. R., Ponti, A., Bick, U., Biganzoli, L., Cserni, G., Cutuli, B., Decker, T., Dietel, M., Gentilini, O., Kuehn, T., Mano, M. P., Mantellini, P., Marotti, L., Poortmans, P., Rank, F., Roe, H., Scaffidi, E., van der Hage, J. A., Viale, G., . . . Cataliotti, L. (2010). Quality indicators in breast cancer care. *Eur J Cancer*, *46*(13), 2344-2356. https://doi.org/10.1016/j.ejca.2010.06.119

DICA. *Dutch Upper GI Cancer Audit (DUCA)*. https://dica.nl/duca/home

DICA. (2018). *Factsheet indicatoren Slokdarm- en maagcarcinoom (DUCA) 2019* DICA.

Donabedian, A. (2005). Evaluating the Quality of Medical Care. *The Milbank Quarterly*, *83*(4), 691-729. https://doi.org/https://doi.org/10.1111/j.1468-0009.2005.00397.x

Duan-Porter, W., Ullman, K., Majeski, B., Miake-Lye, I., Diem, S., & Wilt, T. J. (2022). Care Coordination Models and Tools-Systematic Review and Key Informant Interviews. *J Gen Intern Med*, *37*(6), 1367-1379. https://doi.org/10.1007/s11606-021-07158-w

Gijsen, B., Veldhuis, P., & Geerdes, B. (2022). *Oncologienetwerken in beeld*

Gittell, J. H. (2000). Organizing work to support relational co-ordination. *The International Journal of Human Resource Management*, *11*(3), 517-539. https://doi.org/10.1080/095851900339747

Gittell, J. H. (2002). Coordinating Mechanisms in Care Provider Groups: Relational Coordination as a Mediator and Input Uncertainty as a Moderator of Performance Effects. *Management Science*, *48*(11), 1408-1426. http://www.jstor.org.tudelft.idm.oclc.org/stable/822615

Gittell, J. H., & Weiss, L. (2004). Coordination Networks Within and Across Organizations: A Multi-level Framework*. *Journal of Management Studies*, *41*(1), 127-153. https://doi.org/https://doi.org/10.1111/j.1467-6486.2004.00424.x

Guarneri, V., Pronzato, P., Bertetto, O., Roila, F., Amunni, G., Bortolami, A., Tognazzo, S., Griguolo, G., Pagano, E., Stracci, F., Bianconi, F., Gemmi, F., Bachini, L., Ciccone, G., Paoli, G., Paleari, L., Conte, P. F., Association, o. b. o. t. P., & Association, o. b. o. t. P. (2020). Use of Electronic Administrative Databases to Measure Quality Indicators of Breast Cancer Care: Experience of Five Regional Oncology Networks in Italy. *JCO Oncology Practice*, *16*(2), e211-e220. https://doi.org/10.1200/jop.19.00466

Integraal kankercentrum Nederland. (2016). *Integrale Oncologische Zorgpaden - handleiding voor implementatie* (IKNL, Issue.

Integraal kankercentrum Nederland. (2021). *Slokdarm- en maagkanker in Nederland*.

Integraal kankercentrum Nederland. (2024a). *About NCR data* https://iknl.nl/en/ncr-data

Integraal kankercentrum Nederland. (2024b). *Oncoguide*. Retrieved 12-03 from https://iknl.nl/onderzoek/innovatie/oncoguide

Integraal Zorg Akkoord. (2022).

Kern, L. M., Dhopeshwarkar, R., Barrón, Y., Wilcox, A., Pincus, H., & Kaushal, R. (2009). Measuring the effects of health information technology on quality of care: a novel set of proposed metrics for electronic quality reporting. *Jt Comm J Qual Patient Saf*, *35*(7), 359-369. https://doi.org/10.1016/s1553-7250(09)35051-5

Kianfar, S., Carayon, P., Hundt, A. S., & Hoonakker, P. (2019). Care coordination for chronically ill patients: Identifying coordination activities and interdependencies. *Applied Ergonomics*, *80*, 9-16. https://doi.org/https://doi.org/10.1016/j.apergo.2019.05.002

Kugler, C. M., De Santis, K. K., Rombey, T., Goossen, K., Breuing, J., Könsgen, N., Mathes, T., Hess, S., Burchard, R., & Pieper, D. (2021). Perspective of potential patients on the hospital volume-outcome relationship and the minimum volume threshold for total knee arthroplasty: a qualitative focus group and interview study. *BMC Health Serv Res*, *21*(1), 633. https://doi.org/10.1186/s12913-021-06641-8

Kuiper, B. (n.d.). *Inzet regionaal casemanagement*.

Latina, R., Salomone, K., D'Angelo, D., Coclite, D., Castellini, G., Gianola, S., Fauci, A., Napoletano, A., Iacorossi, L., & Iannone, P. (2020). Towards a New System for the Assessment of the Quality in Care Pathways: An Overview of Systematic Reviews. *Int J Environ Res Public Health*, *17*(22). https://doi.org/10.3390/ijerph17228634

Leijten, F. R. M., Struckmann, V., van Ginneken, E., Czypionka, T., Kraus, M., Reiss, M., Tsiachristas, A., Boland, M., de Bont, A., Bal, R., Busse, R., & Rutten-van Mölken, M. (2018). The SELFIE framework for integrated care for multi-morbidity: Development and description. *Health Policy*, *122*(1), 12-22. https://doi.org/10.1016/j.healthpol.2017.06.002

Lemmens, L., Van Zelm, R., Vanhaecht, K., & Kerkkamp, H. (2008). Systematic review: indicators to evaluate effectiveness of clinical pathways for gastrointestinal surgery. *Journal of Evaluation in Clinical Practice*, *14*(5), 880-887. https://doi.org/https://doi.org/10.1111/j.1365-2753.2008.01079.x

Liu, R., Weldon, C. B., Linehan, E., Gordon, N., Abbe, T., Hennings, M., James, H., Katzel, J., Ng, C., Tomita, M., Velotta, J. B., Ossowski, S., Sakoda, L. C., Sprague, S. L., Dowling, A., Beringer, K., Ravelo, A., Yu, E., & Trosman, J. R. (2023). Fostering a High-Functioning Team in Cancer Care Using the 4R Oncology Model: Assessment in a Large Health System and a Blueprint for Other Institutions. *JCO Oncology Practice*, *19*(1), e125-e137. https://doi.org/10.1200/op.22.00287

Lodewijckx, C., Vanhaecht, K., & Panella, M. (2012). A new model of care pathways for reorganization of chronic care. *International Journal of Care Pathways*, *16*, 1-2. https://doi.org/10.1258/jicp.2011.011m33

Long, J. C., Cunningham, F. C., & Braithwaite, J. (2013). Bridges, brokers and boundary spanners in collaborative networks: a systematic review. *BMC Health Services Research*, *13*(1), 158. https://doi.org/10.1186/1472-6963-13-158

Luciano, M. M., DeChurch, L. A., & Mathieu, J. E. (2018). Multiteam Systems: A Structural Framework and Meso-Theory of System Functioning. *Journal of Management*, *44*(3), 1065-1096. https://doi.org/10.1177/0149206315601184

McDonald, K. M., Schultz, E., Albin, L., Pineda, N., Lonhart, J., Sundaram, V., Smith-Spangler, C., Brustrom, J., Malcolm, E., Rohn, L., & Davies, S. (2014). *Care Coordination Measures Atlas Update. Content last reviewed June 2014.* .

McDonald, K. M., Sundaram, V., Bravata, D. M., Lewis, R., Lin, N., Kraft, S. A., McKinnon, M., Paguntalan, H., & Owens, D. K. (2007). *Closing the Quality Gap: A Critical Analysis of Quality Improvement Strategies* (AHRQ Technical Reviews (Vol. 7: Care Coordination), Issue.

MediMapp. (2021). *MediTopp Analytics Experience Radboudumc*. https://www.youtube.com/watch?v=l4cgYw1pDVo

Mériade, L., & Rochette, C. (2021). Integrated care pathway for breast cancer: A relational and geographical approach. *Soc Sci Med*, *270*, 113658. https://doi.org/10.1016/j.socscimed.2020.113658

Microsoft. (2024).

Middelveldt, I., Regts, G., & Van der Zwaag, E. (2018). *De ontwikkeling van oncologienetwerken in Nederland - aanbevelingen rond orgnaisatie en financiering* (Regionale Oncologienetwerken, Issue. R. Oncologienetwerken.

Mintzberg, H. (1979). *The structuring of Organizations*. Prentice-Hall.

MRDM Support. (2024). *Codman Connect*. https://support.mrdm.com/nl/codman/codman-connect/

MUMC. In M. m. n. m. bereikbaar (Ed.).

Nezami, M. R., de Bruijne, M. L. C., Hertogh, M. J. C. M., & Bakker, H. L. M. (2023). Inter-Organizational Collaboration in Interconnected Infrastructure Projects. *Sustainability*, *15*(8). https://doi.org/10.3390/su15086721

Okhuysen, G. A., & Bechky, B. A. (2009). 10 Coordination in Organizations: An Integrative Perspective. *Academy of Management Annals*, *3*(1), 463-502. https://doi.org/10.5465/19416520903047533

Oncologienetwerk Veluwe IJssel (2023). Retrieved 06-03-2024 from https://www.oncologienetwerkveluweijssel.nl/

OncologieZorgNetwerken. (n.d.). *Wat doet een netwerk* https://oncologiezorgnetwerken.nl/wat-doet-een-netwerk/#wat

Panella, M., Marchisio, S., & Di Stanislao, F. (2003). Reducing clinical variations with clinical pathways: do pathways work? *International Journal for Quality in Health Care*, *15*(6), 509-521. https://doi.org/10.1093/intqhc/mzg057

Patton, M. Q. (1999). Enhancing the quality and credibility of qualitative analysis. *Health Serv Res*, *34*(5 Pt 2), 1189-1208.

Peterson, K., Anderson, J., Bourne, D., & Boundy, E. (2018). *Scoping Brief: Care Coordination Theoretical Models and Frameworks* (VA Evidence Synthesis Program Reports, Issue.

Peterson, K., Anderson, J., Bourne, D., Charns, M. P., Gorin, S. S., Hynes, D. M., McDonald, K. M., Singer, S. J., & Yano, E. M. (2019). Health Care Coordination Theoretical Frameworks: a Systematic Scoping Review to Increase Their Understanding and Use in Practice. *J Gen Intern Med*, *34*(Suppl 1), 90-98. https://doi.org/10.1007/s11606-019-04966-z

Platform Oncologie - SONCOS. (2023). *Multidisciplinaire normering oncologische zorg in Nederland* (SONCOS Normeringsrapport Issue 11-2023).

Provan, K. G., Fish, A., & Sydow, J. (2007). Interorganizational Networks at the Network Level: A Review of the Empirical Literature on Whole Networks. *Journal of Management*, *33*(3), 479-516. https://doi.org/10.1177/0149206307302554

Regionale oncologienetwerken. (2020, 24-01-2020). *App regionale zorgpaden voor gastro-enterologische tumoren*. https://oncologienetwerken.nl/nieuws/artikel/app-regionale-zorgpaden-voor-gastro-enterologische-tumoren

Regionale oncologienetwerken. (2022a). *Gegevensset MDO (aanmelding en verslag) - handvatten implementatie*

Regionale oncologienetwerken. (2022b). *Welk MDO platform wordt het?* https://oncologienetwerken.nl/nieuws/artikel/welk-mdo-platform-wordt-het

Regionale oncologienetwerken. (2023a). *Bijlage Oncologieroute 2027*.

Regionale Oncologienetwerken. (2023b). *Eindrapport Meetmodel Waardegedreven zorg slokdarm- en maagkanker*.

Regionale oncologienetwerken. (2023c). *Nieuw oncologienetwerk: OncoNoVo+*. https://oncologienetwerken.nl/nieuws/artikel/nieuw-oncologienetwerk-onconovo

Rotter, T., Kinsman, L., James, E., Machotta, A., Willis, J., Snow, P., & Kugler, J. (2012). The effects of clinical pathways on professional practice, patient outcomes, length of stay, and hospital costs: Cochrane systematic review and meta-analysis. *Eval Health Prof*, *35*(1), 3-27. https://doi.org/10.1177/0163278711407313

Schultz, E. M., & McDonald, K. M. (2014). What is care coordination? *International Journal of Care Coordination*, *17*(1-2), 5-24. https://doi.org/10.1177/2053435414540615

Schultz, E. M., Pineda, N., Lonhart, J., Davies, S. M., & McDonald, K. M. (2013). A systematic review of the care coordination measurement landscape. *BMC Health Services Research*, *13*(1), 119. https://doi.org/10.1186/1472-6963-13-119

Sheinfeld Gorin, S., & Haggstrom, D. (2018). The coordination of chronic care: an introduction. *Translational Behavioral Medicine*, *8*(3), 313-317. https://doi.org/10.1093/tbm/iby048

Siegel, R., Castro, K., Eisenstein, J., Stallings, H., Hegedus, P., Bryant, D., Kadlubek, P., & Clauser, S. (2014). Quality Improvement in the National Cancer Institute Community Cancer Centers Program: The Quality Oncology Practice Initiative Experience. *Journal of oncology practice / American Society of Clinical Oncology*, *11*. https://doi.org/10.1200/JOP.2014.000703

Smits, C., van Zutphen, J., & Tolboom, M. (2020a). *Generieke Blauwdruk MDO*.

Smits, C., van Zutphen, J., & Tolboom, M. (2020b). *Verbeterplan MDO*

Soulve Innovations. (n.d.). MediMapp Producten. In.

Strandberg-Larsen, M., & Krasnik, A. (2009). Measurement of integrated healthcare delivery: a systematic review of methods and future research directions. *Int J Integr Care*, *9*, e01. https://doi.org/10.5334/ijic.305

Suter, E., Oelke, N. D., Adair, C. E., & Armitage, G. D. (2009). Ten key principles for successful health systems integration. *Healthc Q*, *13 Spec No*(Spec No), 16-23. https://doi.org/10.12927/hcq.2009.21092

Suter, E., Oelke, N. D., Dias da Silva Lima, M. A., Stiphout, M., Janke, R., Witt, R. R., Van Vliet-Brown, C., Schill, K., Rostami, M., Hepp, S., Birney, A., Al-Roubaiai, F., & Quintana Marques, G. (2017). Indicators and Measurement Tools for Health Systems Integration: A Knowledge Synthesis. *International Journal of Integrated Care*. https://doi.org/10.5334/ijic.3931

Taplin, S. H., & Rodgers, A. B. (2010). Toward improving the quality of cancer care: addressing the interfaces of primary and oncology-related subspecialty care. *J Natl Cancer Inst Monogr*, *2010*(40), 3-10. https://doi.org/10.1093/jncimonographs/lgq006

Trosman, J. R., Carlos, R. C., Simon, M. A., Madden, D. L., Gradishar, W. J., III, A. B. B., Rapkin, B. D., Weiss, E. S., Gareen, I. F., Wagner, L. I., Khan, S. A., Bunce, M. M., Small, A., & Weldon, C. B. (2016). Care for a Patient With Cancer As a Project: Management of Complex Task Interdependence in Cancer Care Delivery. *Journal of Oncology Practice*, *12*(11), 1101-1113. https://doi.org/10.1200/jop.2016.013573

Trosman, J. R., Weldon, C. B., Rapkin, B. D., III, A. B. B., Makower, D. F., Liang, S.-Y., Kulkarni, S. A., Perez, C. B., Lo, S. S., Krueger, E. A., Throckmorton, A. D., Gallagher, C., Hoskins, K., Schaeffer, C. M., Horn, J. V., Schapira, L., Ravelo, A., Yu, E., & Gradishar, W. J. (2021). Evaluation of the Novel 4R Oncology Care Planning Model in Breast Cancer: Impact on Patient Self-Management and Care Delivery in Safety-Net and Non–Safety-Net Centers. *JCO Oncology Practice*, *17*(8), e1202-e1214. https://doi.org/10.1200/op.21.00161

Uijen, A. A., Heinst, C. W., Schellevis, F. G., van den Bosch, W. J. H. M., van de Laar, F. A., Terwee, C. B., & Schers, H. J. (2012). Measurement Properties of Questionnaires Measuring Continuity of Care: A Systematic Review. *PloS one*, *7*(7), e42256. https://doi.org/10.1371/journal.pone.0042256

Valentijn, P. P., Angus, L., Boesveld, I., Nurjono, M., Ruwaard, D., & Vrijhoef, H. (2017). Validating the Rainbow Model of Integrated Care Measurement Tool: results from three pilot studies in The Netherlands, Singapore and Australia. *International Journal of Integrated Care*. https://doi.org/10.5334/ijic.3203

Valentijn, P. P., Eggers, C., Bloem, B. R., Grimes, D., Goldman, J., McGinley, J., Gardner, J., Piemonte, M. E. P., Dahodwala, N., Brennan, L., Iansek, R., Kovacs, N., Parashos, S., Hilel, A., Rajan, R., Interdisciplinary, t. M. S. G. o. M. o. M. D., & Care, I. (2023). Validation of the Rainbow Model of Integrated Care Measurement Tool in Parkinson's Disease. *Movement Disorders*, *38*(7), 1253-1261. https://doi.org/https://doi.org/10.1002/mds.29413

Valentijn, P. P., Schepman, S. M., Opheij, W., & Bruijnzeels, M. A. (2013). Understanding integrated care: a comprehensive conceptual framework based on the integrative functions of primary care. *Int J Integr Care*, *13*, e010. https://doi.org/10.5334/ijic.886

van Hoeve, J., de Munck, L., Otter, R., de Vries, J., & Siesling, S. (2014). Quality improvement by implementing an integrated oncological care pathway for breast cancer patients. *Breast*, *23*(4), 364-370. https://doi.org/10.1016/j.breast.2014.01.008

van Hoeve, J. C., Elferink, M. A. G., Klaase, J. M., Kouwenhoven, E. A., Schiphorst, P. P. J. B. M., & Siesling, S. (2015). Long-term effects of a regional care pathway for patients with rectal cancer. *International Journal of Colorectal Disease*, *30*(6), 787-795. https://doi.org/10.1007/s00384-015-2209-7

van Hoeve, J. C., Verhoeven, R. H. A., Nagengast, W. B., Oppedijk, V., Lynch, M. G., van Rooijen, J. M., Veldhuis, P., Siesling, S., & Kouwenhoven, E. A. (2023). Managed Clinical Network for esophageal cancer enables reduction of variation between hospitals trends in treatment strategies, lead time, and 2-year survival. *Eur J Surg Oncol*, *49*(1), 106-112. https://doi.org/10.1016/j.ejso.2022.07.022

Van Houdt, S., Heyrman, J., Vanhaecht, K., Sermeus, W., & De Lepeleire, J. (2013a). Care pathways across the primary-hospital care continuum: using the multi-level framework in explaining care coordination. *BMC Health Serv Res*, *13*, 296. https://doi.org/10.1186/1472-6963-13-296

Van Houdt, S., Heyrman, J., Vanhaecht, K., Sermeus, W., & De Lepeleire, J. (2013b). Care pathways to improve care co-ordination and quality between primary and hospital care for patients with radical prostatectomy: a quality improvement project. *Qual Prim Care*, *21*(3), 149-155.

Van Houdt, S., Heyrman, J., Vanhaecht, K., Sermeus, W., & De Lepeleire, J. (2013c). An in-depth analysis of theoretical frameworks for the study of care coordination. *Int J Integr Care*, *13*, e024. https://doi.org/10.5334/ijic.1068

Van Houdt, S., Sermeus, W., Vanhaecht, K., & De Lepeleire, J. (2014). Focus groups to explore healthcare professionals' experiences of care coordination: towards a theoretical framework for the study of care coordination. *BMC Fam Pract*, *15*, 177. https://doi.org/10.1186/s12875-014-0177-6

van Leeuwen, M. J. C., & Klomp, C. G. (2023). *Openbaar faillissementsverslag rechtspersoon (ex art. 73A Fw.), kenmerk 05_gel_23_432_F_V_02*.

Vanhaecht, K., De Witte, K., Depreitere, R., & Sermeus, W. (2006). Clinical pathway audit tools: a systematic review. *J Nurs Manag*, *14*(7), 529-537. https://doi.org/10.1111/j.1365-2934.2006.00705.x

Vanhaecht, K., Panella, M., van Zelm, R., & Sermeus, W. (2010). An overview on the history and concept of care pathways as complex interventions. *International Journal of Care Pathways*, *14*(3), 117-123. https://doi.org/10.1258/jicp.2010.010019

Verhoeven, D. C., Chollette, V., Lazzara, E. H., Shuffler, M. L., Osarogiagbon, R. U., & Weaver, S. J. (2021). The Anatomy and Physiology of Teaming in Cancer Care Delivery: A Conceptual Framework. *J Natl Cancer Inst*, *113*(4), 360-370. https://doi.org/10.1093/jnci/djaa166

Visserman, E. A., Gijsen, B. C. M., & Blaauwbroek, H. G. (2014). *Zorgstandaard Kanker*.

Wagner, J. A. (2023). Inter-team coordination in multiteam systems: Mechanisms, transitions, and precipitants. *Organizational Psychology Review*, *0*(0), 20413866231153537. https://doi.org/10.1177/20413866231153537

Weaver, S., Feitosa, J., Salas, E., Seddon, R., & Vozenilek, J. (2013). The science of teams: the theoretical drivers, models, and competencies of team performance for patient safety. *Improving patient safety through teamwork and team training*, 3-26.

Weaver, S. J., Che, X. X., Petersen, L. A., & Hysong, S. J. (2018). Unpacking Care Coordination Through a Multiteam System Lens: A Conceptual Framework and Systematic Review. *Med Care*, *56*(3), 247-259. https://doi.org/10.1097/mlr.0000000000000874

Weaver, S. J., & Jacobsen, P. B. (2018). Cancer care coordination: opportunities for healthcare delivery research. *Translational Behavioral Medicine*, *8*(3), 503-508. https://doi.org/10.1093/tbm/ibx079

XenForo. (2024). *Kennisplatform Digitale uitwisseling in de zorg*. https://digitaleuitwisseling.nl/

Zorgconcepten, E. (n.d.). *Egidiusnetwerken zijn koplopers. Ook in de toekomst.* https://egidiuszorgconcepten.nl/ambitie/

Zorginstituut Nederland. *Zorginzicht: Open data Medisch-specialistische zorg (MSZ) / Ziekenhuizen en Zelfstandige Behandelcentra*. Retrieved 27-02-2024 from https://www.zorginzicht.nl/openbare-data/open-data-medisch-specialistische-zorg-msz-ziekenhuizen-en-zelfstandige-behandelcentra#spiegelinformatie-msz-data-ski-tool

Zorginstituut Nederland. (2022a). *Kader passende zorg*.

Zorginstituut Nederland. (2022b). *Signalement Passende zorg voor mensen met kanker: netwerk- en expertzorg* Z. Nederland.

Zorginstituut Nederland. (2023a). *Passende zorg in oncologieregio's: plan van aanpak netwerk- en expertzorg voor mensen met kanker*

Zorginstituut Nederland. (2023b). *Plan van aanpak Netwerkvorming, concentratie en spreiding vaatchiruische zorg*

Appendix A: Rainbow model of integrated care

integrated care from a primary care perspective (Valentijn et al., 2013). The framework helps to create an understanding and interpretation of the interactions within integrated care. RMIC is considered one of the most comprehensive and validated models of integrated care and includes a corresponding measurement tool (Bautista et al., 2016; Valentijn et al., 2017; Valentijn et al., 2023). Although the focus is on the primary integrated care, this model could also be applied to the setting of RCPs by using the defined six dimensions of integration at three levels of the healthcare system (micro, meso, and macro level). The different levels of integration are needed to facilitate the continuous and coordinated delivery of services (Figure A.1).

System integration (macro level) uses a holistic approach requiring cross-sectoral collaboration crossing boundaries between organisations and different specialisations. System integration also includes the alignment of rules and policies within the system.

Organisational integration (meso level) concerns the delivery, production, and coordination of services across different organisations via inter-organisational relationships. Differences in bureaucratic structures, levels of expertise, funding mechanisms and regulations can make the organisational integration more complicated.

Professional integration (meso level) relates to partnerships between professionals within and between organisations. The relationships are often based on the collective responsibility and accountability to provide good quality care to the patient creating shared problem-solving and decision-making, but causing the traditional hierarchy and clear definition of roles to get blurred.

Clinical and service integration (micro level) refers to the coherence in the care delivery pathway of an individual patient across time, place and discipline including the coordination across the professional, institutional, and sectorial boundaries. Additionally, the concept of appropriate care should be considered by looking at the broader social health context besides a focus on the particular condition and enabling the patient to coordinate their needs.

In functional and normative integration, the previous three levels of integration are linked.

Functional integration refers to the coordination of support activities like financial, management and information systems to coordinate and support accountability and decision-making between organisations, professionals, and patients. This involves linking the different systems around the primary process of care delivery (Valentijn et al., 2013).

Normative integration links the different levels by providing a common frame of reference of mission, vision, (work) values and culture between organisations, professional groups and individuals within the system (Valentijn et al., 2013).

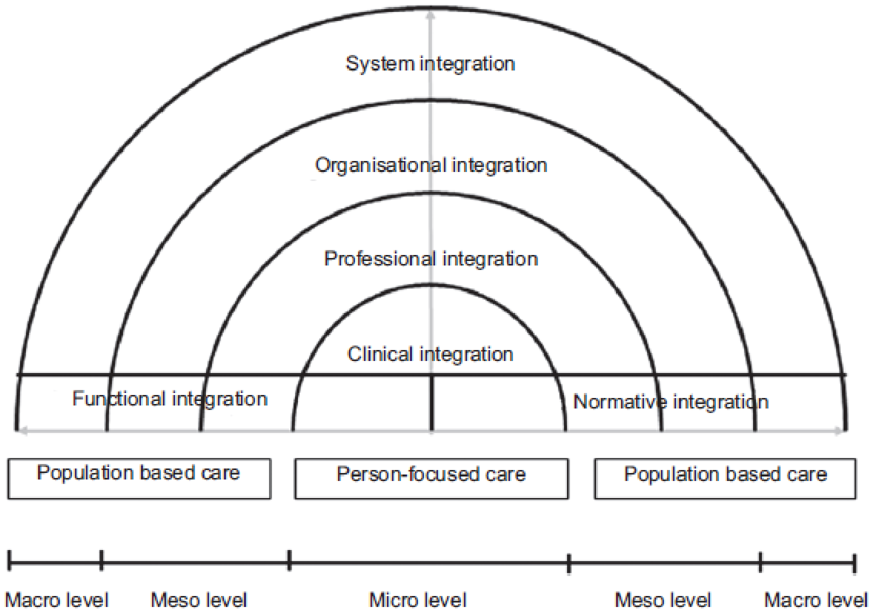


Figure A.1 Conceptual rainbow framework for integrated care, adapted from Valentijn et al. (2023).

Organisational and professional integration could be considered as one of the main differences between a care pathway and an RCP. For both types a continuum of integration ranging from segregation with autonomous organisations each functioning as an independent entity to full integration as mergers and acquisitions (Valentijn et al., 2013). The extent of integration is based on the duration of the commitment (by negotiations and assessing the outcomes of the collaboration) and the degree of autonomy and authority. In the middle of this continuum from segregation to integration, the state of network governance is defined, in which RCPs operate. The network types of arrangement are often difficult due to the tension between flexibility and commitment. They are mainly dependent upon relationships, reputation, and mutual interests with each organisation keeping its autonomy.

Appendix B: Overview of interview questions

The standardised questions set for both the healthcare professionals and patients are included in this appendix. For the interviews with academics, policymakers, or an expert within a certain subtheme of coordination (monitoring or information exchange) a personalised slightly different question set was drafted focused on their role in the regional oncology network and their views on how coordination in regional care pathways should be organised. Since these were interview-specific, they are not included in this appendix.

At the start of each interview, the aim of the interview was explained. The interview questions are in Dutch because all interviews were conducted in Dutch.

B.1 Interview questions for healthcare professionals or project coordinators in CCN

Introductie vragen

1) Kunt u wat vertellen over uw functie en dagelijkse taken?

Regionaal zorgpad

Definitie regionaal zorgpad: Ik definieer een regionaal zorgpad als een samenwerking tussen ziekenhuizen voor een bepaald zorgpad (bijvoorbeeld slokdarmkanker). De ziekenhuizen hebben afspraken gemaakt voor het zorgpad, waarbij een deel van de behandeling in een ander partnerziekenhuis plaatsvindt. Bijvoorbeeld elk ziekenhuis voert zelf de diagnostiek en geeft chemoradiatie voor en na een operatie, maar de operaties vinden gecentraliseerd in maar één van de ziekenhuizen plaats. Dit gaat dus verder dan een gezamenlijk MDO.

2) Kunt u zich in deze definitie vinden of heeft u nog aanvullingen?
3) Wat zijn volgens u de voor- en nadelen van een regionaal zorgpad?

Regionaal zorgpad in de situatie van de geïnterviewden

4) Hoe ziet het regionale zorgpad(en) er in jullie situatie uit?
5) Hoelang hebben jullie al een gezamenlijk regionaal zorgpad?
6) Waarom hebben jullie het zorgpad zo vormgegeven zoals het nu is?
7) Hoe bent u betrokken bij het regionale zorgpad? Wat zijn uw taken in het regionale zorgpad?
8) Wat zijn volgens u de gevaren/valkuilen bij regionale samenwerking van ziekenhuizen?
    a. Hoe gaat u met deze gevaren/valkuilen om?

Coördinatie en afstemming

Eerst wordt de definitie van coördinatie vastgesteld wat wordt gebruikt als een vertrekpunt voor de vragen. Aan de hand van deze definitie wordt de huidige situatie op het gebied van samenwerking en coördinatie besproken en de belangrijke kenmerken hiervan in regionale oncologie zorgpaden.

Definitie van coördinatie: Coördinatie in een regionaal zorgpad is de organisatie van de zorg voor een patiënt tussen twee of meer partners. Dit kan tussen de verschillende ziekenhuizen zijn, maar ook binnen een ziekenhuis. Coördinatie overbrugt hiaten tussen de verschillende zorgverleners/organisaties tijdens het zorgtraject van de patiënt. Coördinatie heeft o.a. te maken met personeel, informatie en andere middelen op elkaar afstemmen.

9) Sluit deze definitie aan bij waar coördinatie volgens u aan moet voldoen?
10) Hoe ziet de samenwerking in jullie zorgpad eruit?
11) Is er sprake van coördinatie in het zorgpad; en hoe is dit vormgegeven?
12) Wie coördineert de samenwerking in het regionale zorgpad? En is dit de meest geschikte persoon volgens u?
13) Op welke momenten in het proces is afstemming vereist?
14) Hoe houden jullie overzicht op alle afstemmingsmomenten?
15) Waar liggen uitdagingen/knelpunten in de coördinatie van het regionale zorgpad?
    a. Wat zou een geschikte oplossing zijn voor deze knelpunten?
    b. Hoe zou u deze knelpunten inzichtelijk kunnen maken?
16) Wat zijn succesfactoren voor goede coördinatie in een regionaal zorgpad?
    a. Hoe hebben jullie ervoor gezorgd dat deze succesfactoren zijn ingebed?
    b. Hoe kan kunnen deze succesfactoren inzichtelijk worden maken?
17) Hoe wordt coördinatie van een regionaal zorgpad in uw ideale wereld vormgeven?
18) Denkt u dat er verschillen zijn in coördinatie bij zorgpaden van verschillende ziektebeelden?
    a. En waar zitten deze verschillen in?
19) Is er weleens sprake geweest van een moment dat niet duidelijk is waar de patiënt zich in het zorgpad bevindt?
20) Is er wel eens onduidelijkheid over de stappen die moeten worden genomen in het regionale zorgpad?

Monitoring

Monitoring kan bijdragen om meer inzicht in het regionaal zorgpad te verkrijgen. Eén van de aspecten die belangrijk kan zijn voor een coördinatie is het monitoren van patiënten. Ook als de patiënt in een ander ziekenhuis wordt behandeld gedurende het zorgpad.

21) Welke uitkomstmaten/indicatoren kunnen worden gebruikt om het regionaal zorgpad te monitoren?
    a. En welke uitkomstmaten/indicatoren kunnen specifiek worden gebruikt voor de een van de aspecten van coördinatie in het regionale zorgpad?
        i. Bij geen respons voorbeelden geven zoals uniforme werkafspraken.
22) Denkt u dat het belangrijk is dit te monitoren en waarom?
23) Wat kan het monitoren van patiënten volgens u opleveren? Waarom?
24) Hoe hebben jullie nu monitoring van patiënten in het regionale zorgpad ingericht?
25) Wat zijn de verbeter/knelpunten in monitoring waar jullie nu tegenaan lopen?

Dashboard

26) Hoe zou een dashboard u ondersteunen in (de samenwerking in) het regionale zorgpad?
27) Waar zou u het dashboard voor willen gebruiken?
28) Wat wilt u in een dashboard van een regionaal zorgpad zien?

Afronding

1) Heeft u alles kunnen zeggen tijdens dit interview of wilt u nog iets toevoegen? Heeft u nog andere op- of aanmerkingen?

B.2 Interview questions for patients

Doel van het interview:

Ervaringen van patiënten over de huidige manier van samenwerken in regionale oncologie zorgpaden

- Wat gaat goed en moet behouden blijven.
- Waar lopen ze tegenaan en wat zouden ze anders willen zien. Hoe willen ze dat anders zien en wat denken zij dat er nodig is om dat te bereiken.

Vragen voor patiënten

Achtergrondinformatie over de patiënt: ziektebeeld, wanneer naar ander ziekenhuis gegaan, en hoelang geleden.

1) Hoe heeft u de begeleiding/afstemming rondom de overstap van het ene ziekenhuis naar het andere ziekenhuis ervaren?
2) Welke dingen verliepen volgens u goed en moeten behouden blijven?
3) Tegen welke dingen bent u aangelopen rondom de overgang van het ene ziekenhuis naar het andere ziekenhuis (en weer terug)?
    a) Welke dingen zou u liever anders zien of kunnen verbeterd worden?
    b) Wat denkt u dat er nodig is om deze veranderingen te bereiken?
4) Heeft u de overgang tussen de ziekenhuizen anders ervaren dan de overdracht tussen specialisten binnen hetzelfde ziekenhuis of met de fysiotherapeut of diëtiste in het ziekenhuis?

Eventuele extra vragen (bij voldoende tijd):

5) Heeft u onduidelijkheid ervaren tijdens de overgang van het ene ziekenhuis naar het andere ziekenhuis? Bijvoorbeeld: Was voor u duidelijk bij wie u met vragen moest zijn?
6) Heeft u verschillen (of juist overeenkomsten) tussen de ziekenhuizen ervaren die overstap voor u moeilijker (of makkelijker) maakten

Appendix C: Analysis of care coordination using the developed framework

This appendix outlines my analysis of the situation of care coordination within the case study area and generally in the Netherlands based on the care coordination framework.

CS = case study. GN = General in the Netherlands.

Multiteam system composition

GN: different specialists and their respective teams are involved in the patient care from diagnosis until follow-up. The teams working in the different hospitals are more dispersed than teams within the same hospital, making coordination across teams and organisations more challenging. The "silos" of the different hospitals and teams should be crossed to work collectively.

CS: RCP is organised for three hospitals and the radiotherapy group. Hospitals A and B have a longer relationship working together and hospital C joined in the summer of 2023. In the agreement between the hospitals, the participants and centres for surgery are determined. Links between the hospitals and moments for coordination are created at the level of the region by the tumour boards (meeting twice a year), and for individual patients the MDM structural links the different partners. The teams within hospital A are generally still organised per specialism instead of per care pathway. The oncology network is managed by a board that discusses ongoing matters and monitors the process of the network.

Assessing the volume norms for the case study hospital shows the norm for oesophagus cancer is met (34 operations in 2023), while for gastric cancer the case study hospital is structurally below the norm for the past years (12 operations in 2023). The CS hospital is already acting on these volume norms by joining a larger CCN.

Linkages between teams

GN: Teams of the collaborating hospitals often do not have relations before the start of the network collaboration. Therefore, it is important to create linkages between the individuals with a similar function in the different hospitals.

CS: Surgeons of hospitals A and B work together and perform the surgeries together. Hospital A plans to increase linkages between staff by collocating the administrative staff for oncological treatments in an oncological centre.

Alignment of organisational cultures/climates

GN: the collaborating hospitals often sign a declaration of intention to start collaborating and in a later stadium sign a collective agreement containing the shared goals of the network.

CS: Alignment of organisational climates is still growing by getting to know each other better and giving insights into each other's situation. The shared belief to deliver the best care for the patient is present in all three hospitals. However, the norms and values could be more aligned by aligning some working agreements even more. E.g. the way the patient can contact the hospital.

Alignment of organisational process and logistics

GN: The collective agreement and meetings with all hospitals allow alignment of the processes at the start of the collaboration.

CS: At the beginning, the processes around the MDM were aligned and problems in processes and logistics were solved within each hospital. Some alignment in the organisational process could still be optimised like the prehabilitation phase before surgery differing among the hospitals.

Governance & payment structures

GN: The network office facilitates improvement actions and balances stakeholders' interests between the hospitals. Within the network, tumour boards are organised per tumour type. Payment structure is determined by policy and insurers for which hospitals generally do not have a lot of power to change. Therefore, generally nationwide improvement actions are followed.

CS: Governance within the case study network seems similar to other regions having tumour boards meeting twice a year. In line with the SONCOS standards, an agreement is standardised on paper. Although the tumour-specific agreement could be elaborated on in more detail e.g. including the item of information transfer between the hospitals.

External factors

GN: No direct influence for hospitals is available on these factors generally; they are bounded by the regulations and current policies.

CS: The financial situation of the case study hospital might be considered as an external factor influencing the availability of resources like time, finances, and people for the network.

Characteristics of the task

GN: The care pathway for upper GI is standardised, but also shows some variability for specific patients. The professionals depend upon each other to complete their tasks and some tasks are complex and variable. Therefore, a higher degree of coordination is needed, and protocols alone are likely not sufficient.

CS: No specific observations.

Patient characteristics

GN: No specific observations.

CS: The interviewed patient was satisfied with the way the care pathway was explained and the guidance within the care pathway to understand the next steps.

Plans, rules, tools

GN: Many CCNs have created shared RCP protocols including the involved roles and their actions for each step within the care process often displayed in tables (Integraal kankercentrum Nederland, 2016).

CS: RCP protocols are not joined resulting in each hospital having its own protocols that should be changed and are therefore not always aligned. Some ambiguity in the defined roles and responsibilities of professionals is present both within and between the hospitals. Checklists of tasks are included within the protocol and partly within the EMR to guide individuals. The protocol also includes norms set by the hospital but does not include clearly which individuals should perform certain actions.

Regarding throughput times between diagnosis and treatment based on the DICA registrations, the median time of patients is around or below the median benchmark time in the Netherlands. Only for patients from another hospital with stomach cancer (3 patients) the median time was 63,5 days compared to the Dutch average of 53,5 days.

The DICA registration also shows the percentage of patients who were advised according to the guidelines to receive neo-adjuvant treatment. For oesophagus cancer all patients received the advised treatment, for gastric cancer the percentage is around 60% in line with the average in the Netherlands.

Objects, representations, artefacts, and information systems

GN: All CCNs are investigating opportunities for easier information and data exchange between the hospitals. No monitoring dashboards at the regional level exist.

CS: The case study hospital is investigating the opportunities of a transmural portal in HiX to have insights within each other's EMR system. This will likely reduce the number of times hospitals request the status of a patient from another hospital by email. Currently, multiple methods are used to track the process of the patients within the care pathway and keep an overview of the tasks, but these lack alarm signals.

Roles

GN: Roles are much related to the clear descriptions within the RCP protocols.

CS: The attending physician and point of contact are clearly stated within the agreements and protocols. In some specific situations, roles do not always seem to be clearly defined resulting in unclarity of who should complete a certain task. Some doubt whether the tasks should indeed be conducted by certain roles.

Routines

GN: CCNs have organised MDM to coordinate the care of patients. A guidance document is available for hospitals on how to organise the MDM. At the level of the network, the meetings with the network and tumour board serve this purpose.

CS: The MDM is scheduled weekly and there are agreements about who performs which steps for registration. The registrations are sent by email without a clear registration format. Routines of the professionals often include monitoring patients regularly by looking within their records. Some routines within the pathway might be improved to increase efficiency like the administrative staff waiting to plan certain appointments to ensure the patient does not see these.

Proximity

GN: Proximity is created by meeting in person and getting to know each other. The interviewed patients had the impression the professionals in different hospitals know each other well.

CS: Professionals try to meet regularly in person and plan on-site visits at the other hospitals. Some individuals think the contact could be more low-threshold via e.g. communication by phone instead of email.

Shared goals

GN: The standards describe the agreement of the collaboration should include the shared goals.

CS: The aim of the collaboration is formulated within the agreement reflecting the needs of the patient.

Knowledge

GN: no specific observation.

CS: Due to high turnover in personnel some knowledge is only known by one individual. The protocols are not capable of sharing all knowledge showing the importance of knowledge transfer between employees. More employees should know certain processes to become less dependent. Also, a lack of monitoring systems causes knowledge about patients not to be shared among healthcare professionals.

Accountability

GN: The protocol supports documenting accountability.

CS: Accountability is documented, however the mechanisms for holding individuals accountable when they do not complete their tasks might be better defined.

Predictability

GN: No specific observations

CS: No specific observations.

Common understanding

GN: No specific observations

CS: Generally, there is a common understanding of the task division. However, for some specific situations, it should be better outlined who performs which tasks.

Trust

GN: No specific observations.

CS: The situations in which ambiguity of roles or misunderstandings occur cause trust to decline. However, trust is also able to grow between professionals when actions are performed as expected or by enhancing proximity.

Need for coordination

GN: No specific observations.

CS: A different need for coordination might be perceived by the different individuals resulting in different working methods of individuals. For example, some individuals do send a message in certain situations while others do not. This might be caused by not everyone knowing why it is important to execute a specific action.

Boundary spanning

GN: Case managers often have the role of boundary spanners within CCNs. On the network level, the programme office of the network, generally, has the role of connecting the different hospitals and introducing improvement activities.

CS: Each hospital has case managers although the roles of the case managers differ slightly.

Information exchange

GN: All CCNs are investigating opportunities for easier information and data exchange between the hospitals.

CS: There are arrangements about the way information exchange takes place. Possibilities for looking into each other’s EMR system via HiX transmural portal are explored. Lack of closed-loop communication.

Collective problem-solving and decision-making

GN: Collective decision-making is facilitated during the MDM by discussing each patient and their treatment advice.

CS: No additional observations besides GN.

Negotiation

GN: No specific observations.

CS: No specific description for the case study hospital

Mutual adjustment

GN: No specific observations.

CS: Mutual adjustment does happen between the hospitals for example when a chemotherapy treatment is delayed, and the moment of surgery should be rescheduled.