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Implementing an Enhanced Recovery After Thoracic Surgery programme in the Netherlands: a qualitative study investigating facilitators and barriers for implementation.

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Abstract

Objectives:

This study aims to elucidate determinants for succesful implementation of the Enhanced Recovery After Thoracic Surgery (ERATS) protocol for perioperative care for surgical lung cancer patients in the Netherlands.

Setting:

Lung cancer operations are performed in both academic and regional hospitals, either by cardiothoracic or general thoracic surgeons. Limiting the impact of these operations by optimising and standardising perioperative care with the ERATS protocol is thought to enable reduction in length of stay, complications and costs.

Participants:

A broad spectrum of stakeholders (N=18) in perioperative care for lung resection patients participated in this study, ranging from patient representatives, healthcare professionals (HCPs) to an insurance company representative.

Interventions

Semi-structured interviews (N=14) were conducted with the stakeholders (N=18). The interviews were conducted one on one by telephone and twice, face to face, in small groups. Verbatim transcriptions of these interviews were coded for the purpose of thematic analysis.

Outcome measures:

Determinants for successful implementation of the ERATS protocol in the Netherlands.

Results:

Several determinants correspond with previous publications: having a multidisciplinary team, leadership from a senior clinician and support from an ERAS®-coordinator as facilitators; lack of feedback on performance and absence of management support as barriers. Our study underscores the potential detrimental effect of inconsistent communication, the lack of support in the transition from hospital to home and the barrier posed by lack of accessible audit data.

Conclusions:

Based on a structured problem analysis among a wide selection of stakeholders, this study provides a solid basis for choosing adequate implementation strategies for implementing the ERATS protocol in the Netherlands. Emphasis on consistent and sufficient communication, support in the transition from hospital to home and adequate audit and feedback data, in addition to established implementation strategies for ERAS®-type programmes, will enable a tailored approach to implementation of ERATS in the Dutch context.

Key words: Thoracic Surgery; Enhanced Recovery After Surgery; Implementation Science; Qualitative research; Facilitators and Barriers

STRENGTHS AND LIMITATIONS

- Strength: our research approach using semi-structured interviews with a wide range of stakeholders and subsequent thematic analysis to identify facilitators and barriers for successful implementation of the ERATS protocol, makes our approach transferable to other fields, countries and contexts.
- Strength: data triangulation; due to interviews with a wide range of stakeholders, we were able to obtain different perspectives on the Dutch situation.
- Limitation: the interviewers were both surgical HCPs; we tried to limit bias with the semi-structured nature of the interviews and the use of a predetermined topic list.
- Limitation: most of the interviewed stakeholders were health care professionals and patients; no board members and only one health insurance representative were interviewed, which might have biased the results. For this reason, socio-political factors, like reimbursement and costs, might have been underreported.

INTRODUCTION

Lung cancer has the highest incidence of cancer diagnoses and is the leading cause for cancer deaths worldwide.[1] The cornerstone of curative treatment of non-small cell lung cancer (NSCLC) is surgical resection; due to advanced stages at presentation or limited physical condition of the patients, this treatment can only be offered to approximately 20-25% of new NSCLC patients.[2] Anatomical lung resections, however, are associated with a considerable length of stay and postoperative complications that can contribute to significant morbidity.[3,4] Long-term outcome and disease free survival are worse in patients with major pulmonary complications.[3–5] In addition to these clinical outcomes, (pulmonary) complications affect patient-centred outcomes and health-care costs.[6]

In order to take full advantage of the curative potential of surgical treatment of NSCLC, focussing on optimal recovery after surgery is essential. Limiting the impact of operations by optimising and standardising perioperative care, as propagated by the Enhanced Recovery After Surgery (ERAS®) Society, has shown to reduce length of stay, complications and costs in several other surgical fields. Limited series of ERAS®-type programmes show promising results in lung resection patients.[7–11]

In absence of a Dutch clinical guideline on perioperative care in lung resection patients, practice variation exists for these patients.[12] This variation in perioperative care is associated with variation in clinical outcomes, for example length of stay and complications.[3,4] Due to the mandatory registration in the Dutch national lung surgery audit (DLCAs), reliable national data is available regarding the number of anatomical lung resections per year (over 2,200), length of stay (4-8 days) and complications (30%) in the Netherlands.[3,4]

Based on recent recommendations of the first guideline from the ERAS® Society and the European Society of Thoracic Surgeons (ESTS) concerning this patient group, a Dutch protocol was developed.[13] This protocol is aimed at optimisation and standardisation of perioperative care for lung resection patients, and, as a consequence, reduction of practice variation: the Enhanced recovery After Thoracic Surgery (ERATS) protocol.[13]

ERAS®-type programs rely applying a set of evidence-based care interventions perioperatively.[7] While individual components might not have a significant effect, the combination of these small improvements is thought to work synergistically.[14] Correlation between overall high compliance rates with ERAS®-type protocols and better outcomes support this notion.[10,15,16] However, successful and sustained implementation of a complex multidisciplinary perioperative care protocol to achieve high compliance is challenging.[17,18]

In order to implement the ERATS-protocol succesfully, implementation strategies need to be developed that tackle existing barriers and embrace facilitators. Since facilitators and barriers are dependant on context, it is important to examine them specific to type of care and the healthcare system for which the protocol is intended. Therefore, this study aims to elucidate the facilitators and barriers for succesful implementation of the ERATS protocol in the Netherlands. These insights can be used to develop tailored implementation strategies to support implementation in practice.

METHODS

In this qualitative study, semi-structured interviews were conducted with a broad spectrum of stakeholders in perioperative care for lung resection patients.

Participants

We purposively recruited the following stakeholders in perioperative care for lung resection patients: patient representatives, healthcare professionals (HCPs), healthcare managers at departmental level, data managers, a representative of an electronic medical record (EMR) company and a representative of a healthcare insurance company. The subjects were selected in consultation with the patient advocacy group Longkanker Nederland (Lung Cancer the Netherlands) and the multidisciplinary ERATS working group of the Dutch Society for Lung Surgery (NVvL). As the majority of lung resections in the Netherlands is performed in larger, non-academic teaching hospitals by general thoracic surgeons, the HCP subjects were mostly recruited from such teaching hospitals. HCPs from academic medical centres, a regional hospital and a cardiothoracic surgeon were interviewed to broaden the perspective.

Patient and Public Involvement

Longkanker Nederland, has been involved in the ERATS project, prior to this problem analysis and the director (LB) participates in this study as an author. They have participated in the development of the ERATS-protocol and the design of the ERATS Trial that will follow this problem analysis. The subjects, including 2 patients and a Longkanker Nederland representative, were selected in consultation with Longkanker Nederland. All participants will receive a copy of the article, when published.

The ERATS programme

Like all ERAS®-type programmes, ERATS consists of a combination of evidence-based care interventions that are thought to work synergistically.[7,8] As an illustration: ERATS relies on preparing patients preoperatively, by giving detailed information about what to expect regarding the operation and recovery period, by limiting the fasting time and by avoiding prolonged recovery from anaesthesia by limiting use of anxiolytic medication. During the operation, hypothermia is avoided, medication is given against pain and nausea. Opioids are used as sparingly as possible to avoid side effects. Postoperatively, patients will be stimulated to mobilise and resume a normal diet early: to sit in a chair and have a normal meal on the day of operation; chest tubes, urinary catheters, IV lines, epidural catheters, etcetera are avoided as much as possible or removed as early as possible, based on clear, protocolled instructions. The combination of interventions is expected to lead to a reduction in length of stay, complications, readmissions and cost.[10,19]

Interview content/procedure

A topic guide, based on the model of Fleuren et al., served as the framework for the semi-structured interviews.[20,21] [supplementary table 1] This model describes determinants of innovation that influence the adoption, implementation and maintenance of an innovation within the healthcare sector. It recognises four different categories: the determinants related to the innovation itself, factors concerning

the users/health care professional (HCP), determinants regarding the organisation, and the socio-political context.[20] Depending on the role of the subject, different aspects of the topic guide were explored more or less extensively. When no new insights were discovered in the last 3 interviews, it was considered that sampling saturation was reached.

Process

During a 3-month period (October- December 2019), the first author (EvM) conducted 14 interviews, with occasional assistance of CdB. EvM is a general thoracic surgeon, working in a teaching hospital and lead of the national ERATS implementation effort; CdB is a resident in general surgery. Two interviews were conducted as a face-to-face group interview, the remaining 12 were conducted one-to-one, mostly by telephone. Audio was recorded from all interviews and additional notes were taken during the sessions.

Analysis

With verbatim transcription of the recordings, two of the authors (EvM and FvN) created a consensus based codebook [Supplementary table 2], by analysing two interviews independently.[22] This codebook was used to code all interviews in ATLAS.ti 8 [ATLAS.ti Scientific Software Development GmbH, Berlin, Germany]. Next, the codes were sorted and grouped together into different themes, following a thematic analysis by two of the authors (EvM and FvN).[23] To detect patterns in responses as well as for data triangulation, data was organised according to subject group as well: patient representatives, nurses, case manager, physicians, management/supportive within hospital, supportive outside hospital (Insurance/EMR).[24] The most relevant and illustrative quotes were selected after discussion among the research team.

Ethics

All subjects received study information for participants in writing, informing them of their right to withdraw their cooperation without explanation. Confidentiality was secured by limiting access to the transcripts and data to 2 of the authors (EvM and FvN), erasing recordings of the interviews after transcription and erasing identifying information from the transcripts. All participants signed an informed consent form prior to the interview. The Medical Ethics Review Committee of VU University Medical Center deemed the Medical Research Involving Human Subjects Act (WMO) not applicable and confirmed that an official approval by the committee was not required (MERC ref. 2019.488).

RESULTS

In total, 14 interviews were conducted with the stakeholders as summarized in Table 1. The healthcare managers we interviewed represented a quality improvement department, a hospital's oncology centre and a clinical surgical department. Interviews lasted on average 43 minutes (range 25-68 minutes).

The identified determinants, both facilitators and barriers, were organised thematically into five themes involving implementation of the ERATS programme. Each of the themes was divided in sub-themes, as is described in Table 2.

Theme 1: Communication HCP-Patient

This theme relates to all communication between HCPs and patients, and how this can affect implementation.

Consistent and sufficient information flow

Many stakeholders, the patient representatives, nurses and case manager in particular, mentioned providing patients with sufficient and consistent information as an important factor for ERATS implementation. *"everything was clear and every question was answered, often before the question was even asked. They knew what you would experience every day. That gives confidence" (Patient 2)*. Receiving information that was consistent with information from other HCPs was deemed an important facilitator as well. *"You want to avoid that everybody is saying something different" (Surgeon 1)*. The other side, inconsistency or lack of information as a barrier creating confusion rather than confidence, was only mentioned by patient representatives, nurses and case manager. *"… [I heard] two different takes on the same situation, with two physicians disagreeing as far as I could tell from a patient's perspective. So, I told them that that had been very upsetting and had made me anxious." (Patient 2)*.

Support in the transition hospital-home

Patient representatives as well as HCPs mentioned the presence of a case manager as a facilitator. This was mentioned explicitly in the context of the transition from hospital care to further recovery at home. Again, while many HCPs appreciated the presence of a case manager, the potential downside of the lack of a case manager in post-discharge care only was mentioned by those closest to the patients: patient representatives, nurses and the case manager.

Use of patient feedback

Different forms of patient feedback, as contributor to quality improvement, were mentioned, ranging from formalised lists of Patient Reported Outcome Measures (PROMs) to the ability to speak to an HCP about personal experiences. "*It helps to be able to share your experience[…] I'm not one to start a formal complaints procedure; I just want to tell someone what went wrong and hope a next patient will not have the same experience again." (Patient 1)*. Using this feedback was considered to be a facilitator for implementing change in perioperative care at the patient level, as well as at management and the

insurance company level. *"…getting a wider spread of knowledge among patients. The best thing is when patients themselves start asking for what they want and how they want their care to be provided. Stimulating this is a role we have fulfil…". (insurance company representative)*

Theme 2: HCP professional competencies and experience

This theme encompasses the competencies of individual HCPs, both regarding HCPs' medical expertise as well as HCPs' communicator skills regarding accessibility and empathy.[25]

Different competencies and experience of a multidisciplinary team of HCPs

HCPs having the medical expertise to deliver the necessary care within their role was mentioned as an important facilitator in protocol implementation, and sometimes the lack of expertise was mentioned as a barrier. *"… often they, one more than the other, will dig their heels in. It will also depend on the training level [of the nursing staff] […] I have found that having a good team on the nursing ward is essential for patient wellbeing.] (Patient 1)*. Participation of HCPs with many years of experience was judged to enhance protocol implementation by being able to tailor the generic protocol to individual needs within a certain bandwidth.

Accessibility and empathy of HCP

Accessibility and HPC's empathy -or the lack thereof- were mentioned as facilitators and barriers respectively. However, not all HCPs were automatically expected to be able to provide these qualities all the time, as long as all needs were met by the team as a whole. *"… it would have been nice if he [physician] would have been more empathetic; sometimes he tries to be and I crack up laughing, thinking " Oh, it's so silly what you're saying now", but I like him and I can take it. My emotional issues I share with the oncology nurse." (Patient 1)*.

Coordination between HCPs

Good quality handovers and coordination between HCPs lead to a consistent treatment plan. The experience of being treated by one team with one clear plan is expected, but when this coordination among HCPs is lacking it is deemed a barrier for implementation.

Theme 3: Patient factors

The third theme concerns the baseline physical and psychological condition of the patient before surgery, as well as the social context of the patient; these can be both facilitators and barriers. The factors mentioned within this theme, were predominately put forward by the patient representatives.

Patient autonomy

Patient autonomy was mentioned by patients as well as several HCPs as a tool in perioperative care; respecting patients' autonomy in making the decision to undergo surgery was mentioned as an example of how to achieve motivation for the perioperative care programme. Providing patients with information about preoperative preparation and sharing responsibility for optimisation of physical condition can

contribute to empowerment to make decisions and was deemed another factor that influences implementation.

Situation at home

When the home situation does not allow for early discharge after surgery, or no measures can be taken to improve home situation, this poses a potential barrier, influencing the willingness of a patient to actively participate. Young parents, having to take care of their infants and patients with a partner with special needs were mentioned as an example, as well as older patients. *"The feeling of being discharged from hospital before they were ready. That is not good, obviously. That stings." (Pulmonary Physician 2)*.

Physical condition and age

While age was mentioned by some, the physical condition was mentioned by surgeons and patient representatives alike. Since patients, considered for lung resections, already are screened for the physical ability to undergo such a resection, the comments mostly referred to the physical ability after surgery or limitations in daily life. *"…the fitter you are, going into an operation, the easier your revovery will be." (Patient 2)*. Physical condition and age however, can influence the expectations of the healthcare professionals, as well as the expectations of the patients regarding their ability to adhere to the ERATS protocol.

Theme 4: Factors influencing change in perioperative care delivery

In order to implement the ERATS-protocol, HCP's have to be able to change the way they work. The facilitators and barriers that were mentioned mainly concern determinants at the HCP's team level, but also organisational factors associated with the change process.

Support for change

Implementation of ERATS cannot be achieved by HCPs alone; support from management is essential to adopt a multidisciplinary protocol. At management and insurance company level, socio-economic factors will come into play, where the benefits at the level of individual patients should also translate into cost-effectiveness. "*… the patient is number one, quality of medical care is two and cost is three. Those are the three pillars of our "sensible care" programme […] a protocol like the one you have developed [ERATS] follows these pillars seamlessly." (*Insurance representative).

Teamwork

Having a multidisciplinary team that works according to the same protocol was generally considered a facilitator for ERATS implementation, generating support for individual HCPs to follow ERATS. Previous negative experiences by individual HCPs with early discharge or perceived contraindications for ERATS, like advanced age, can limit the willingness to implement ERATS. *"Yes, in theory everybody [HCP] can know what is expected of them, but this "you've had a big operation, so take it easy for another day"-approach to patients will keep emerging. So old habbits and old emotions." (Pulmonary Physician 2)*.

The perceived benefits of ERATS and the team effort to achieve multidisciplinary improvement in care were mentioned as facilitator. Another facilitator mentioned was having a clear implementation plan, aided with training sessions, educational materials for both HCPs and patients, so all HCPs know when ERATS has started.

Available time for HCPs

Workload was mentioned as a barrier by several HCPs. Not having time to gather the ERATS team and discuss implementation is one factor, perceived extra work by ward nurses or physiotherapists in delivering ERATS another. "*Everybody is so busy; nobody has time to sit down and discuss topics like this [ERATS]". (Surgeon 2)*.

The realisation of the expected benefits of following the ERATS protocol, like reduction of complications, regarding workload can act as a facilitator as well: *"when a patient catches pneumonia, it will mean a lot more work [for the nurses] […], than just helping them mobilise early." (Quality improvement officer)*.

Receiving support by colleagues, leadership and management, declaring ERATS implementation a priority and providing logistic and administrative support was mentioned as a facilitator. Even though insurance companies do not want to get involved in specific medical decisions, they can act as a facilitator by supporting quality improvement projects like ERATS implementation in their contract negotiations.

Data collection and feedback

Insight into the effects of ERATS helps to inform patients about what to expect after an anatomical lung resection. And in turn, it also aids implementation by helping HCPs understand the consequences of their actions. *"We never look at 30-day outcome data, we're quite bad at that. We really are focused on short term effects.[…] We have difficulty understanding the influence of all our actions in the operating theatre on the 30-day outcome." (Anesthesiologist 2)*.

The work necessary for data extraction from EMRs, data processing and structured feedback sessions poses a significant barrier. While EMR companies are working on better data extraction capabilities, for now, lack of automated data extraction is deemed a barrier.

Theme 5: Usability of the ERATS protocol

While all interviewees agreed on knowledge of the protocol by the HCPs as a facilitator, the HCPs also acknowledged the potential barriers created in case of a voluminous, unclear and/or inconsistent protocol.

Concise multidisciplinary protocol

Clear instructions on procedures and guidelines were mentioned by all interviewees.Having one multidisciplinary protocol was mentioned as a facilitator in eliminating different styles of different HCPs and therefore a facilitator in adopting ERATS. Specifically, standardised, rather than physician

dependent, use of minimally invasive surgical techniques and clear step by step instructions regarding pain management, were mentioned specifically as determinants of successful implementation.

Clear goals

Another sub-theme touched on the effect of having clear recovery goals to work towards by following the protocol. By informing patients and HCPs about these goals, they can be engaged to help achieve them. In contrast, sending mixed signals, due to lack of clarity of the goals of the protocol, was deemed a barrier.

Flexibility

While many of the responses mentioned the benefits of a clear and concise protocol, flexibility to deviate from the protocol was mentioned as a facilitator as well. Being able to tailor the protocol to specific needs of specific patients was mentioned as a factor to achieve acceptance and implementation of ERATS, noting that ERATS should be a method and not a goal in itself. *" I think it's a perfect plan [ERATS] and I think a lot of it is very good, as long as there is room for exceptions." (Patient 1).*

Clear logistics

The ERATS protocol is thought to provide guidance and enhance the logistic preoperative processes, while keeping time to surgery to a minimum. Postoperatively, well prepared patients are expected to be able to adhere to the clear daily goals, resulting in a predictable postoperative period.

DISCUSSION

Our qualitative study identified facilitators and barriers for successful implementation of the ERATS protocol in the Netherlands, which were organised, through thematical analysis, into 5 themes. Most facilitators and barriers correspond with previous publications; most notably the necessity of a multidisciplinary team, with leadership from a senior clinician and support of an ERAS®-coordinator as facilitators; lack of feedback on performance and absence of management support as barriers.[17,18] Our study put emphasis on the potential detrimental effect of inconsistent communication, the lack of support in the transition from hospital to home and the barrier posed by lack of accessible audit data. The main references for our findings are the consensus statement on training and implementation published by the ERAS® Society and a systematic review of barriers to and facilitators of implementing enhanced recovery pathways, which was based on the Consolidated Framework for Implementation Research (CFIR).[17,18, 26]

The first theme, concerning communication between HCPs and patients, was very prominent in our interviews. In contrast to the accepted facilitator of consistent and sufficient communication, patient representatives in our study also stressed the potential barrier posed by poor or inconsistent information regarding ERATS. [17,18] The same pattern was observed regarding support in the transition hospital to home, which was viewed as a facilitator by all; the lack of support in this transition was reported as a barrier by those having to compensate for its absence: patients, their representatives and nurses. The importance of extending support beyond the hospital walls, has been described previously, but does not feature in the consensus statement nor the systematic review.[17,18,27] Our finding and the omission in both publications suggests a possible blind spot for HCPs regarding continuation of care after discharge. Empowering patients in preparation for discharge, as well as active post discharge surveillance has been shown to reduce ER visits and readmissions in ERAS patients.[28,29]

Support by management and department leadership was mentioned as essential facilitator for change in our study and is unequivocally supported by literature.[17,18] Lack of easily accessible audit and feedback data, to regularly evaluate ERATS implementation as well as patient experiences, was emphasised as a barrier; being able to show consequences of certain actions to HCP's, to provide patients with real data on what to expect and to justify investments in time and resourses to management and insurance companies, was stressed to be a key facilitator.

Having a clear and concise multidisciplinary ERATS protocol used across different specialties was thought to aid consistent execution by all involved.[18,27] High levels of protocol adherence are important to achieve the intended benefits for the patients.[10,15,16] This is, however, at odds with the call for some flexibility by some of our interviewees and in the previously mentioned patients as partners-study.[27] When individualised information or care for specific needs of a patient can be provided, high protocol adherence can still be achieved in a satisfactory manner for the patient.

Application/generalizability: Implications for practice & research

In addition to the suggestions from the ERAS® Society consensus statement and the systematic review, several other implementation strategies can be selected.[17,18] Even though there is no undisputed way to select implementation strategies, projects like the Expert Recommendations for Implementing Change

(ERIC) project have created a set of well defined implementation strategies for (CFIR)-based contextual barriers that can be deployed.[30,31]

The main take-aways from our study are that implementation strategies for ERATS in the Netherlands should put emphasis on communication between HCPs and patients supported by educational materials, preparing patients, as well as family members, to be active participants. Special provisions should be made to extend ERATS care beyond hospital wards, especially after discharge. Additional strategies should include optimisation of data collection, analysis and feedback to the ERATS Teams to regularly evaluate ERATS implementation data as well as patient experiences. Early measurable effects from implementation will motivate ERATS Teams during implementation and regular standardised evaluation of feedback data is thought to help continuous quality improvement.[32,33] Providing IT support and adequate data management will also provide data to justify the resources deployed for ERATS implementation.[34] The specific attention to these determinants will help tailor implementation strategies to the Dutch situation.

Strengths & limitations

One strength of our study is data triangulation; using a wide range of stakeholders, we were able to obtain different perspectives on the Dutch situation. By definition of qualitative research is not generisable, in addition the results of our analysis are specific to the Dutch socio-political context. Yet, the research approach with semi-structured interviews and thematic analysis, makes this approach transferable to other fields, countries and contexts.

Another limitation is that the interviewers were both surgical HCPs; we tried to limit bias with the semi-structured nature of the interviews and the use of a predetermined topic list. Most of the interviewed stakeholders were health care professionals and patients; no board members and only one health insurance representative were interviewed, which might have biased the results. For this reason, socio-political factors, like reimbursement and costs, might have been underreported.

Conclusion

Based on a structured problem analysis among a wide selection of stakeholders, this study identified specific facilitators and barriers for implementing the ERATS protocol in the Netherlands. Based on our study, emphasis on consistent and sufficient communication, support in the transition from hospital to home and adequate audit and feedback data, in addition to known general guidelines on implementing ERAS®-type programmes, will enable a tailored approach to implementation of ERATS in the Dutch context.

CONFLICT OF INTEREST

Dr. von Meyenfeldt reports grants from Johnson&Johnson, outside the submitted work.

Dr. Barberio, in her capacity as director of Longkanker Nederland, reports subsidies from KWF kankerbestrijding and PGO subsidie, grants from Abbvie, grants from AMGEN, grants from Astra Zeneca, grants from Boehringer Ingelheim, grants from BM-S, grants from Janssen-Cilag, grants from MSD, grants from Novartis, grants from Pfizer, grants from Roche, grants from Takeda; all outside the submitted work.

Prof. Anema reports grants from Various, grants from Various, grants from Pfizer & ZonMw, personal grant from Dutch Social Security Agency, personal fees from Various and personal fees from Evalua LtD, outside the submitted work; and he was an invited co-opted member of the guideline development group for the Dutch Occupational Medicine guideline for low back pain and the Dutch national Insurance Medicine protocol for Lumbosacral syndrome. He is appointed in 2016 as president of the Work disability Prevention and Integration committee of the International Commission on Occupational Health (ICOH).

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The original data is available form the corresponding author, within the limits of the signed informed consent from the contributors. The interview guide and code book are available as supplementary material.

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571 **Table 1: Subject characteristics (N=18)**

Characteristics	N
Gender	
• Male	8
• Female	10
Age	
• 20-29	1
• 30-39	8
• 40-49	3
• 50-59	4
• >60	2
Occupation	
• General thoracic surgeon	2
• Cardiothoracic surgeon	1
• Anaesthesiologist	2
• Pulmonary physician	2
• Nurse	2
• Case manager	1
• Healthcare manager	3
• Patient representative	3
• Electronic Medical Record specialist	1
• Health insurance company representative	1
Years active in current role	
• 0-2	8
• 3-5	3
• 5-10	2
• >10	5
Organisation type of healthcare professionals/healthcare managers	N= 13
• Academic Medical Centre	2
• Teaching Hospital	10
• Regional hospital	1

Table 2: Thematical organisation of identified determinants for implementation of the Enhanced Recovery After Thoracic Surgery (ERATS) protocol in the Netherlands.

Theme	Sub theme
Communication HCP-Patient	• Consistent information • Liaison in the transition hospital-home • Use of patient experiences
HCP professional competencies and experience	• Different competencies and experience of a multidisciplinary team of HCPs • Accessibility and empathy of HCP • Coordination between HCP's/hospitals
Patient factors	• Patient autonomy • Situation at home • Physical condition and age
Factors influencing change in perioperative care delivery	• Support for change • Teamwork • Available time for HCPs • Data gathering and feedback
Usability of the ERATS protocol	• Concise multidisciplinary protocol • Clear goals • Flexibility • Clear logistics

Topic guide interview ERATS

Introduction

The care for the more than 2,200 patients who undergo a lung resection every year in the Netherlands varies greatly and also has clinically important effects on outcomes, such as admission duration, complications, perceived quality of care and costs. Based on a recently published international guideline, a Dutch multidisciplinary working group, in collaboration with the patient organization, has developed a care protocol. Through optimization and standardization of care, this Enhanced Recovery After Thoracic Surgery (ERATS) protocol aims to help patients recover faster from lung resection, with less risk of complications and readmissions, and with an increased perceived quality of care.

In this protocol, among many other things, describes the patient information process and physical preparation before the lung resection. Perioperative methods of pain relief, rules for the removal of drains and early mobilization of patients are described in detail.

However, implementing such a protocol sometimes proves difficult. That is why we would like to talk to you in the context of an interview study, to find out which things could possibly help or hinder the input of research results. Both patients and professionals will participate in this study. The results will be published in a scientific article.

The interview will last a maximum of one hour.

Before we start the interview, I would like to ask you to sign a consent form. By signing this form you consent to participate in the study, that this conversation will be recorded and typed out later and that we may also use the information you provide today for research into the implementation of ERATS. *<have permission form signed>*

Now,I will turn on the audio recorder and we can start. *<turn on recorder>*

Demographic characteristics

[prior to the interview, the researcher fills in details where possible and checks these during the interview together with the interviewee] To start with, I would like to ask some general questions about your position (if any items have not yet been completed).

What is your age?	Years:
What is your gender?	
Where do you work/what organisation do you work for?	
What is your job description?	
How many years have you worked in your current position?	Years:

INTERVIEW TOPICS Stakeholders

Based on of Measuring Instrument for Determinants of Innovations (MIDI) TNO 2012; based on Fleuren MAH et al. Int J Qual Heal Care. 2014; 26 (5): 501-510.

DOMAIN: Current method (MIDI; Determinant 5),

- How many anatomical lung resections does your hospital perform per year?
- What does the current perioperative care for lung sections look like at the moment?
- In your experience, what are the most important parts of good perioperative care in pulmonary resections?
- Which factors play a role in your choice of the current approach? What are the considerations for this? This includes the type of patient (age, gender, etc.), preference for patient treatment, advantages and disadvantages of approaches, doctor's knowledge and experience, etc.
- Which other professionals are involved in this?
- What advantages do you have as a doctor with the current working method?

  Prompts:

  - time savings
  - shift workload
  - cost savings, etc.

- Are standard data currently registered to monitor your working method? What data do you collect? How does the registration work? How is this perceived?

- Are there other factors at the organizational level, ie within the hospital / or your department, that play a role in the choice of this method?

  prompts:

  - policy
  - support / support by colleagues in the same discipline or other discipline
  - support / support by supervisor / higher management
  - cooperation between other departments
  - finances, etc.

- Are there other factors in the broader context that influence?

  prompts:

  - reimbursement from health insurer, etc.).

DOMAIN: Implementation ERATS

Oral explanation ERATS.

- Do you expect added value from the implementation of ERATS?

  Prompts:

  - Is ERATS right for your patients? (MIDI D7)
  - Will Patients generally be satisfied with the implementation of ERATS? (MIDI D11)
  - To what extent does ERATS offer you a personal advantage / disadvantage? (MIDI D8)
  - Is it important for you to gain profit in LOS, complications, readmissions and patient satisfaction with ERATS? Is that likely to work? MIDI D9)

- Which things in your current working method / procedures need to be changed to implement ERATS? (MIDI D5)

- What is necessary for a good implementation? What can support implementation?

  Prompts:

  - What are the requirements for implementation plan (MIDI D1, clear, D3 complete)
  - What are the requirements for the substantiation of ERATS (MIDI D2)
  - Have sufficient knowledge to use ERATS (MIDI D17, D18)
  - Is there a coordinator for ERATS implementation available in your organization (MIDI D25)

- Will patients generally cooperate if ERATS is implemented? (MIDI D12)
- Which professionals / other departments should be involved in this? And what is needed for this?

  Prompts:

  - Adequate support from colleagues (MIDI D13)
  - Will all colleagues work according to ERATS? (MIDI D14)
  - In addition to the introduction of ERATS, are there any other changes that you are currently or will soon be dealing with? (MIDI 26)

- How does the decision-making process for these types of innovations proceed: central (top management) or decentralized (professionals)?

  Prompts:

  - Has there been formal support from management for ERATS implementation? (MIDI D19)
  - Are there enough personnel to implement ERATS? (MIDI D21)
  - Do you have enough time to integrate ERATS into your daily work? (MIDI D23)
  - Do you have sufficient resources (folders / website)

- Are there conflicting goals between different professional groups? If a professional group does not want to work in accordance with ERATS, are there financial consequences? For example, professional groups benefit from longer admission / or more invasive treatments (ICU? Anesthesia?).

- How do you think we can best fit ERATS into daily practice? What is needed for incorporation into daily practice?

Prompts:

  - Do you consider it part of your task to follow ERATS? (MIDI D10)
  - Do you think you can manage your ERATS tasks? (MIDI D16)
  - What information do you need to be able to implement ERATS properly? (MIDI D27)
  - Who expects you to work according to ERATS? (MIDI D15)
  - Whose opinion is important to you (MIDI D15)
  - What is the role of feedback on the results achieved with ERATS? What data do you need? How should this data be collected? (MIDI D6)
  - What is the role of feedback on the progress of ERATS implementation in your organization? (MIDI D28)

CLOSING

This was my last question. Are there any other things that we have not discussed that you think are relevant to this project?

  - Are there any other colleagues or stakeholders that you think could be helpful if we speak to them?

Thank you! *<turn off audio recorder>*

Codebook Barriers and facilitators related to implementation of ERATS

Domain	Code	Code in Atlas.ti	Description of the code
SUGGESTIONS FOR IMPROVEMENT	Suggestions for improvement	Suggestions for improvement F Facilitator B Barrier	This is a field in which we collect all suggestions for improvement, such as improvement for the program or components thereof, the organization, personnel, etc.
1 Broader Context	**Any factor that relates to the broader context in which lung surgery is performed in the Netherlands**		
1 Broader Context	1.1 Communication between Hospitals/HCPs	Communication HCPs F Communication HCPs B	• Everything mentioned with regard to communication between hospitals / HealthCare Professionals (HCPs) • MDO's
1 Broader Context	1.2		
1 Broader Context	1.3		
1 Broader Context	1.4		
2 Patient Factors	**Any factors that relate to the needs, preferences, or behaviour of patients regarding ERATS**		
2 Patient Factors	2.1 Informing patients	Informing patients F Informing patients B	• Various media information (movies / website / folder) • Clear information • Illiteracy • Realistic information • Consistent information HCP team • Managing expectations
2 Patient Factors	2.2 Autonomy patients	Autonomy patients F Autonomy patients B	Everything that is mentioned with regard to the autonomy of the patient

2 Patient Factors	2.3 Situation at home	Home situation F Home situation B	• Anything mentioned with regard to the patient's home situation • Having insight into the home situation
2 Patient Factors	2.4 Age patients	Age patients F Age patients B	Everything that is mentioned regarding the age of the patient
2 Patient Factors	2.5 Physical condition patients	Condition patients F Condition patients B	• Be fit for surgery • Fit is more important than age • Getting fit after surgery
3 Team Factors	**Any factors that relate to the Team delivering ERATS, especially the ability to deliver a care programme as one team, with one message and consistent information**		
3 Team Factors	3.1 inconsistent information team	Inconsistent info team B	• Everyone has their own ways • Colleague tells something different / varying stories
3 Team Factors	3.2 Case manager	Case manager F	• 1 point of contact for the patient • 1 point of contact for the organization • Central organizer/manager
3 Team Factors	3.3 Handover/consultation HCPs	Handover HCPs F Handover HCPs B	• Inadequate referral to pain team • Presence of cross-team consultation • Good handovers between HCPs • Short lines between HCPs • Good cooperation with anesthesiology department • Explanation of the process by lung specialist
3 Team Factors	3.4 contact post-discharge	Post-discharge contact F Post-discharge contact B	• Active: receiving a call after discharge • Passive: having a telephone number to call after discharge
3 Team Factors	3.5 Quality HCPs	Quality HCP F Quality HCP B	• Stricter guidence by physiotherapist • Clear appointments with physiotherapist • Strict and clear guidence by nurses
3 Team Factors	3.6 Work pressure Ward	Work pressure ward B	• Overburdened nurses/limited time

3 Team Factors	3.7 Wilingness to change	Willingness to change F Willingness to change B	• Rigidity by ward personnel • Being early adopters • Initiative for change with the surgeons
3 Team Factors	3.8 Support team leaders	Support team keader F Support team leader B	
3 Team Factors	3.9 Use of patient experiences	Use patient experiences F Use patient experiences B	• Person to share personal experiences with at time of discharge • Periodic reflective conversations with team and former patients
4 Protocol Factors	**Any factors that relate to the ERATS protocol, its materials, evidence for the program.**		
4 Protocol Factors	4.1 concise protocol	concise protocol F concise protocol B	• The old protocol is very extensive
4 Protocol Factors	4.2 Flexibility within bandwidth	Flexibility within bandwidth F Flexibility within bandwidth B	• Prior arrangements with anaesthesiology • Room for flexibility within the protocol • Possibility to personalise treatment within constraints of the protocol • Protocol = basis; individualising is a possibility.
4 Protocol Factors	4.3 Logistics time MDT-operation	Logistics time MDT-operation F Logistics time MDT-operation B	• Limited time for preparation by physiotherapist/dietician • Rigid guideline regarding time between MDT-Operation • Limited time between intake-operation
4 Protocol Factors	4.4 knowedge of the protocol by HCP	knowedge of the protocol by HCP F knowedge of the protocol by HCP B	• Not all HCPs know the perioperative protocol.
4 Protocol Factors	4.5 Variation protocols/old protocols	Variation protocols/old protocols F Variation protocols/old protocols B	• Old situation: every speciality has their own protocol
4 Protocol Factors	4.6 Minimally invasive surgical technique	Minimally invasive surgical technique F Minimally invasive surgical technique B	• Strive for a minimally invasive technique

4 Protocol Factors	4.7 Protocol discharge criteria clear	Protocol discharge criteria clear F	• Electronic chest drain systems are sometimes hard to interpret • Pain and airleak are important factors for LOS • Clear discharge criteria • Data electroic drain system as input for clinical decisions
4 Protocol Factors	4.8 Protocol pain management clear	Protocol pain management clear F	• Pain management without catheters • Urinar catheter/epidural limit mobilisation • Variety of methods in pain management • Pain immediatly postoperatively • Pain and nausea limit recovery
4 Protocol Factors	4.9 Limited support Transfer hospital - home	Limited support Transfer hospital - home B	• Preparing for the influence of the operation on the situation at home • Uncertainty regarding breathing after discharge • Availability support in transition hospital-home • Support from social services
5 Hospital Factors	**Any factors that relate to the abilities and organisation of the hospital that influence the implementation of ERATS.**		
5 Hospital Factors	5.1 Workload Data registration	Workload Data registration B	• Workload national audit data gathering • Data registration not directy from EMR
5 Hospital Factors	5.2 Logistics MDT - operation	Logistics MDT -operation F Logistics MDT -operation B	• Intake process with a departments invoved • Monitoring & managing time between MDT and Operation • Week planning: planning opertions reated to MDT date • Clarity on operation date • Support from vounteers during intake process • Patients want tob e operated on as soon as possibe
5 Hospital Factors	5.3 Added value data feedback	Added value data feedback F Added value data feedback B	• Limited motivation for data registration (without data feedback) • Imited to financial data • Data feedback can improve care • Feedback data/3months

			• Irregular feedback from national audit programme • Benchmark
5 Hospital Factors	5.4 Support for innovation by management	Support for innovation by management F Support for innovation by management B	• Support from departmental management • Support from quality improvement officers
5 Hospital Factors	5.5 Complete dataset for ERATS	Complete dataset for ERATS	• No estabished PROMS set • No data feedback
6 Surgeon factors	**Any factors that relate to the Surgeon performing the lung resection and providing perioperative care**		
6 Surgeon factors	6.1 Experience surgeon	Experience surgeon F Experience surgeon B	• Experience HCP (number of operations performed/number of patients treated)
6 Surgeon factors	6.2 Presence/availability surgeon	Presence/availability surgeon F Presence/availability surgeon B	• HCP/Surgeon availabe at the bedsise • Sufficient time for patient education • Communication HCPs-patient • Consultation by the surgeon at time of discharge
6 Surgeon factors	Empathy HCP	Empathy HCP F Empathy HCP B	

Standards for Reporting Qualitative Research (SRQR)*

http://www.equator-network.org/reporting-guidelines/srqr/

	Page/line no(s).
Title and abstract	
Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	P1/L1-3
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	P2/L29-67
Introduction	
Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	P5/L86-120
Purpose or research question - Purpose of the study and specific objectives or questions	P5/L120-122
Methods	
Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	P6-P7/L160-166 P7/L176-184
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	P7/L168-173
Context - Setting/site and salient contextual factors; rationale**	P5/L134-137
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	P6/L128-134 P6/L160-162 P7/L166-167
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	P7/L188-194
Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	P7/L170-174

Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	P6-7/L159-167 P7/L169-191
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	P8/L197-199 Table 1
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	P7/L176-191
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	P6/L160-162 P7/L176-185
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	P7/L180-184

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	P8-P12/L196-374
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	P8-P12/L196-374

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	P13-P14 /L376-448
Limitations - Trustworthiness and limitations of findings	P14/L430-440

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	P15/L451-464
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	P15/L451-464 P15/L482-483

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

**The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.

Reference:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
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BMJ Open

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Implementing an Enhanced Recovery After Thoracic Surgery programme in the Netherlands: a qualitative study investigating facilitators and barriers for implementation.

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Abstract

Objectives:

This study aims to elucidate determinants for succesful implementation of the Enhanced Recovery After Thoracic Surgery (ERATS) protocol for perioperative care for surgical lung cancer patients in the Netherlands.

Setting:

Lung cancer operations are performed in both academic and regional hospitals, either by cardiothoracic or general thoracic surgeons. Limiting the impact of these operations by optimising and standardising perioperative care with the ERATS protocol is thought to enable reduction in length of stay, complications and costs.

Participants:

A broad spectrum of stakeholders in perioperative care for lung resection patients participated in this study, ranging from patient representatives, healthcare professionals (HCPs) to an insurance company representative.

Interventions

Semi-structured interviews (N=14) were conducted with the stakeholders (N=18). The interviews were conducted one on one by telephone and twice, face to face, in small groups. Verbatim transcriptions of these interviews were coded for the purpose of thematic analysis.

Outcome measures:

Determinants for successful implementation of the ERATS protocol in the Netherlands.

Results:

Several determinants correspond with previous publications: having a multidisciplinary team, leadership from a senior clinician and support from an ERAS®-coordinator as facilitators; lack of feedback on performance and absence of management support as barriers. Our study underscores the potential detrimental effect of inconsistent communication, the lack of support in the transition from hospital to home and the barrier posed by lack of accessible audit data.

Conclusions:

Based on a structured problem analysis among a wide selection of stakeholders, this study provides a solid basis for choosing adequate implementation strategies to introduce the ERATS protocol in the Netherlands. Emphasis on consistent and sufficient communication, support in the transition from hospital to home and adequate audit and feedback data, in addition to established implementation strategies for ERAS®-type programmes, will enable a tailored approach to implementation of ERATS in the Dutch context.

Key words: Thoracic Surgery; Enhanced Recovery After Surgery; Implementation Science; Qualitative research; Facilitators and Barriers

STRENGTHS AND LIMITATIONS

- Strength: our research approach using semi-structured interviews with a wide range of stakeholders and subsequent thematic analysis to identify facilitators and barriers for successful implementation of the ERATS protocol, makes our approach transferable to other fields, countries and contexts.
- Strength: data triangulation; due to interviews with a wide range of stakeholders, we were able to obtain different perspectives on the Dutch situation.
- Limitation: the interviewers were both surgical HCPs; we tried to limit bias with the semi-structured nature of the interviews and the use of a predetermined topic list.
- Limitation: most of the interviewed stakeholders were health care professionals and patients; no board members and only one health insurance representative were interviewed, which might have biased the results. For this reason, socio-political factors, like reimbursement and costs, might have been underreported.

INTRODUCTION

Lung cancer has the highest incidence of cancer diagnoses and is the leading cause for cancer deaths worldwide.[1] The cornerstone of curative treatment of non-small cell lung cancer (NSCLC) is surgical resection; due to advanced stages at presentation or limited physical condition of the patients, this treatment can only be offered to approximately 20-25% of new NSCLC patients.[2] Anatomical lung resections, however, are associated with a considerable length of stay and postoperative complications that can contribute to significant morbidity.[3,4] Long-term outcome and disease free survival are worse in patients with major pulmonary complications.[3–5] In addition to these clinical outcomes, (pulmonary) complications affect patient-centred outcomes and health-care costs.[6]

Therefore, focussing on optimal recovery after surgery is essential. Limiting the impact of operations by optimising and standardising perioperative care, as propagated by the Enhanced Recovery After Surgery (ERAS®) Society, has shown to reduce length of stay, complications and costs in several other surgical fields. Limited series of ERAS®-type programmes show promising results in lung resection patients.[7–11]

In absence of a Dutch clinical guideline on perioperative care in lung resection patients, practice variation exists for these patients.[12] This variation in perioperative care is associated with variation in clinical outcomes, for example length of stay and complications.[3,4] Due to the mandatory registration in the Dutch national lung surgery audit (DLCAs), reliable national data is available regarding the number of anatomical lung resections per year (over 2,200), length of stay (4-8 days) and complications (30%) in the Netherlands.[3,4]

Based on recent recommendations of the first guideline from the ERAS® Society and the European Society of Thoracic Surgeons (ESTS) concerning this patient group, a Dutch protocol was developed.[13] This protocol is aimed at optimisation and standardisation of perioperative care for lung resection patients, and, as a consequence, reduction of practice variation: the Enhanced recovery After Thoracic Surgery (ERATS) protocol.[13]

ERAS®-type programs rely applying a set of evidence-based care interventions perioperatively.[7] While individual components might not have a significant effect, the combination of these small improvements is thought to work synergistically.[14] Correlation between overall high compliance rates with ERAS®-type protocols and better outcomes support this notion.[10,15,16] However, successful and sustained implementation of a complex multidisciplinary perioperative care protocol to achieve high compliance is challenging.[17,18]

In order to implement the ERATS-protocol succesfully, implementation strategies need to be developed that tackle existing barriers and embrace facilitators. Since facilitators and barriers are dependant on context, it is important to examine them specific to type of care and the healthcare system for which the protocol is intended. Therefore, this study aims to elucidate the facilitators and barriers for succesful implementation of the ERATS protocol in the Netherlands. These insights can be used to develop tailored implementation strategies to support implementation in practice.

METHODS

In this qualitative study, semi-structured interviews were conducted with a broad spectrum of stakeholders in perioperative care for lung resection patients.

Participants

We purposively recruited the following stakeholders in perioperative care for lung resection patients: patient representatives, healthcare professionals (HCPs), healthcare managers at departmental level, data managers, a representative of an electronic medical record (EMR) company and a representative of a healthcare insurance company. The subjects were selected in consultation with the patient advocacy group Longkanker Nederland (Lung Cancer the Netherlands) and the multidisciplinary ERATS working group of the Dutch Society for Lung Surgery (NVvL). As the majority of lung resections in the Netherlands is performed in larger, non-academic teaching hospitals by general thoracic surgeons, the HCP subjects were mostly recruited from such teaching hospitals. The remainder of the anatomical lung resections is performed mainly in the 8 academic medical centres and a few regional hospitals. HCPs from academic medical centres, a regional hospital and a cardiothoracic surgeon were interviewed to broaden the perspective and ensure a representative sample for the Dutch situation.

Patient and Public Involvement

Longkanker Nederland, has been involved in the ERATS project, prior to this problem analysis and the director (LB) participates in this study as an author. They have participated in the development of the ERATS-protocol and the design of the ERATS Trial that will follow this problem analysis. The subjects, including 2 patients and a Longkanker Nederland representative, were selected in consultation with Longkanker Nederland. All participants will receive a copy of the article, when published.

The ERATS programme

Like all ERAS®-type programmes, ERATS consists of a combination of evidence-based care interventions that are thought to work synergistically.[7,8] As an illustration: ERATS relies on preparing patients preoperatively, by giving detailed information about what to expect regarding the operation and recovery period, by limiting the fasting time and by avoiding prolonged recovery from anaesthesia by limiting use of anxiolytic medication. During the operation, hypothermia is avoided, medication is given against pain and nausea. Opioids are used as sparingly as possible to avoid side effects. Postoperatively, patients will be stimulated to mobilise and resume a normal diet early: to sit in a chair and have a normal meal on the day of operation; chest tubes, urinary catheters, IV lines, epidural catheters, etcetera are avoided as much as possible or removed as early as possible, based on clear, protocolled instructions. The combination of interventions is expected to lead to a reduction in length of stay, complications, readmissions and cost.[10,19]

Interview content/procedure

A topic guide, based on the model of Fleuren et al., served as the framework for the semi-structured interviews.[20,21] [supplementary table 1] This model describes determinants of innovation that influence

the adoption, implementation and maintenance of an innovation within the healthcare sector. It recognises four different categories: the determinants related to the innovation itself, factors concerning the users/health care professional (HCP), determinants regarding the organisation, and the socio-political context.[20] Depending on the role of the subject, different aspects of the topic guide were explored more or less extensively. When no new insights were discovered in the last 3 interviews, it was considered that sampling saturation was reached.

Process

During a 3-month period (October- December 2019), the first author (EvM) conducted 14 interviews, with occasional assistance of CdB. EvM is a general thoracic surgeon, working in a teaching hospital and lead of the national ERATS implementation effort; CdB is a resident in general surgery. Two interviews were conducted as a face-to-face group interview, the remaining 12 were conducted one-to-one, mostly by telephone. Audio was recorded from all interviews and additional notes were taken during the sessions.

Analysis

With verbatim transcription of the recordings, two of the authors (EvM and FvN) created a consensus based codebook [Supplementary table 2], by analysing two interviews independently.[22] This codebook was used to code all interviews in ATLAS.ti 8 [ATLAS.ti Scientific Software Development GmbH, Berlin, Germany]. Next, the codes were sorted and grouped together into different themes, following a thematic analysis by two of the authors (EvM and FvN).[23] To detect patterns in responses as well as for data triangulation, data was organised according to subject group as well: patient representatives, nurses, case manager, physicians, management/supportive within hospital, supportive outside hospital (Insurance/EMR).[24] The most relevant and illustrative quotes were selected after discussion among the research team.

Ethics

All subjects received study information for participants in writing, informing them of their right to withdraw their cooperation without explanation. Confidentiality was secured by limiting access to the transcripts and data to 2 of the authors (EvM and FvN), erasing recordings of the interviews after transcription and erasing identifying information from the transcripts. All participants signed an informed consent form prior to the interview. The Medical Ethics Review Committee of VU University Medical Center deemed the Medical Research Involving Human Subjects Act (WMO) not applicable and confirmed that an official approval by the committee was not required (MERC ref. 2019.488).

RESULTS

In total, 14 interviews were conducted with the stakeholders as summarized in Table 1. The healthcare managers we interviewed represented a quality improvement department, a hospital's oncology centre and a clinical surgical department. Interviews lasted on average 43 minutes (range 25-68 minutes).

The identified determinants, both facilitators and barriers, were organised thematically into five themes involving implementation of the ERATS programme. Each of the themes was divided in sub-themes *(italic),* as is described in Table 2.

Theme 1: Communication HCP-Patient

This theme relates to all communication between HCPs and patients, and how this can affect implementation.

Consistent and sufficient information flow

Many stakeholders, the patient representatives, nurses and case manager in particular, mentioned providing patients with sufficient and consistent information as an important factor for ERATS implementation. *"everything was clear and every question was answered, often before the question was even asked. They knew what you would experience every day. That gives confidence" (Patient 2)*. Receiving information that was consistent with information from other HCPs was deemed an important facilitator as well. The other side, inconsistency or lack of information as a barrier creating confusion rather than confidence, was only mentioned by patient representatives, nurses and case manager.

Support in the transition hospital-home

Patient representatives as well as HCPs mentioned the presence of a case manager as a facilitator. This was mentioned explicitly in the context of the transition from hospital care to further recovery at home. Again, while many HCPs appreciated the presence of a case manager, the potential downside of the lack of a case manager in post-discharge care only was mentioned by those closest to the patients: patient representatives, nurses and the case manager.

Use of patient feedback

Different forms of patient feedback, as contributor to quality improvement, were mentioned, ranging from formalised lists of Patient Reported Outcome Measures (PROMs) to the ability to speak to an HCP about personal experiences. "*I just want to tell someone what went wrong and hope a next patient will not have the same experience again." (Patient 1)*. Using this feedback was considered to be a facilitator for implementing change in perioperative care at the patient level, as well as at management and the insurance company level.

Theme 2: HCP professional competencies and experience

This theme encompasses the competencies of individual HCPs, both regarding HCPs' medical expertise as well as HCPs' communicator skills regarding accessibility and empathy.[25]

Different competencies and experience of a multidisciplinary team of HCPs

HCPs having the medical expertise to deliver the necessary care within their role was mentioned as an important facilitator in protocol implementation, and sometimes the lack of expertise was mentioned as a barrier. *"… often they, one more than the other, will dig their heels in. It will also depend on the training level [of the nursing staff] […] I have found that having a good team on the nursing ward is essential for patient wellbeing.] (Patient 1)*. Participation of HCPs with many years of experience was judged to enhance protocol implementation by being able to tailor the generic protocol to individual needs within a certain bandwidth.

Accessibility and empathy of HCP

Accessibility and HPC's empathy -or the lack thereof- were mentioned as facilitators and barriers respectively. However, not all HCPs were automatically expected to be able to provide these qualities all the time, as long as all needs were met by the team as a whole. *"… it would have been nice if he [physician] would have been more empathetic; sometimes he tries to be and I crack up laughing, thinking " Oh, it's so silly what you're saying now", but I like him and I can take it. My emotional issues I share with the oncology nurse." (Patient 1)*.

Coordination between HCPs

Good quality handovers and coordination between HCPs lead to a consistent treatment plan. The experience of being treated by one team with one clear plan is expected, but when this coordination among HCPs is lacking it is deemed a barrier for implementation.

Theme 3: Patient factors

The third theme concerns the baseline physical and psychological condition of the patient before surgery, as well as the social context of the patient; these factors were predominately put forward by the patient representatives.

Patient autonomy

Patient autonomy was mentioned by patients as well as several HCPs as a tool in perioperative care; respecting patients' autonomy in making the decision to undergo surgery was mentioned as an example of how to achieve motivation for the perioperative care programme. Empowering patients with information about preoperative preparation and sharing this responsibility with patients was deemed another factor that influences implementation.

Situation at home

When the home situation does not allow for early discharge after surgery, this poses a potential barrier, influencing the willingness of a patient to actively participate. Young parents, with small children or a partner with special needs, were mentioned as an example, as were older patients. *"The feeling of being*

discharged from hospital before they were ready. That is not good, obviously. That stings." (Pulmonary Physician 2).

Physical condition and age

While age was mentioned by some, the physical condition was mentioned by surgeons and patient representatives alike. Since patients, considered for lung resections, already are screened for the physical ability to undergo such a resection, the comments mostly referred to the physical ability after surgery or limitations in daily life. *"…the fitter you are, going into an operation, the easier your revovery will be." (Patient 2)*. Physical condition and age however, can influence the expectations of the healthcare professionals, as well as the expectations of the patients regarding their ability to adhere to the ERATS protocol.

Theme 4: Factors influencing change in perioperative care delivery

In order to implement the ERATS-protocol, HCP's have to be able to change the way they work. The facilitators and barriers that were mentioned mainly concern determinants at the HCP's team level, but also organisational factors associated with the change process.

Support for change

Implementation of ERATS cannot be achieved by HCPs alone; support from management is essential to adopt a multidisciplinary protocol. At management and insurance company level, socio-economic factors will come into play, where the benefits at the level of individual patients should also translate into cost-effectiveness. "*… the patient is number one, quality of medical care is two and cost is three. Those are the three pillars of our "sensible care" programme […] a protocol like the one you have developed [ERATS] follows these pillars seamlessly." (*Insurance representative).

Teamwork

Having a multidisciplinary team that works according to the same protocol was generally considered a facilitator, generating support for individual HCPs to follow ERATS. Previous negative experiences by individual HCPs or perceived contraindications for ERATS, like advanced age, can limit the willingness to implement ERATS. *",,, but this "you've had a big operation, so take it easy for another day"-approach to patients will keep emerging. So old habbits and old emotions." (Pulmonary Physician 2)*.

The perceived benefits of ERATS and the team effort to achieve multidisciplinary improvement in care were mentioned as facilitator. Another facilitator mentioned was having a clear implementation plan, aided with training sessions, educational materials for both HCPs and patients, so all HCPs know when ERATS has started.

Available time for HCPs

Not having time to gather the ERATS team and discuss implementation is one barrier, perceived extra work by ward nurses or physiotherapists in delivering ERATS another. "*Everybody is so busy; nobody has time to sit down and discuss topics like this [ERATS]". (Surgeon 2)*.
The realisation of the expected benefits of following the ERATS protocol, like reduction of complications, regarding workload can act as a facilitator as well: *"when a patient catches pneumonia, it will mean a lot more work [for the nurses] […], than just helping them mobilise early." (Quality improvement officer)*.

Receiving support by colleagues, leadership and management, declaring ERATS implementation a priority and providing logistic and administrative support was mentioned as a facilitator. Even though insurance companies do not want to get involved in specific medical decisions, they can act as a facilitator by supporting quality improvement projects like ERATS implementation in their contract negotiations.

Data collection and feedback

Insight into the effects of ERATS helps to inform patients about what to expect after an anatomical lung resection. And in turn, it also aids implementation by helping HCPs understand the consequences of their actions. *"We never look at 30-day outcome data, we're quite bad at that. We really are focused on short term effects.[…] We have difficulty understanding the influence of all our actions in the operating theatre on the 30-day outcome." (Anesthesiologist 2)*.
The work necessary for data extraction from EMRs, data processing and structured feedback sessions poses a significant barrier. While EMR companies are working on better data extraction capabilities, for now, lack of automated data extraction is deemed a barrier.

Theme 5: Usability of the ERATS protocol

While all interviewees agreed on knowledge of the protocol by the HCPs as a facilitator, the HCPs also acknowledged the potential barriers created in case of a voluminous, unclear and/or inconsistent protocol.

Concise multidisciplinary protocol

Clear instructions on procedures and guidelines were mentioned by all interviewees.Having one multidisciplinary protocol was mentioned as a facilitator in eliminating different styles of different HCPs and therefore a facilitator in adopting ERATS. Specifically, standardised, rather than physician dependent, use of minimally invasive surgical techniques and clear step by step instructions regarding pain management, were mentioned specifically as determinants of successful implementation.

Clear goals

Another sub-theme touched on having clear recovery goals to work towards by following the protocol. By informing patients and HCPs about these goals, they can be engaged to help achieve them. In contrast, sending mixed signals, due to lack of clarity of the goals of the protocol, was deemed a barrier.

Flexibility

While many of the responses mentioned the benefits of a clear and concise protocol, flexibility to deviate from the protocol was mentioned as a facilitator as well. Being able to tailor the protocol to specific needs of specific patients was mentioned as a factor to achieve acceptance and implementation of ERATS, noting that ERATS should be a method and not a goal in itself. *" I think it's a perfect plan [ERATS] and I think a lot of it is very good, as long as there is room for exceptions." (Patient 1).*

Clear logistics

The ERATS protocol is thought to provide guidance and enhance the logistic preoperative processes, while keeping time to surgery to a minimum. Postoperatively, well prepared patients are expected to be able to adhere to the clear daily goals, resulting in a predictable postoperative period.

DISCUSSION

Our qualitative study identified facilitators and barriers for successful implementation of the ERATS protocol in the Netherlands, which were organised, through thematical analysis, into 5 themes. Most facilitators and barriers reinforce findings in previous publications; most notably the necessity of a multidisciplinary team, with leadership from a senior clinician and support of an ERAS®-coordinator as facilitators; lack of feedback on performance and absence of management support as barriers.[17,18] Our study put emphasis on the potential detrimental effect of inconsistent communication, the lack of support in the transition from hospital to home and the barrier posed by lack of accessible audit data. The main references for our findings are the consensus statement on training and implementation published by the ERAS® Society and a systematic review of barriers to and facilitators of implementing enhanced recovery pathways, which was based on the Consolidated Framework for Implementation Research (CFIR).[17,18, 26]

The first theme, concerning communication between HCPs and patients, was very prominent in our interviews. In contrast to the accepted facilitator of consistent and sufficient communication, patient representatives in our study also stressed the potential barrier posed by poor or inconsistent information regarding ERATS. [17,18] The same pattern was observed regarding support in the transition hospital to home, which was viewed as a facilitator by all; the lack of support in this transition was reported as a barrier by those having to compensate for its absence: patients, their representatives and nurses. The importance of extending support beyond the hospital walls, has been described previously, but does not feature in the consensus statement nor the systematic review.[17,18,27] Our finding and the omission in both publications suggests a possible blind spot for HCPs regarding continuation of care after discharge. Empowering patients in preparation for discharge, as well as active post discharge surveillance has been shown to reduce ER visits and readmissions in ERAS patients.[28,29]

Support by management and department leadership was mentioned as essential facilitator for change in our study and is unequivocally supported by literature.[17,18] Lack of easily accessible audit and feedback data, to regularly evaluate ERATS implementation as well as patient experiences, was emphasised as a barrier; being able to show consequences of certain actions to HCP's, to provide patients with real data on what to expect and to justify investments in time and resourses to management and insurance companies, was stressed to be a key facilitator.

Having a clear and concise multidisciplinary ERATS protocol used across different specialties was thought to aid consistent execution by all involved.[18,27] High levels of protocol adherence are important to achieve the intended benefits for the patients.[10,15,16] This is, however, at odds with the call for some flexibility by some of our interviewees and in the previously mentioned patients as partners-study.[27] When individualised information or care for specific needs of a patient can be provided, high protocol adherence can still be achieved in a satisfactory manner for the patient.

Application/generalizability: Implications for practice & research

Our study adds to the body of knowledge regarding potential facilitators and barriers and their potential solutions for ERATS implementation, as discovered in the Dutch situation. In addition to the suggestions from the ERAS® Society consensus statement and the systematic review, several other implementation

strategies can be selected.[17,18] Even though there is no undisputed way to select implementation strategies, projects like the Expert Recommendations for Implementing Change (ERIC) project have created a set of well defined implementation strategies for (CFIR)-based contextual barriers that can be deployed.[30,31] The description of our methodology makes our approach transferable. This potentially aids analysis of the local situation and ERATS implementation in other contexts.[17,18]

The main take-aways from our study are that implementation strategies for ERATS in the Netherlands should put emphasis on communication between HCPs and patients supported by educational materials, preparing patients, as well as family members, to be active participants. Special provisions should be made to extend ERATS care beyond hospital wards, especially after discharge. Additional strategies should include optimisation of data collection, analysis and feedback to the ERATS Teams to regularly evaluate ERATS implementation data as well as patient experiences. Early measurable effects from implementation will motivate ERATS Teams during implementation and regular standardised evaluation of feedback data is thought to help continuous quality improvement.[32,33] Providing IT support and adequate data management will also provide data to justify the resources deployed for ERATS implementation.[34] The specific attention to these determinants will help tailor implementation strategies to the Dutch situation. A Dutch implementation study, the multicentre ERATS Trial, is currently ongoing to evaluate these implementation strategies.

Strengths & limitations

One strength of our study is data triangulation; using a wide range of stakeholders, we were able to obtain different perspectives on the Dutch situation. By definition of qualitative research is not generisable, in addition the results of our analysis are specific to the Dutch socio-political context. Yet, the research approach with semi-structured interviews and thematic analysis, makes this approach transferable to other fields, countries and contexts.

Another limitation is that the interviewers were both surgical HCPs; we tried to limit bias with the semi-structured nature of the interviews and the use of a predetermined topic list. Also, no board members and only one health insurance representative were interviewed, which might have biased the results. For this reason, socio-political factors, like reimbursement and costs, might have been underreported.

Conclusion

Based on a structured problem analysis among a wide selection of stakeholders, this study identified specific facilitators and barriers for implementing the ERATS protocol in the Netherlands. Based on our study, emphasis on consistent and sufficient communication, support in the transition from hospital to home and adequate audit and feedback data, in addition to known general guidelines on implementing ERAS®-type programmes, will enable a tailored approach to implementation of ERATS in the Dutch context.

CONFLICT OF INTEREST

Dr. von Meyenfeldt reports grants from Johnson&Johnson, outside the submitted work.

Dr. Barberio, in her capacity as director of Longkanker Nederland, reports subsidies from KWF kankerbestrijding and PGO subsidie, grants from Abbvie, grants from AMGEN, grants from Astra Zeneca, grants from Boehringer Ingelheim, grants from BM-S, grants from Janssen-Cilag, grants from MSD, grants from Novartis, grants from Pfizer, grants from Roche, grants from Takeda; all outside the submitted work.

Prof. Anema reports grants from Various, grants from Pfizer & ZonMw, personal grant from Dutch Social Security Agency, personal fees from Various and personal fees from Evalua LtD and Ikherstel LtD, outside the submitted work; and he was an invited co-opted member of the guideline development group for the Dutch Occupational Medicine guideline for low back pain and the Dutch national Insurance Medicine protocol for Lumbosacral syndrome. He is appointed in 2016 as president of the Work disability Prevention and Integration committee of the International Commission on Occupational Health (ICOH).

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The original data is available form the corresponding author, within the limits of the signed informed consent from the contributors. The interview guide and code book are available as supplementary material.

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565 **Table 1: Subject characteristics (N=18)**

Characteristics	N
Gender	
• Male	8
• Female	10
Age	
• 20-29	1
• 30-39	8
• 40-49	3
• 50-59	4
• >60	2
Occupation	
• General thoracic surgeon	2
• Cardiothoracic surgeon	1
• Anaesthesiologist	2
• Pulmonary physician	2
• Nurse	2
• Case manager	1
• Healthcare manager	3
• Patient representative	3
• Electronic Medical Record specialist	1
• Health insurance company representative	1
Years active in current role	
• 0-2	8
• 3-5	3
• 5-10	2
• >10	5
Organisation type of healthcare professionals/healthcare managers	N= 13
• Academic Medical Centre	2
• Teaching Hospital	10
• Regional hospital	1

Table 2: Thematical organisation of identified determinants for implementation of the Enhanced Recovery After Thoracic Surgery (ERATS) protocol in the Netherlands.

Theme	Sub theme
Communication HCP-Patient	• Consistent information • Liaison in the transition hospital-home • Use of patient experiences
HCP professional competencies and experience	• Different competencies and experience of a multidisciplinary team of HCPs • Accessibility and empathy of HCP • Coordination between HCP's/hospitals
Patient factors	• Patient autonomy • Situation at home • Physical condition and age
Factors influencing change in perioperative care delivery	• Support for change • Teamwork • Available time for HCPs • Data gathering and feedback
Usability of the ERATS protocol	• Concise multidisciplinary protocol • Clear goals • Flexibility • Clear logistics

Topic guide interview ERATS

Introduction

The care for the more than 2,200 patients who undergo a lung resection every year in the Netherlands varies greatly and also has clinically important effects on outcomes, such as admission duration, complications, perceived quality of care and costs. Based on a recently published international guideline, a Dutch multidisciplinary working group, in collaboration with the patient organization, has developed a care protocol. Through optimization and standardization of care, this Enhanced Recovery After Thoracic Surgery (ERATS) protocol aims to help patients recover faster from lung resection, with less risk of complications and readmissions, and with an increased perceived quality of care.

In this protocol, among many other things, describes the patient information process and physical preparation before the lung resection. Perioperative methods of pain relief, rules for the removal of drains and early mobilization of patients are described in detail.

However, implementing such a protocol sometimes proves difficult. That is why we would like to talk to you in the context of an interview study, to find out which things could possibly help or hinder the input of research results. Both patients and professionals will participate in this study. The results will be published in a scientific article.

The interview will last a maximum of one hour.

Before we start the interview, I would like to ask you to sign a consent form. By signing this form you consent to participate in the study, that this conversation will be recorded and typed out later and that we may also use the information you provide today for research into the implementation of ERATS. *<have permission form signed>*

Now,I will turn on the audio recorder and we can start. *<turn on recorder>*

Demographic characteristics

[prior to the interview, the researcher fills in details where possible and checks these during the interview together with the interviewee] To start with, I would like to ask some general questions about your position (if any items have not yet been completed).

What is your age?	Years:
What is your gender?	
Where do you work/what organisation do you work for?	
What is your job description?	
How many years have you worked in your current position?	Years:

INTERVIEW TOPICS Stakeholders

Based on of Measuring Instrument for Determinants of Innovations (MIDI) TNO 2012; based on Fleuren MAH et al. Int J Qual Heal Care. 2014; 26 (5): 501-510.

DOMAIN: Current method (MIDI; Determinant 5),

- How many anatomical lung resections does your hospital perform per year?
- What does the current perioperative care for lung sections look like at the moment?
- In your experience, what are the most important parts of good perioperative care in pulmonary resections?
- Which factors play a role in your choice of the current approach? What are the considerations for this? This includes the type of patient (age, gender, etc.), preference for patient treatment, advantages and disadvantages of approaches, doctor's knowledge and experience, etc.
- Which other professionals are involved in this?
- What advantages do you have as a doctor with the current working method?

  Prompts:

  - time savings
  - shift workload
  - cost savings, etc.

- Are standard data currently registered to monitor your working method? What data do you collect? How does the registration work? How is this perceived?

- Are there other factors at the organizational level, ie within the hospital / or your department, that play a role in the choice of this method?

  prompts:

  - policy
  - support / support by colleagues in the same discipline or other discipline
  - support / support by supervisor / higher management
  - cooperation between other departments
  - finances, etc.

- Are there other factors in the broader context that influence?

  prompts:

  - reimbursement from health insurer, etc.).

DOMAIN: Implementation ERATS

Oral explanation ERATS.

- Do you expect added value from the implementation of ERATS?

  Prompts:

  - Is ERATS right for your patients? (MIDI D7)
  - Will Patients generally be satisfied with the implementation of ERATS? (MIDI D11)
  - To what extent does ERATS offer you a personal advantage / disadvantage? (MIDI D8)
  - Is it important for you to gain profit in LOS, complications, readmissions and patient satisfaction with ERATS? Is that likely to work? MIDI D9)

- Which things in your current working method / procedures need to be changed to implement ERATS? (MIDI D5)

- What is necessary for a good implementation? What can support implementation?

  Prompts:

  - What are the requirements for implementation plan (MIDI D1, clear, D3 complete)
  - What are the requirements for the substantiation of ERATS (MIDI D2)
  - Have sufficient knowledge to use ERATS (MIDI D17, D18)
  - Is there a coordinator for ERATS implementation available in your organization (MIDI D25)

- Will patients generally cooperate if ERATS is implemented? (MIDI D12)
- Which professionals / other departments should be involved in this? And what is needed for this?

  Prompts:

  - Adequate support from colleagues (MIDI D13)
  - Will all colleagues work according to ERATS? (MIDI D14)
  - In addition to the introduction of ERATS, are there any other changes that you are currently or will soon be dealing with? (MIDI 26)

- How does the decision-making process for these types of innovations proceed: central (top management) or decentralized (professionals)?

  Prompts:

  - Has there been formal support from management for ERATS implementation? (MIDI D19)
  - Are there enough personnel to implement ERATS? (MIDI D21)
  - Do you have enough time to integrate ERATS into your daily work? (MIDI D23)
  - Do you have sufficient resources (folders / website)

- Are there conflicting goals between different professional groups? If a professional group does not want to work in accordance with ERATS, are there financial consequences? For example, professional groups benefit from longer admission / or more invasive treatments (ICU? Anesthesia?).

- How do you think we can best fit ERATS into daily practice? What is needed for incorporation into daily practice?

Prompts:

  - Do you consider it part of your task to follow ERATS? (MIDI D10)
  - Do you think you can manage your ERATS tasks? (MIDI D16)
  - What information do you need to be able to implement ERATS properly? (MIDI D27)
  - Who expects you to work according to ERATS? (MIDI D15)
  - Whose opinion is important to you (MIDI D15)
  - What is the role of feedback on the results achieved with ERATS? What data do you need? How should this data be collected? (MIDI D6)
  - What is the role of feedback on the progress of ERATS implementation in your organization? (MIDI D28)

CLOSING

This was my last question. Are there any other things that we have not discussed that you think are relevant to this project?

  - Are there any other colleagues or stakeholders that you think could be helpful if we speak to them?

Thank you! *<turn off audio recorder>*

Codebook Barriers and facilitators related to implementation of ERATS

Domain	Code	Code in Atlas.ti	Description of the code
SUGGESTIONS FOR IMPROVEMENT	Suggestions for improvement	Suggestions for improvement F Facilitator B Barrier	This is a field in which we collect all suggestions for improvement, such as improvement for the program or components thereof, the organization, personnel, etc.
1 Broader Context	**Any factor that relates to the broader context in which lung surgery is performed in the Netherlands**		
1 Broader Context	1.1 Communication between Hospitals/HCPs	Communication HCPs F Communication HCPs B	• Everything mentioned with regard to communication between hospitals / HealthCare Professionals (HCPs) • MDO's
1 Broader Context	1.2		
1 Broader Context	1.3		
1 Broader Context	1.4		
2 Patient Factors	**Any factors that relate to the needs, preferences, or behaviour of patients regarding ERATS**		
2 Patient Factors	2.1 Informing patients	Informing patients F Informing patients B	• Various media information (movies / website / folder) • Clear information • Illiteracy • Realistic information • Consistent information HCP team • Managing expectations
2 Patient Factors	2.2 Autonomy patients	Autonomy patients F Autonomy patients B	Everything that is mentioned with regard to the autonomy of the patient

2 Patient Factors	2.3 Situation at home	Home situation F Home situation B	• Anything mentioned with regard to the patient's home situation • Having insight into the home situation
2 Patient Factors	2.4 Age patients	Age patients F Age patients B	Everything that is mentioned regarding the age of the patient
2 Patient Factors	2.5 Physical condition patients	Condition patients F Condition patients B	• Be fit for surgery • Fit is more important than age • Getting fit after surgery
3 Team Factors	**Any factors that relate to the Team delivering ERATS, especially the ability to deliver a care programme as one team, with one message and consistent information**		
3 Team Factors	3.1 inconsistent information team	Inconsistent info team B	• Everyone has their own ways • Colleague tells something different / varying stories
3 Team Factors	3.2 Case manager	Case manager F	• 1 point of contact for the patient • 1 point of contact for the organization • Central organizer/manager
3 Team Factors	3.3 Handover/consultation HCPs	Handover HCPs F Handover HCPs B	• Inadequate referral to pain team • Presence of cross-team consultation • Good handovers between HCPs • Short lines between HCPs • Good cooperation with anesthesiology department • Explanation of the process by lung specialist
3 Team Factors	3.4 contact post-discharge	Post-discharge contact F Post-discharge contact B	• Active: receiving a call after discharge • Passive: having a telephone number to call after discharge
3 Team Factors	3.5 Quality HCPs	Quality HCP F Quality HCP B	• Stricter guidence by physiotherapist • Clear appointments with physiotherapist • Strict and clear guidence by nurses
3 Team Factors	3.6 Work pressure Ward	Work pressure ward B	• Overburdened nurses/limited time

3 Team Factors	3.7 Wilingness to change	Willingness to change F Willingness to change B	• Rigidity by ward personnel • Being early adopters • Initiative for change with the surgeons
3 Team Factors	3.8 Support team leaders	Support team keader F Support team leader B	
3 Team Factors	3.9 Use of patient experiences	Use patient experiences F Use patient experiences B	• Person to share personal experiences with at time of discharge • Periodic reflective conversations with team and former patients
4 Protocol Factors	**Any factors that relate to the ERATS protocol, its materials, evidence for the program.**		
4 Protocol Factors	4.1 concise protocol	concise protocol F concise protocol B	• The old protocol is very extensive
4 Protocol Factors	4.2 Flexibility within bandwidth	Flexibility within bandwidth F Flexibility within bandwidth B	• Prior arrangements with anaesthesiology • Room for flexibility within the protocol • Possibility to personalise treatment within constraints of the protocol • Protocol = basis; individualising is a possibility.
4 Protocol Factors	4.3 Logistics time MDT-operation	Logistics time MDT-operation F Logistics time MDT-operation B	• Limited time for preparation by physiotherapist/dietician • Rigid guideline regarding time between MDT-Operation • Limited time between intake-operation
4 Protocol Factors	4.4 knowedge of the protocol by HCP	knowedge of the protocol by HCP F knowedge of the protocol by HCP B	• Not all HCPs know the perioperative protocol.
4 Protocol Factors	4.5 Variation protocols/old protocols	Variation protocols/old protocols F Variation protocols/old protocols B	• Old situation: every speciality has their own protocol
4 Protocol Factors	4.6 Minimally invasive surgical technique	Minimally invasive surgical technique F Minimally invasive surgical technique B	• Strive for a minimally invasive technique

4 Protocol Factors	4.7 Protocol discharge criteria clear	Protocol discharge criteria clear F	• Electronic chest drain systems are sometimes hard to interpret • Pain and airleak are important factors for LOS • Clear discharge criteria • Data electroic drain system as input for clinical decisions
4 Protocol Factors	4.8 Protocol pain management clear	Protocol pain management clear F	• Pain management without catheters • Urinar catheter/epidural limit mobilisation • Variety of methods in pain management • Pain immediatly postoperatively • Pain and nausea limit recovery
4 Protocol Factors	4.9 Limited support Transfer hospital - home	Limited support Transfer hospital - home B	• Preparing for the influence of the operation on the situation at home • Uncertainty regarding breathing after discharge • Availability support in transition hospital-home • Support from social services
5 Hospital Factors	**Any factors that relate to the abilities and organisation of the hospital that influence the implementation of ERATS.**		
5 Hospital Factors	5.1 Workload Data registration	Workload Data registration B	• Workload national audit data gathering • Data registration not directy from EMR
5 Hospital Factors	5.2 Logistics MDT - operation	Logistics MDT -operation F Logistics MDT -operation B	• Intake process with a departments invoved • Monitoring & managing time between MDT and Operation • Week planning: planning opertions reated to MDT date • Clarity on operation date • Support from vounteers during intake process • Patients want tob e operated on as soon as possibe
5 Hospital Factors	5.3 Added value data feedback	Added value data feedback F Added value data feedback B	• Limited motivation for data registration (without data feedback) • Imited to financial data • Data feedback can improve care • Feedback data/3months

			• Irregular feedback from national audit programme • Benchmark
5 Hospital Factors	5.4 Support for innovation by management	Support for innovation by management F Support for innovation by management B	• Support from departmental management • Support from quality improvement officers
5 Hospital Factors	5.5 Complete dataset for ERATS	Complete dataset for ERATS	• No estabished PROMS set • No data feedback
6 Surgeon factors	**Any factors that relate to the Surgeon performing the lung resection and providing perioperative care**		
6 Surgeon factors	6.1 Experience surgeon	Experience surgeon F Experience surgeon B	• Experience HCP (number of operations performed/number of patients treated)
6 Surgeon factors	6.2 Presence/availability surgeon	Presence/availability surgeon F Presence/availability surgeon B	• HCP/Surgeon availabe at the bedsise • Sufficient time for patient education • Communication HCPs-patient • Consultation by the surgeon at time of discharge
6 Surgeon factors	Empathy HCP	Empathy HCP F Empathy HCP B	

Standards for Reporting Qualitative Research (SRQR)*

http://www.equator-network.org/reporting-guidelines/srqr/

	Page/line no(s).
Title and abstract	
Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	P1/L1-3
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	P2/L30-68
Introduction	
Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	P5/L88-117
Purpose or research question - Purpose of the study and specific objectives or questions	P5/L118-123
Methods	
Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	P6-P7/L165-172 P7/L182-190
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	P7/L174-179
Context - Setting/site and salient contextual factors; rationale**	P5/L137-142
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	P6/L132-137 P6-P7/L165-167 P7/L171-172
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	P7/L193-199
Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	P7/L175-179

Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	P6-7/L165-172 P7/L175-196
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	P8/L2002-204 Table 1
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	P7/L182-196
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	P6/L165-167 P7/L182-190
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	P7/L185-190

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	P8-P12/L202-402
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	P8-P12/L202-402

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	P13-P14 /L376-448
Limitations - Trustworthiness and limitations of findings	P14/L464-472

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	P15/L486-498
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	P15/ L486-498 P15/L516-517

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

**The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.

Reference:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
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Implementing an Enhanced Recovery After Thoracic Surgery programme in the Netherlands: a qualitative study investigating facilitators and barriers for implementation.

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Abstract

Objectives:

This study aims to elucidate determinants for succesful implementation of the Enhanced Recovery After Thoracic Surgery (ERATS) protocol for perioperative care for surgical lung cancer patients in the Netherlands.

Setting:

Lung cancer operations are performed in both academic and regional hospitals, either by cardiothoracic or general thoracic surgeons. Limiting the impact of these operations by optimising and standardising perioperative care with the ERATS protocol is thought to enable reduction in length of stay, complications and costs.

Participants:

A broad spectrum of stakeholders in perioperative care for lung resection patients participated in this study, ranging from patient representatives, healthcare professionals (HCPs) to an insurance company representative.

Interventions

Semi-structured interviews (N=14) were conducted with the stakeholders (N=18). The interviews were conducted one on one by telephone and twice, face to face, in small groups. Verbatim transcriptions of these interviews were coded for the purpose of thematic analysis.

Outcome measures:

Determinants for successful implementation of the ERATS protocol in the Netherlands.

Results:

Several determinants correspond with previous publications: having a multidisciplinary team, leadership from a senior clinician and support from an ERAS®-coordinator as facilitators; lack of feedback on performance and absence of management support as barriers. Our study underscores the potential detrimental effect of inconsistent communication, the lack of support in the transition from hospital to home and the barrier posed by lack of accessible audit data.

Conclusions:

Based on a structured problem analysis among a wide selection of stakeholders, this study provides a solid basis for choosing adequate implementation strategies to introduce the ERATS protocol in the Netherlands. Emphasis on consistent and sufficient communication, support in the transition from hospital to home and adequate audit and feedback data, in addition to established implementation strategies for ERAS®-type programmes, will enable a tailored approach to implementation of ERATS in the Dutch context.

Key words: Thoracic Surgery; Enhanced Recovery After Surgery; Implementation Science; Qualitative research; Facilitators and Barriers

STRENGTHS AND LIMITATIONS

- Strength: our research approach using semi-structured interviews with a wide range of stakeholders and subsequent thematic analysis to identify facilitators and barriers for successful implementation of the ERATS protocol, makes our approach transferable to other fields, countries and contexts.
- Strength: data triangulation; due to interviews with a wide range of stakeholders, we were able to obtain different perspectives on the Dutch situation.
- Limitation: the interviewers were both surgical HCPs; we tried to limit bias with the semi-structured nature of the interviews and the use of a predetermined topic list.
- Limitation: no hospital board members and only one health insurance representative were interviewed, which might have biased the results by potentially underreporting of socio-political factors, like reimbursement and costs.

INTRODUCTION

Lung cancer has the highest incidence of cancer diagnoses and is the leading cause for cancer deaths worldwide.[1] The cornerstone of curative treatment of non-small cell lung cancer (NSCLC) is surgical resection; due to advanced stages at presentation or limited physical condition of the patients, this treatment can only be offered to approximately 20-25% of new NSCLC patients.[2] Anatomical lung resections, however, are associated with a considerable length of stay and postoperative complications that can contribute to significant morbidity.[3,4] Long-term outcome and disease free survival are worse in patients with major pulmonary complications.[3–5] In addition to these clinical outcomes, (pulmonary) complications affect patient-centred outcomes and health-care costs.[6]

Therefore, focussing on optimal recovery after surgery is essential. Limiting the impact of operations by optimising and standardising perioperative care, as propagated by the Enhanced Recovery After Surgery (ERAS®) Society, has shown to reduce length of stay, complications and costs in several other surgical fields. Limited series of ERAS®-type programmes show promising results in lung resection patients.[7–11]

In absence of a Dutch clinical guideline on perioperative care in lung resection patients, practice variation exists for these patients.[12] This variation in perioperative care is associated with variation in clinical outcomes, for example length of stay and complications.[3,4] Due to the mandatory registration in the Dutch national lung surgery audit (DLCAs), reliable national data is available regarding the number of anatomical lung resections per year (over 2,200), length of stay (4-8 days) and complications (30%) in the Netherlands.[3,4]

Based on recent recommendations of the first guideline from the ERAS® Society and the European Society of Thoracic Surgeons (ESTS) concerning this patient group, a Dutch protocol was developed.[13] This protocol is aimed at optimisation and standardisation of perioperative care for lung resection patients, and, as a consequence, reduction of practice variation: the Enhanced recovery After Thoracic Surgery (ERATS) protocol.[13]

ERAS®-type programs rely applying a set of evidence-based care interventions perioperatively.[7] While individual components might not have a significant effect, the combination of these small improvements is thought to work synergistically.[14] Correlation between overall high compliance rates with ERAS®-type protocols and better outcomes support this notion.[10,15,16] However, successful and sustained implementation of a complex multidisciplinary perioperative care protocol to achieve high compliance is challenging.[17,18]

In order to implement the ERATS-protocol succesfully, implementation strategies need to be developed that tackle existing barriers and embrace facilitators. Since facilitators and barriers are dependant on context, it is important to examine them specific to type of care and the healthcare system for which the protocol is intended. Therefore, this study aims to elucidate the facilitators and barriers for succesful implementation of the ERATS protocol in the Netherlands. These insights can be used to develop tailored implementation strategies to support implementation in practice.

METHODS

In this qualitative study, semi-structured interviews were conducted with a broad spectrum of stakeholders in perioperative care for lung resection patients.

Participants

We purposively recruited the following stakeholders in perioperative care for lung resection patients: patient representatives, healthcare professionals (HCPs), healthcare managers at departmental level, data managers, a representative of an electronic medical record (EMR) company and a representative of a healthcare insurance company. The subjects were selected in consultation with the patient advocacy group Longkanker Nederland (Lung Cancer the Netherlands) and the multidisciplinary ERATS working group of the Dutch Society for Lung Surgery (NVvL). As the majority of lung resections in the Netherlands is performed in larger, non-academic teaching hospitals by general thoracic surgeons, the HCP subjects were mostly recruited from such teaching hospitals. The remainder of the anatomical lung resections is performed mainly in the 8 academic medical centres and a few regional hospitals. HCPs from academic medical centres, a regional hospital and a cardiothoracic surgeon were interviewed to broaden the perspective and ensure a representative sample for the Dutch situation.

Patient and Public Involvement

Longkanker Nederland, has been involved in the ERATS project, prior to this problem analysis and the director (LB) participates in this study as an author. They have participated in the development of the ERATS-protocol and the design of the ERATS Trial that will follow this problem analysis. The subjects, including 2 patients and a Longkanker Nederland representative, were selected in consultation with Longkanker Nederland. All participants will receive a copy of the article, when published.

The ERATS programme

Like all ERAS®-type programmes, ERATS consists of a combination of evidence-based care interventions that are thought to work synergistically.[7,8] As an illustration: ERATS relies on preparing patients preoperatively, by giving detailed information about what to expect regarding the operation and recovery period, by limiting the fasting time and by avoiding prolonged recovery from anaesthesia by limiting use of anxiolytic medication. During the operation, hypothermia is avoided, medication is given against pain and nausea. Opioids are used as sparingly as possible to avoid side effects. Postoperatively, patients will be stimulated to mobilise and resume a normal diet early: to sit in a chair and have a normal meal on the day of operation; chest tubes, urinary catheters, IV lines, epidural catheters, etcetera are avoided as much as possible or removed as early as possible, based on clear, protocolled instructions. The combination of interventions is expected to lead to a reduction in length of stay, complications, readmissions and cost.[10,19]

Interview content/procedure

A topic guide, based on the model of Fleuren et al., served as the framework for the semi-structured interviews.[20,21] [supplementary table 1] This model describes determinants of innovation that influence

the adoption, implementation and maintenance of an innovation within the healthcare sector. It recognises four different categories: the determinants related to the innovation itself, factors concerning the users/health care professional (HCP), determinants regarding the organisation, and the socio-political context.[20] Depending on the role of the subject, different aspects of the topic guide were explored more or less extensively. When no new insights were discovered in the last 3 interviews, it was considered that sampling saturation was reached.

Process

During a 3-month period (October- December 2019), the first author (EvM) conducted 14 interviews, with occasional assistance of CdB. EvM is a general thoracic surgeon, working in a teaching hospital and lead of the national ERATS implementation effort; CdB is a resident in general surgery. Two interviews were conducted as a face-to-face group interview, the remaining 12 were conducted one-to-one, mostly by telephone. Audio was recorded from all interviews and additional notes were taken during the sessions.

Analysis

With verbatim transcription of the recordings, two of the authors (EvM and FvN) created a consensus based codebook [Supplementary table 2], by analysing two interviews independently.[22] This codebook was used to code all interviews in ATLAS.ti 8 [ATLAS.ti Scientific Software Development GmbH, Berlin, Germany]. Next, the codes were sorted and grouped together into different themes, following a thematic analysis by two of the authors (EvM and FvN).[23] To detect patterns in responses as well as for data triangulation, data was organised according to subject group as well: patient representatives, nurses, case manager, physicians, management/supportive within hospital, supportive outside hospital (Insurance/EMR).[24] The most relevant and illustrative quotes were selected after discussion among the research team.

Ethics

All subjects received study information for participants in writing, informing them of their right to withdraw their cooperation without explanation. Confidentiality was secured by limiting access to the transcripts and data to 2 of the authors (EvM and FvN), erasing recordings of the interviews after transcription and erasing identifying information from the transcripts. All participants signed an informed consent form prior to the interview. The Medical Ethics Review Committee of VU University Medical Center deemed the Medical Research Involving Human Subjects Act (WMO) not applicable and confirmed that an official approval by the committee was not required (MERC ref. 2019.488).

RESULTS

In total, 14 interviews were conducted with the stakeholders as summarized in Table 1. The healthcare managers we interviewed represented a quality improvement department, a hospital's oncology centre and a clinical surgical department. Interviews lasted on average 43 minutes (range 25-68 minutes).

The identified determinants, both facilitators and barriers, were organised thematically into five themes involving implementation of the ERATS programme. Each of the themes was divided in sub-themes *(italic),* as is described in Table 2.

Theme 1: Communication HCP-Patient

This theme relates to all communication between HCPs and patients, and how this can affect implementation.

Consistent and sufficient information flow

Many stakeholders, the patient representatives, nurses and case manager in particular, mentioned providing patients with sufficient and consistent information as an important factor for ERATS implementation. *"everything was clear and every question was answered, often before the question was even asked. They knew what you would experience every day. That gives confidence" (Patient 2)*. Receiving information that was consistent with information from other HCPs was deemed an important facilitator as well. The other side, inconsistency or lack of information as a barrier creating confusion rather than confidence, was only mentioned by patient representatives, nurses and case manager.

Support in the transition hospital-home

Patient representatives as well as HCPs mentioned the presence of a case manager as a facilitator. This was mentioned explicitly in the context of the transition from hospital care to further recovery at home. Again, while many HCPs appreciated the presence of a case manager, the potential downside of the lack of a case manager in post-discharge care only was mentioned by those closest to the patients: patient representatives, nurses and the case manager.

Use of patient feedback

Different forms of patient feedback, as contributor to quality improvement, were mentioned, ranging from formalised lists of Patient Reported Outcome Measures (PROMs) to the ability to speak to an HCP about personal experiences. "*I just want to tell someone what went wrong and hope a next patient will not have the same experience again." (Patient 1)*. Using this feedback was considered to be a facilitator for implementing change in perioperative care at the patient level, as well as at management and the insurance company level.

Theme 2: HCP professional competencies and experience

This theme encompasses the competencies of individual HCPs, both regarding HCPs' medical expertise as well as HCPs' communicator skills regarding accessibility and empathy.[25]

Different competencies and experience of a multidisciplinary team of HCPs

HCPs having the medical expertise to deliver the necessary care within their role was mentioned as an important facilitator in protocol implementation, and sometimes the lack of expertise was mentioned as a barrier. *"… often they, one more than the other, will dig their heels in. It will also depend on the training level [of the nursing staff] […] I have found that having a good team on the nursing ward is essential for patient wellbeing.] (Patient 1)*. Participation of HCPs with many years of experience was judged to enhance protocol implementation by being able to tailor the generic protocol to individual needs within a certain bandwidth.

Accessibility and empathy of HCP

Accessibility and HPC's empathy -or the lack thereof- were mentioned as facilitators and barriers respectively. However, not all HCPs were automatically expected to be able to provide these qualities all the time, as long as all needs were met by the team as a whole. *"… it would have been nice if he [physician] would have been more empathetic; sometimes he tries to be and I crack up laughing, thinking " Oh, it's so silly what you're saying now", but I like him and I can take it. My emotional issues I share with the oncology nurse." (Patient 1)*.

Coordination between HCPs

Good quality handovers and coordination between HCPs lead to a consistent treatment plan. The experience of being treated by one team with one clear plan is expected, but when this coordination among HCPs is lacking it is deemed a barrier for implementation.

Theme 3: Patient factors

The third theme concerns the baseline physical and psychological condition of the patient before surgery, as well as the social context of the patient; these factors were predominately put forward by the patient representatives.

Patient autonomy

Patient autonomy was mentioned by patients as well as several HCPs as a tool in perioperative care; respecting patients' autonomy in making the decision to undergo surgery was mentioned as an example of how to achieve motivation for the perioperative care programme. Empowering patients with information about preoperative preparation and sharing this responsibility with patients was deemed another factor that influences implementation.

Situation at home

When the home situation does not allow for early discharge after surgery, this poses a potential barrier, influencing the willingness of a patient to actively participate. Young parents, with small children or a partner with special needs, were mentioned as an example, as were older patients. *"The feeling of being*

discharged from hospital before they were ready. That is not good, obviously. That stings." (Pulmonary Physician 2).

Physical condition and age

While age was mentioned by some, the physical condition was mentioned by surgeons and patient representatives alike. Since patients, considered for lung resections, already are screened for the physical ability to undergo such a resection, the comments mostly referred to the physical ability after surgery or limitations in daily life. *"…the fitter you are, going into an operation, the easier your revovery will be." (Patient 2)*. Physical condition and age however, can influence the expectations of the healthcare professionals, as well as the expectations of the patients regarding their ability to adhere to the ERATS protocol.

Theme 4: Factors influencing change in perioperative care delivery

In order to implement the ERATS-protocol, HCP's have to be able to change the way they work. The facilitators and barriers that were mentioned mainly concern determinants at the HCP's team level, but also organisational factors associated with the change process.

Support for change

Implementation of ERATS cannot be achieved by HCPs alone; support from management is essential to adopt a multidisciplinary protocol. At management and insurance company level, socio-economic factors will come into play, where the benefits at the level of individual patients should also translate into cost-effectiveness. "*… the patient is number one, quality of medical care is two and cost is three. Those are the three pillars of our "sensible care" programme […] a protocol like the one you have developed [ERATS] follows these pillars seamlessly." (*Insurance representative).

Teamwork

Having a multidisciplinary team that works according to the same protocol was generally considered a facilitator, generating support for individual HCPs to follow ERATS. Previous negative experiences by individual HCPs or perceived contraindications for ERATS, like advanced age, can limit the willingness to implement ERATS. *",,, but this "you've had a big operation, so take it easy for another day"-approach to patients will keep emerging. So old habbits and old emotions." (Pulmonary Physician 2)*.

The perceived benefits of ERATS and the team effort to achieve multidisciplinary improvement in care were mentioned as facilitator. Another facilitator mentioned was having a clear implementation plan, aided with training sessions, educational materials for both HCPs and patients, so all HCPs know when ERATS has started.

Available time for HCPs

Not having time to gather the ERATS team and discuss implementation is one barrier, perceived extra work by ward nurses or physiotherapists in delivering ERATS another. "*Everybody is so busy; nobody has time to sit down and discuss topics like this [ERATS]". (Surgeon 2)*.
The realisation of the expected benefits of following the ERATS protocol, like reduction of complications, regarding workload can act as a facilitator as well: *"when a patient catches pneumonia, it will mean a lot more work [for the nurses] […], than just helping them mobilise early." (Quality improvement officer)*.

Receiving support by colleagues, leadership and management, declaring ERATS implementation a priority and providing logistic and administrative support was mentioned as a facilitator. Even though insurance companies do not want to get involved in specific medical decisions, they can act as a facilitator by supporting quality improvement projects like ERATS implementation in their contract negotiations.

Data collection and feedback

Insight into the effects of ERATS helps to inform patients about what to expect after an anatomical lung resection. And in turn, it also aids implementation by helping HCPs understand the consequences of their actions. *"We never look at 30-day outcome data, we're quite bad at that. We really are focused on short term effects.[…] We have difficulty understanding the influence of all our actions in the operating theatre on the 30-day outcome." (Anesthesiologist 2)*.
The work necessary for data extraction from EMRs, data processing and structured feedback sessions poses a significant barrier. While EMR companies are working on better data extraction capabilities, for now, lack of automated data extraction is deemed a barrier.

Theme 5: Usability of the ERATS protocol

While all interviewees agreed on knowledge of the protocol by the HCPs as a facilitator, the HCPs also acknowledged the potential barriers created in case of a voluminous, unclear and/or inconsistent protocol.

Concise multidisciplinary protocol

Clear instructions on procedures and guidelines were mentioned by all interviewees.Having one multidisciplinary protocol was mentioned as a facilitator in eliminating different styles of different HCPs and therefore a facilitator in adopting ERATS. Specifically, standardised, rather than physician dependent, use of minimally invasive surgical techniques and clear step by step instructions regarding pain management, were mentioned specifically as determinants of successful implementation.

Clear goals

Another sub-theme touched on having clear recovery goals to work towards by following the protocol. By informing patients and HCPs about these goals, they can be engaged to help achieve them. In contrast, sending mixed signals, due to lack of clarity of the goals of the protocol, was deemed a barrier.

Flexibility

While many of the responses mentioned the benefits of a clear and concise protocol, flexibility to deviate from the protocol was mentioned as a facilitator as well. Being able to tailor the protocol to specific needs of specific patients was mentioned as a factor to achieve acceptance and implementation of ERATS, noting that ERATS should be a method and not a goal in itself. *" I think it's a perfect plan [ERATS] and I think a lot of it is very good, as long as there is room for exceptions." (Patient 1).*

Clear logistics

The ERATS protocol is thought to provide guidance and enhance the logistic preoperative processes, while keeping time to surgery to a minimum. Postoperatively, well prepared patients are expected to be able to adhere to the clear daily goals, resulting in a predictable postoperative period.

DISCUSSION

Our qualitative study identified facilitators and barriers for successful implementation of the ERATS protocol in the Netherlands, which were organised, through thematical analysis, into 5 themes. Most facilitators and barriers reinforce findings in previous publications; most notably the necessity of a multidisciplinary team, with leadership from a senior clinician and support of an ERAS®-coordinator as facilitators; lack of feedback on performance and absence of management support as barriers.[17,18] Our study put emphasis on the potential detrimental effect of inconsistent communication, the lack of support in the transition from hospital to home and the barrier posed by lack of accessible audit data. The main references for our findings are the consensus statement on training and implementation published by the ERAS® Society and a systematic review of barriers to and facilitators of implementing enhanced recovery pathways, which was based on the Consolidated Framework for Implementation Research (CFIR).[17,18, 26]

The first theme, concerning communication between HCPs and patients, was very prominent in our interviews. In contrast to the accepted facilitator of consistent and sufficient communication, patient representatives in our study also stressed the potential barrier posed by poor or inconsistent information regarding ERATS. [17,18] The same pattern was observed regarding support in the transition hospital to home, which was viewed as a facilitator by all; the lack of support in this transition was reported as a barrier by those having to compensate for its absence: patients, their representatives and nurses. The importance of extending support beyond the hospital walls, has been described previously, but does not feature in the consensus statement nor the systematic review.[17,18,27] Our finding and the omission in both publications suggests a possible blind spot for HCPs regarding continuation of care after discharge. Empowering patients in preparation for discharge, as well as active post discharge surveillance has been shown to reduce ER visits and readmissions in ERAS patients.[28,29]

Support by management and department leadership was mentioned as essential facilitator for change in our study and is unequivocally supported by literature.[17,18] Lack of easily accessible audit and feedback data, to regularly evaluate ERATS implementation as well as patient experiences, was emphasised as a barrier; being able to show consequences of certain actions to HCP's, to provide patients with real data on what to expect and to justify investments in time and resourses to management and insurance companies, was stressed to be a key facilitator.

Having a clear and concise multidisciplinary ERATS protocol used across different specialties was thought to aid consistent execution by all involved.[18,27] High levels of protocol adherence are important to achieve the intended benefits for the patients.[10,15,16] This is, however, at odds with the call for some flexibility by some of our interviewees and in the previously mentioned patients as partners-study.[27] When individualised information or care for specific needs of a patient can be provided, high protocol adherence can still be achieved in a satisfactory manner for the patient.

Application/generalizability: Implications for practice & research

Our study adds to the body of knowledge regarding potential facilitators and barriers and their potential solutions for ERATS implementation, as discovered in the Dutch situation. In addition to the suggestions from the ERAS® Society consensus statement and the systematic review, several other implementation

strategies can be selected.[17,18] Even though there is no undisputed way to select implementation strategies, projects like the Expert Recommendations for Implementing Change (ERIC) project have created a set of well defined implementation strategies for (CFIR)-based contextual barriers that can be deployed.[30,31] The description of our methodology makes our approach transferable. This potentially aids analysis of the local situation and ERATS implementation in other contexts.[17,18]

The main take-aways from our study are that implementation strategies for ERATS in the Netherlands should put emphasis on communication between HCPs and patients supported by educational materials, preparing patients, as well as family members, to be active participants. Special provisions should be made to extend ERATS care beyond hospital wards, especially after discharge. Additional strategies should include optimisation of data collection, analysis and feedback to the ERATS Teams to regularly evaluate ERATS implementation data as well as patient experiences. Early measurable effects from implementation will motivate ERATS Teams during implementation and regular standardised evaluation of feedback data is thought to help continuous quality improvement.[32,33] Providing IT support and adequate data management will also provide data to justify the resources deployed for ERATS implementation.[34] The specific attention to these determinants will help tailor implementation strategies to the Dutch situation. A Dutch implementation study, the multicentre ERATS Trial, is currently ongoing to evaluate these implementation strategies.

Strengths & limitations

One strength of our study is data triangulation; using a wide range of stakeholders, we were able to obtain different perspectives on the Dutch situation. By definition of qualitative research is not generisable, in addition the results of our analysis are specific to the Dutch socio-political context. Yet, the research approach with semi-structured interviews and thematic analysis, makes this approach transferable to other fields, countries and contexts.

Another limitation is that the interviewers were both surgical HCPs; we tried to limit bias with the semi-structured nature of the interviews and the use of a predetermined topic list. Also, no board members and only one health insurance representative were interviewed, which might have biased the results. For this reason, socio-political factors, like reimbursement and costs, might have been underreported.

Conclusion

Based on a structured problem analysis among a wide selection of stakeholders, this study identified specific facilitators and barriers for implementing the ERATS protocol in the Netherlands. Based on our study, emphasis on consistent and sufficient communication, support in the transition from hospital to home and adequate audit and feedback data, in addition to known general guidelines on implementing ERAS®-type programmes, will enable a tailored approach to implementation of ERATS in the Dutch context.

CONFLICT OF INTEREST

Dr. von Meyenfeldt reports grants from Johnson&Johnson, outside the submitted work.

Dr. Barberio, in her capacity as director of Longkanker Nederland, reports subsidies from KWF kankerbestrijding and PGO subsidie, grants from Abbvie, grants from AMGEN, grants from Astra Zeneca, grants from Boehringer Ingelheim, grants from BM-S, grants from Janssen-Cilag, grants from MSD, grants from Novartis, grants from Pfizer, grants from Roche, grants from Takeda; all outside the submitted work.

Prof. Anema reports grants from Various, grants from Pfizer & ZonMw, personal grant from Dutch Social Security Agency, personal fees from Various and personal fees from Evalua LtD and Ikherstel LtD, outside the submitted work; and he was an invited co-opted member of the guideline development group for the Dutch Occupational Medicine guideline for low back pain and the Dutch national Insurance Medicine protocol for Lumbosacral syndrome. He is appointed in 2016 as president of the Work disability Prevention and Integration committee of the International Commission on Occupational Health (ICOH).

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The original data is available form the corresponding author, within the limits of the signed informed consent from the contributors. The interview guide and code book are available as supplementary material.

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564 **Table 1: Subject characteristics (N=18)**

Characteristics	N
Gender	
• Male	8
• Female	10
Age	
• 20-29	1
• 30-39	8
• 40-49	3
• 50-59	4
• >60	2
Occupation	
• General thoracic surgeon	2
• Cardiothoracic surgeon	1
• Anaesthesiologist	2
• Pulmonary physician	2
• Nurse	2
• Case manager	1
• Healthcare manager	3
• Patient representative	3
• Electronic Medical Record specialist	1
• Health insurance company representative	1
Years active in current role	
• 0-2	8
• 3-5	3
• 5-10	2
• >10	5
Organisation type of healthcare professionals/healthcare managers	N= 13
• Academic Medical Centre	2
• Teaching Hospital	10
• Regional hospital	1

Table 2: Thematical organisation of identified determinants for implementation of the Enhanced Recovery After Thoracic Surgery (ERATS) protocol in the Netherlands.

Theme	Sub theme
Communication HCP-Patient	• Consistent information • Liaison in the transition hospital-home • Use of patient experiences
HCP professional competencies and experience	• Different competencies and experience of a multidisciplinary team of HCPs • Accessibility and empathy of HCP • Coordination between HCP's/hospitals
Patient factors	• Patient autonomy • Situation at home • Physical condition and age
Factors influencing change in perioperative care delivery	• Support for change • Teamwork • Available time for HCPs • Data gathering and feedback
Usability of the ERATS protocol	• Concise multidisciplinary protocol • Clear goals • Flexibility • Clear logistics

Topic guide interview ERATS

Introduction

The care for the more than 2,200 patients who undergo a lung resection every year in the Netherlands varies greatly and also has clinically important effects on outcomes, such as admission duration, complications, perceived quality of care and costs. Based on a recently published international guideline, a Dutch multidisciplinary working group, in collaboration with the patient organization, has developed a care protocol. Through optimization and standardization of care, this Enhanced Recovery After Thoracic Surgery (ERATS) protocol aims to help patients recover faster from lung resection, with less risk of complications and readmissions, and with an increased perceived quality of care.

In this protocol, among many other things, describes the patient information process and physical preparation before the lung resection. Perioperative methods of pain relief, rules for the removal of drains and early mobilization of patients are described in detail.

However, implementing such a protocol sometimes proves difficult. That is why we would like to talk to you in the context of an interview study, to find out which things could possibly help or hinder the input of research results. Both patients and professionals will participate in this study. The results will be published in a scientific article.

The interview will last a maximum of one hour.

Before we start the interview, I would like to ask you to sign a consent form. By signing this form you consent to participate in the study, that this conversation will be recorded and typed out later and that we may also use the information you provide today for research into the implementation of ERATS. *<have permission form signed>*

Now,I will turn on the audio recorder and we can start. *<turn on recorder>*

Demographic characteristics

[prior to the interview, the researcher fills in details where possible and checks these during the interview together with the interviewee] To start with, I would like to ask some general questions about your position (if any items have not yet been completed).

What is your age?	Years:
What is your gender?	
Where do you work/what organisation do you work for?	
What is your job description?	
How many years have you worked in your current position?	Years:

INTERVIEW TOPICS Stakeholders

Based on of Measuring Instrument for Determinants of Innovations (MIDI) TNO 2012; based on Fleuren MAH et al. Int J Qual Heal Care. 2014; 26 (5): 501-510.

DOMAIN: Current method (MIDI; Determinant 5),

- How many anatomical lung resections does your hospital perform per year?
- What does the current perioperative care for lung sections look like at the moment?
- In your experience, what are the most important parts of good perioperative care in pulmonary resections?
- Which factors play a role in your choice of the current approach? What are the considerations for this? This includes the type of patient (age, gender, etc.), preference for patient treatment, advantages and disadvantages of approaches, doctor's knowledge and experience, etc.
- Which other professionals are involved in this?
- What advantages do you have as a doctor with the current working method?

  Prompts:

  - time savings
  - shift workload
  - cost savings, etc.

- Are standard data currently registered to monitor your working method? What data do you collect? How does the registration work? How is this perceived?

- Are there other factors at the organizational level, ie within the hospital / or your department, that play a role in the choice of this method?

  prompts:

  - policy
  - support / support by colleagues in the same discipline or other discipline
  - support / support by supervisor / higher management
  - cooperation between other departments
  - finances, etc.

- Are there other factors in the broader context that influence?

  prompts:

  - reimbursement from health insurer, etc.).

DOMAIN: Implementation ERATS

Oral explanation ERATS.

- Do you expect added value from the implementation of ERATS?

  Prompts:

  - Is ERATS right for your patients? (MIDI D7)
  - Will Patients generally be satisfied with the implementation of ERATS? (MIDI D11)
  - To what extent does ERATS offer you a personal advantage / disadvantage? (MIDI D8)
  - Is it important for you to gain profit in LOS, complications, readmissions and patient satisfaction with ERATS? Is that likely to work? MIDI D9)

- Which things in your current working method / procedures need to be changed to implement ERATS? (MIDI D5)

- What is necessary for a good implementation? What can support implementation?

  Prompts:

  - What are the requirements for implementation plan (MIDI D1, clear, D3 complete)
  - What are the requirements for the substantiation of ERATS (MIDI D2)
  - Have sufficient knowledge to use ERATS (MIDI D17, D18)
  - Is there a coordinator for ERATS implementation available in your organization (MIDI D25)

- Will patients generally cooperate if ERATS is implemented? (MIDI D12)
- Which professionals / other departments should be involved in this? And what is needed for this?

  Prompts:

  - Adequate support from colleagues (MIDI D13)
  - Will all colleagues work according to ERATS? (MIDI D14)
  - In addition to the introduction of ERATS, are there any other changes that you are currently or will soon be dealing with? (MIDI 26)

- How does the decision-making process for these types of innovations proceed: central (top management) or decentralized (professionals)?

  Prompts:

  - Has there been formal support from management for ERATS implementation? (MIDI D19)
  - Are there enough personnel to implement ERATS? (MIDI D21)
  - Do you have enough time to integrate ERATS into your daily work? (MIDI D23)
  - Do you have sufficient resources (folders / website)

- Are there conflicting goals between different professional groups? If a professional group does not want to work in accordance with ERATS, are there financial consequences? For example, professional groups benefit from longer admission / or more invasive treatments (ICU? Anesthesia?).

- How do you think we can best fit ERATS into daily practice? What is needed for incorporation into daily practice?

Prompts:

  - Do you consider it part of your task to follow ERATS? (MIDI D10)
  - Do you think you can manage your ERATS tasks? (MIDI D16)
  - What information do you need to be able to implement ERATS properly? (MIDI D27)
  - Who expects you to work according to ERATS? (MIDI D15)
  - Whose opinion is important to you (MIDI D15)
  - What is the role of feedback on the results achieved with ERATS? What data do you need? How should this data be collected? (MIDI D6)
  - What is the role of feedback on the progress of ERATS implementation in your organization? (MIDI D28)

CLOSING

This was my last question. Are there any other things that we have not discussed that you think are relevant to this project?

  - Are there any other colleagues or stakeholders that you think could be helpful if we speak to them?

Thank you! *<turn off audio recorder>*

Codebook Barriers and facilitators related to implementation of ERATS

Domain	Code	Code in Atlas.ti	Description of the code
SUGGESTIONS FOR IMPROVEMENT	Suggestions for improvement	Suggestions for improvement F Facilitator B Barrier	This is a field in which we collect all suggestions for improvement, such as improvement for the program or components thereof, the organization, personnel, etc.
1 Broader Context	**Any factor that relates to the broader context in which lung surgery is performed in the Netherlands**		
1 Broader Context	1.1 Communication between Hospitals/HCPs	Communication HCPs F Communication HCPs B	• Everything mentioned with regard to communication between hospitals / HealthCare Professionals (HCPs) • MDO's
1 Broader Context	1.2		
1 Broader Context	1.3		
1 Broader Context	1.4		
2 Patient Factors	**Any factors that relate to the needs, preferences, or behaviour of patients regarding ERATS**		
2 Patient Factors	2.1 Informing patients	Informing patients F Informing patients B	• Various media information (movies / website / folder) • Clear information • Illiteracy • Realistic information • Consistent information HCP team • Managing expectations
2 Patient Factors	2.2 Autonomy patients	Autonomy patients F Autonomy patients B	Everything that is mentioned with regard to the autonomy of the patient

2 Patient Factors	2.3 Situation at home	Home situation F Home situation B	• Anything mentioned with regard to the patient's home situation • Having insight into the home situation
2 Patient Factors	2.4 Age patients	Age patients F Age patients B	Everything that is mentioned regarding the age of the patient
2 Patient Factors	2.5 Physical condition patients	Condition patients F Condition patients B	• Be fit for surgery • Fit is more important than age • Getting fit after surgery
3 Team Factors	**Any factors that relate to the Team delivering ERATS, especially the ability to deliver a care programme as one team, with one message and consistent information**		
3 Team Factors	3.1 inconsistent information team	Inconsistent info team B	• Everyone has their own ways • Colleague tells something different / varying stories
3 Team Factors	3.2 Case manager	Case manager F	• 1 point of contact for the patient • 1 point of contact for the organization • Central organizer/manager
3 Team Factors	3.3 Handover/consultation HCPs	Handover HCPs F Handover HCPs B	• Inadequate referral to pain team • Presence of cross-team consultation • Good handovers between HCPs • Short lines between HCPs • Good cooperation with anesthesiology department • Explanation of the process by lung specialist
3 Team Factors	3.4 contact post-discharge	Post-discharge contact F Post-discharge contact B	• Active: receiving a call after discharge • Passive: having a telephone number to call after discharge
3 Team Factors	3.5 Quality HCPs	Quality HCP F Quality HCP B	• Stricter guidence by physiotherapist • Clear appointments with physiotherapist • Strict and clear guidence by nurses
3 Team Factors	3.6 Work pressure Ward	Work pressure ward B	• Overburdened nurses/limited time

3 Team Factors	3.7 Wilingness to change	Willingness to change F Willingness to change B	• Rigidity by ward personnel • Being early adopters • Initiative for change with the surgeons
3 Team Factors	3.8 Support team leaders	Support team keader F Support team leader B	
3 Team Factors	3.9 Use of patient experiences	Use patient experiences F Use patient experiences B	• Person to share personal experiences with at time of discharge • Periodic reflective conversations with team and former patients
4 Protocol Factors	**Any factors that relate to the ERATS protocol, its materials, evidence for the program.**		
4 Protocol Factors	4.1 concise protocol	concise protocol F concise protocol B	• The old protocol is very extensive
4 Protocol Factors	4.2 Flexibility within bandwidth	Flexibility within bandwidth F Flexibility within bandwidth B	• Prior arrangements with anaesthesiology • Room for flexibility within the protocol • Possibility to personalise treatment within constraints of the protocol • Protocol = basis; individualising is a possibility.
4 Protocol Factors	4.3 Logistics time MDT-operation	Logistics time MDT-operation F Logistics time MDT-operation B	• Limited time for preparation by physiotherapist/dietician • Rigid guideline regarding time between MDT-Operation • Limited time between intake-operation
4 Protocol Factors	4.4 knowedge of the protocol by HCP	knowedge of the protocol by HCP F knowedge of the protocol by HCP B	• Not all HCPs know the perioperative protocol.
4 Protocol Factors	4.5 Variation protocols/old protocols	Variation protocols/old protocols F Variation protocols/old protocols B	• Old situation: every speciality has their own protocol
4 Protocol Factors	4.6 Minimally invasive surgical technique	Minimally invasive surgical technique F Minimally invasive surgical technique B	• Strive for a minimally invasive technique

4 Protocol Factors	4.7 Protocol discharge criteria clear	Protocol discharge criteria clear F	• Electronic chest drain systems are sometimes hard to interpret • Pain and airleak are important factors for LOS • Clear discharge criteria • Data electroic drain system as input for clinical decisions
4 Protocol Factors	4.8 Protocol pain management clear	Protocol pain management clear F	• Pain management without catheters • Urinar catheter/epidural limit mobilisation • Variety of methods in pain management • Pain immediatly postoperatively • Pain and nausea limit recovery
4 Protocol Factors	4.9 Limited support Transfer hospital - home	Limited support Transfer hospital - home B	• Preparing for the influence of the operation on the situation at home • Uncertainty regarding breathing after discharge • Availability support in transition hospital-home • Support from social services
5 Hospital Factors	**Any factors that relate to the abilities and organisation of the hospital that influence the implementation of ERATS.**		
5 Hospital Factors	5.1 Workload Data registration	Workload Data registration B	• Workload national audit data gathering • Data registration not directy from EMR
5 Hospital Factors	5.2 Logistics MDT - operation	Logistics MDT -operation F Logistics MDT -operation B	• Intake process with a departments invoved • Monitoring & managing time between MDT and Operation • Week planning: planning opertions reated to MDT date • Clarity on operation date • Support from vounteers during intake process • Patients want tob e operated on as soon as possibe
5 Hospital Factors	5.3 Added value data feedback	Added value data feedback F Added value data feedback B	• Limited motivation for data registration (without data feedback) • Imited to financial data • Data feedback can improve care • Feedback data/3months

			• Irregular feedback from national audit programme • Benchmark
5 Hospital Factors	5.4 Support for innovation by management	Support for innovation by management F Support for innovation by management B	• Support from departmental management • Support from quality improvement officers
5 Hospital Factors	5.5 Complete dataset for ERATS	Complete dataset for ERATS	• No estabished PROMS set • No data feedback
6 Surgeon factors	**Any factors that relate to the Surgeon performing the lung resection and providing perioperative care**		
6 Surgeon factors	6.1 Experience surgeon	Experience surgeon F Experience surgeon B	• Experience HCP (number of operations performed/number of patients treated)
6 Surgeon factors	6.2 Presence/availability surgeon	Presence/availability surgeon F Presence/availability surgeon B	• HCP/Surgeon availabe at the bedsise • Sufficient time for patient education • Communication HCPs-patient • Consultation by the surgeon at time of discharge
6 Surgeon factors	Empathy HCP	Empathy HCP F Empathy HCP B	

Standards for Reporting Qualitative Research (SRQR)*

http://www.equator-network.org/reporting-guidelines/srqr/

	Page/line no(s).
Title and abstract	
Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	P1/L1-3
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	P2/L30-68
Introduction	
Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	P5/L88-117
Purpose or research question - Purpose of the study and specific objectives or questions	P5/L118-123
Methods	
Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	P6-P7/L165-172 P7/L182-190
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	P7/L174-179
Context - Setting/site and salient contextual factors; rationale**	P5/L137-142
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	P6/L132-137 P6-P7/L165-167 P7/L171-172
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	P7/L193-199
Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	P7/L175-179

Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	P6-7/L165-172 P7/L175-196
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	P8/L2002-204 Table 1
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	P7/L182-196
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	P6/L165-167 P7/L182-190
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	P7/L185-190

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	P8-P12/L202-402
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	P8-P12/L202-402

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	P13-P14 /L376-448
Limitations - Trustworthiness and limitations of findings	P14/L464-472

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	P15/L486-498
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	P15/ L486-498 P15/L516-517

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

**The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.

Reference:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
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Implementing an Enhanced Recovery After Thoracic Surgery programme in the Netherlands: a qualitative study investigating facilitators and barriers for implementation.

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Abstract

Objectives:

This study aims to elucidate determinants for succesful implementation of the Enhanced Recovery After Thoracic Surgery (ERATS) protocol for perioperative care for surgical lung cancer patients in the Netherlands.

Setting:

Lung cancer operations are performed in both academic and regional hospitals, either by cardiothoracic or general thoracic surgeons. Limiting the impact of these operations by optimising and standardising perioperative care with the ERATS protocol is thought to enable reduction in length of stay, complications and costs.

Participants:

A broad spectrum of stakeholders in perioperative care for lung resection patients participated in this study, ranging from patient representatives, healthcare professionals (HCPs) to an insurance company representative.

Interventions

Semi-structured interviews (N=14) were conducted with the stakeholders (N=18). The interviews were conducted one on one by telephone and twice, face to face, in small groups. Verbatim transcriptions of these interviews were coded for the purpose of thematic analysis.

Outcome measures:

Determinants for successful implementation of the ERATS protocol in the Netherlands.

Results:

Several determinants correspond with previous publications: having a multidisciplinary team, leadership from a senior clinician and support from an ERAS®-coordinator as facilitators; lack of feedback on performance and absence of management support as barriers. Our study underscores the potential detrimental effect of inconsistent communication, the lack of support in the transition from hospital to home and the barrier posed by lack of accessible audit data.

Conclusions:

Based on a structured problem analysis among a wide selection of stakeholders, this study provides a solid basis for choosing adequate implementation strategies to introduce the ERATS protocol in the Netherlands. Emphasis on consistent and sufficient communication, support in the transition from hospital to home and adequate audit and feedback data, in addition to established implementation strategies for ERAS®-type programmes, will enable a tailored approach to implementation of ERATS in the Dutch context.

Key words: Thoracic Surgery; Enhanced Recovery After Surgery; Implementation Science; Qualitative research; Facilitators and Barriers

STRENGTHS AND LIMITATIONS

- Strength: our research approach using semi-structured interviews with a wide range of stakeholders and subsequent thematic analysis to identify facilitators and barriers for successful implementation of the ERATS protocol, makes our approach transferable to other fields, countries and contexts.
- Strength: data triangulation; due to interviews with a wide range of stakeholders, we were able to obtain different perspectives on the Dutch situation.
- Limitation: the interviewers were both surgical HCPs; we tried to limit bias with the semi-structured nature of the interviews and the use of a predetermined topic list.
- Limitation: no hospital board members and only one health insurance representative were interviewed, which might have biased the results by potentially underreporting of socio-political factors, like reimbursement and costs.

INTRODUCTION

Lung cancer has the highest incidence of cancer diagnoses and is the leading cause for cancer deaths worldwide.[1] The cornerstone of curative treatment of non-small cell lung cancer (NSCLC) is surgical resection; due to advanced stages at presentation or limited physical condition of the patients, this treatment can only be offered to approximately 20-25% of new NSCLC patients.[2] Anatomical lung resections, however, are associated with a considerable length of stay and postoperative complications that can contribute to significant morbidity.[3,4] Long-term outcome and disease free survival are worse in patients with major pulmonary complications.[3–5] In addition to these clinical outcomes, (pulmonary) complications affect patient-centred outcomes and health-care costs.[6]

Therefore, focussing on optimal recovery after surgery is essential. Limiting the impact of operations by optimising and standardising perioperative care, as propagated by the Enhanced Recovery After Surgery (ERAS®) Society, has shown to reduce length of stay, complications and costs in several other surgical fields. Limited series of ERAS®-type programmes show promising results in lung resection patients.[7–11]

In absence of a Dutch clinical guideline on perioperative care in lung resection patients, practice variation exists for these patients.[12] This variation in perioperative care is associated with variation in clinical outcomes, for example length of stay and complications.[3,4] Due to the mandatory registration in the Dutch national lung surgery audit (DLCAs), reliable national data is available regarding the number of anatomical lung resections per year (over 2,200), length of stay (4-8 days) and complications (30%) in the Netherlands.[3,4]

Based on recent recommendations of the first guideline from the ERAS® Society and the European Society of Thoracic Surgeons (ESTS) concerning this patient group, a Dutch protocol was developed.[13] This protocol is aimed at optimisation and standardisation of perioperative care for lung resection patients, and, as a consequence, reduction of practice variation: the Enhanced recovery After Thoracic Surgery (ERATS) protocol.[13]

ERAS®-type programs rely applying a set of evidence-based care interventions perioperatively.[7] While individual components might not have a significant effect, the combination of these small improvements is thought to work synergistically.[14] Correlation between overall high compliance rates with ERAS®-type protocols and better outcomes support this notion.[10,15,16] However, successful and sustained implementation of a complex multidisciplinary perioperative care protocol to achieve high compliance is challenging.[17,18]

In order to implement the ERATS-protocol succesfully, implementation strategies need to be developed that tackle existing barriers and embrace facilitators. Since facilitators and barriers are dependant on context, it is important to examine them specific to type of care and the healthcare system for which the protocol is intended. Therefore, this study aims to elucidate the facilitators and barriers for succesful implementation of the ERATS protocol in the Netherlands. These insights can be used to develop tailored implementation strategies to support implementation in practice.

METHODS

In this qualitative study, semi-structured interviews were conducted with a broad spectrum of stakeholders in perioperative care for lung resection patients.

Participants

We purposively recruited the following stakeholders in perioperative care for lung resection patients: patient representatives, healthcare professionals (HCPs), healthcare managers at departmental level, data managers, a representative of an electronic medical record (EMR) company and a representative of a healthcare insurance company. The subjects were selected in consultation with the patient advocacy group Longkanker Nederland (Lung Cancer the Netherlands) and the multidisciplinary ERATS working group of the Dutch Society for Lung Surgery (NVvL). As the majority of lung resections in the Netherlands is performed in larger, non-academic teaching hospitals by general thoracic surgeons, the HCP subjects were mostly recruited from such teaching hospitals. The remainder of the anatomical lung resections is performed mainly in the 8 academic medical centres and a few regional hospitals. HCPs from academic medical centres, a regional hospital and a cardiothoracic surgeon were interviewed to broaden the perspective and ensure a representative sample for the Dutch situation.

Patient and Public Involvement

Longkanker Nederland, has been involved in the ERATS project, prior to this problem analysis and the director (LB) participates in this study as an author. They have participated in the development of the ERATS-protocol and the design of the ERATS Trial that will follow this problem analysis. The subjects, including 2 patients and a Longkanker Nederland representative, were selected in consultation with Longkanker Nederland. All participants will receive a copy of the article, when published.

The ERATS programme

Like all ERAS®-type programmes, ERATS consists of a combination of evidence-based care interventions that are thought to work synergistically.[7,8] As an illustration: ERATS relies on preparing patients preoperatively, by giving detailed information about what to expect regarding the operation and recovery period, by limiting the fasting time and by avoiding prolonged recovery from anaesthesia by limiting use of anxiolytic medication. During the operation, hypothermia is avoided, medication is given against pain and nausea. Opioids are used as sparingly as possible to avoid side effects. Postoperatively, patients will be stimulated to mobilise and resume a normal diet early: to sit in a chair and have a normal meal on the day of operation; chest tubes, urinary catheters, IV lines, epidural catheters, etcetera are avoided as much as possible or removed as early as possible, based on clear, protocolled instructions. The combination of interventions is expected to lead to a reduction in length of stay, complications, readmissions and cost.[10,19]

Interview content/procedure

A topic guide, based on the model of Fleuren et al., served as the framework for the semi-structured interviews.[20,21] [supplementary table 1] This model describes determinants of innovation that influence

the adoption, implementation and maintenance of an innovation within the healthcare sector. It recognises four different categories: the determinants related to the innovation itself, factors concerning the users/health care professional (HCP), determinants regarding the organisation, and the socio-political context.[20] Depending on the role of the subject, different aspects of the topic guide were explored more or less extensively. When no new insights were discovered in the last 3 interviews, it was considered that sampling saturation was reached.

Process

During a 3-month period (October- December 2019), the first author (EvM) conducted 14 interviews, with occasional assistance of CdB. EvM is a general thoracic surgeon, working in a teaching hospital and lead of the national ERATS implementation effort; CdB is a resident in general surgery. Two interviews were conducted as a face-to-face group interview, the remaining 12 were conducted one-to-one, mostly by telephone. Audio was recorded from all interviews and additional notes were taken during the sessions.

Analysis

With verbatim transcription of the recordings, two of the authors (EvM and FvN) created a consensus based codebook [Supplementary table 2], by analysing two interviews independently.[22] This codebook was used to code all interviews in ATLAS.ti 8 [ATLAS.ti Scientific Software Development GmbH, Berlin, Germany]. Next, the codes were sorted and grouped together into different themes, following a thematic analysis by two of the authors (EvM and FvN).[23] To detect patterns in responses as well as for data triangulation, data was organised according to subject group as well: patient representatives, nurses, case manager, physicians, management/supportive within hospital, supportive outside hospital (Insurance/EMR).[24] The most relevant and illustrative quotes were selected after discussion among the research team.

Ethics

All subjects received study information for participants in writing, informing them of their right to withdraw their cooperation without explanation. Confidentiality was secured by limiting access to the transcripts and data to 2 of the authors (EvM and FvN), erasing recordings of the interviews after transcription and erasing identifying information from the transcripts. All participants signed an informed consent form prior to the interview. The Medical Ethics Review Committee of VU University Medical Center deemed the Medical Research Involving Human Subjects Act (WMO) not applicable and confirmed that an official approval by the committee was not required (MERC ref. 2019.488).

RESULTS

In total, 14 interviews were conducted with the stakeholders as summarized in Table 1. The healthcare managers we interviewed represented a quality improvement department, a hospital's oncology centre and a clinical surgical department. Interviews lasted on average 43 minutes (range 25-68 minutes).

The identified determinants, both facilitators and barriers, were organised thematically into five themes involving implementation of the ERATS programme. Each of the themes was divided in sub-themes *(italic),* as is described in Table 2.

Theme 1: Communication HCP-Patient

This theme relates to all communication between HCPs and patients, and how this can affect implementation.

Consistent and sufficient information flow

Many stakeholders, the patient representatives, nurses and case manager in particular, mentioned providing patients with sufficient and consistent information as an important factor for ERATS implementation. *"everything was clear and every question was answered, often before the question was even asked. They knew what you would experience every day. That gives confidence" (Patient 2)*. Receiving information that was consistent with information from other HCPs was deemed an important facilitator as well. The other side, inconsistency or lack of information as a barrier creating confusion rather than confidence, was only mentioned by patient representatives, nurses and case manager.

Support in the transition hospital-home

Patient representatives as well as HCPs mentioned the presence of a case manager as a facilitator. This was mentioned explicitly in the context of the transition from hospital care to further recovery at home. Again, while many HCPs appreciated the presence of a case manager, the potential downside of the lack of a case manager in post-discharge care only was mentioned by those closest to the patients: patient representatives, nurses and the case manager.

Use of patient feedback

Different forms of patient feedback, as contributor to quality improvement, were mentioned, ranging from formalised lists of Patient Reported Outcome Measures (PROMs) to the ability to speak to an HCP about personal experiences. "*I just want to tell someone what went wrong and hope a next patient will not have the same experience again." (Patient 1)*. Using this feedback was considered to be a facilitator for implementing change in perioperative care at the patient level, as well as at management and the insurance company level.

Theme 2: HCP professional competencies and experience

This theme encompasses the competencies of individual HCPs, both regarding HCPs' medical expertise as well as HCPs' communicator skills regarding accessibility and empathy.[25]

Different competencies and experience of a multidisciplinary team of HCPs

HCPs having the medical expertise to deliver the necessary care within their role was mentioned as an important facilitator in protocol implementation, and sometimes the lack of expertise was mentioned as a barrier. *"… often they, one more than the other, will dig their heels in. It will also depend on the training level [of the nursing staff] […] I have found that having a good team on the nursing ward is essential for patient wellbeing.] (Patient 1)*. Participation of HCPs with many years of experience was judged to enhance protocol implementation by being able to tailor the generic protocol to individual needs within a certain bandwidth.

Accessibility and empathy of HCP

Accessibility and HPC's empathy -or the lack thereof- were mentioned as facilitators and barriers respectively. However, not all HCPs were automatically expected to be able to provide these qualities all the time, as long as all needs were met by the team as a whole. *"… it would have been nice if he [physician] would have been more empathetic; sometimes he tries to be and I crack up laughing, thinking " Oh, it's so silly what you're saying now", but I like him and I can take it. My emotional issues I share with the oncology nurse." (Patient 1)*.

Coordination between HCPs

Good quality handovers and coordination between HCPs lead to a consistent treatment plan. The experience of being treated by one team with one clear plan is expected, but when this coordination among HCPs is lacking it is deemed a barrier for implementation.

Theme 3: Patient factors

The third theme concerns the baseline physical and psychological condition of the patient before surgery, as well as the social context of the patient; these factors were predominately put forward by the patient representatives.

Patient autonomy

Patient autonomy was mentioned by patients as well as several HCPs as a tool in perioperative care; respecting patients' autonomy in making the decision to undergo surgery was mentioned as an example of how to achieve motivation for the perioperative care programme. Empowering patients with information about preoperative preparation and sharing this responsibility with patients was deemed another factor that influences implementation.

Situation at home

When the home situation does not allow for early discharge after surgery, this poses a potential barrier, influencing the willingness of a patient to actively participate. Young parents, with small children or a partner with special needs, were mentioned as an example, as were older patients. *"The feeling of being*

discharged from hospital before they were ready. That is not good, obviously. That stings." (Pulmonary Physician 2).

Physical condition and age

While age was mentioned by some, the physical condition was mentioned by surgeons and patient representatives alike. Since patients, considered for lung resections, already are screened for the physical ability to undergo such a resection, the comments mostly referred to the physical ability after surgery or limitations in daily life. *"…the fitter you are, going into an operation, the easier your revovery will be." (Patient 2)*. Physical condition and age however, can influence the expectations of the healthcare professionals, as well as the expectations of the patients regarding their ability to adhere to the ERATS protocol.

Theme 4: Factors influencing change in perioperative care delivery

In order to implement the ERATS-protocol, HCP's have to be able to change the way they work. The facilitators and barriers that were mentioned mainly concern determinants at the HCP's team level, but also organisational factors associated with the change process.

Support for change

Implementation of ERATS cannot be achieved by HCPs alone; support from management is essential to adopt a multidisciplinary protocol. At management and insurance company level, socio-economic factors will come into play, where the benefits at the level of individual patients should also translate into cost-effectiveness. "*… the patient is number one, quality of medical care is two and cost is three. Those are the three pillars of our "sensible care" programme […] a protocol like the one you have developed [ERATS] follows these pillars seamlessly." (*Insurance representative).

Teamwork

Having a multidisciplinary team that works according to the same protocol was generally considered a facilitator, generating support for individual HCPs to follow ERATS. Previous negative experiences by individual HCPs or perceived contraindications for ERATS, like advanced age, can limit the willingness to implement ERATS. *",,, but this "you've had a big operation, so take it easy for another day"-approach to patients will keep emerging. So old habbits and old emotions." (Pulmonary Physician 2)*.

The perceived benefits of ERATS and the team effort to achieve multidisciplinary improvement in care were mentioned as facilitator. Another facilitator mentioned was having a clear implementation plan, aided with training sessions, educational materials for both HCPs and patients, so all HCPs know when ERATS has started.

Available time for HCPs

Not having time to gather the ERATS team and discuss implementation is one barrier, perceived extra work by ward nurses or physiotherapists in delivering ERATS another. "*Everybody is so busy; nobody has time to sit down and discuss topics like this [ERATS]". (Surgeon 2)*.
The realisation of the expected benefits of following the ERATS protocol, like reduction of complications, regarding workload can act as a facilitator as well: *"when a patient catches pneumonia, it will mean a lot more work [for the nurses] […], than just helping them mobilise early." (Quality improvement officer)*.

Receiving support by colleagues, leadership and management, declaring ERATS implementation a priority and providing logistic and administrative support was mentioned as a facilitator. Even though insurance companies do not want to get involved in specific medical decisions, they can act as a facilitator by supporting quality improvement projects like ERATS implementation in their contract negotiations.

Data collection and feedback

Insight into the effects of ERATS helps to inform patients about what to expect after an anatomical lung resection. And in turn, it also aids implementation by helping HCPs understand the consequences of their actions. *"We never look at 30-day outcome data, we're quite bad at that. We really are focused on short term effects.[…] We have difficulty understanding the influence of all our actions in the operating theatre on the 30-day outcome." (Anesthesiologist 2)*.
The work necessary for data extraction from EMRs, data processing and structured feedback sessions poses a significant barrier. While EMR companies are working on better data extraction capabilities, for now, lack of automated data extraction is deemed a barrier.

Theme 5: Usability of the ERATS protocol

While all interviewees agreed on knowledge of the protocol by the HCPs as a facilitator, the HCPs also acknowledged the potential barriers created in case of a voluminous, unclear and/or inconsistent protocol.

Concise multidisciplinary protocol

Clear instructions on procedures and guidelines were mentioned by all interviewees.Having one multidisciplinary protocol was mentioned as a facilitator in eliminating different styles of different HCPs and therefore a facilitator in adopting ERATS. Specifically, standardised, rather than physician dependent, use of minimally invasive surgical techniques and clear step by step instructions regarding pain management, were mentioned specifically as determinants of successful implementation.

Clear goals

Another sub-theme touched on having clear recovery goals to work towards by following the protocol. By informing patients and HCPs about these goals, they can be engaged to help achieve them. In contrast, sending mixed signals, due to lack of clarity of the goals of the protocol, was deemed a barrier.

Flexibility

While many of the responses mentioned the benefits of a clear and concise protocol, flexibility to deviate from the protocol was mentioned as a facilitator as well. Being able to tailor the protocol to specific needs of specific patients was mentioned as a factor to achieve acceptance and implementation of ERATS, noting that ERATS should be a method and not a goal in itself. *" I think it's a perfect plan [ERATS] and I think a lot of it is very good, as long as there is room for exceptions." (Patient 1).*

Clear logistics

The ERATS protocol is thought to provide guidance and enhance the logistic preoperative processes, while keeping time to surgery to a minimum. Postoperatively, well prepared patients are expected to be able to adhere to the clear daily goals, resulting in a predictable postoperative period.

DISCUSSION

Our qualitative study identified facilitators and barriers for successful implementation of the ERATS protocol in the Netherlands, which were organised, through thematical analysis, into 5 themes. Most facilitators and barriers reinforce findings in previous publications; most notably the necessity of a multidisciplinary team, with leadership from a senior clinician and support of an ERAS®-coordinator as facilitators; lack of feedback on performance and absence of management support as barriers.[17,18] Our study put emphasis on the potential detrimental effect of inconsistent communication, the lack of support in the transition from hospital to home and the barrier posed by lack of accessible audit data. The main references for our findings are the consensus statement on training and implementation published by the ERAS® Society and a systematic review of barriers to and facilitators of implementing enhanced recovery pathways, which was based on the Consolidated Framework for Implementation Research (CFIR).[17,18, 26]

The first theme, concerning communication between HCPs and patients, was very prominent in our interviews. In contrast to the accepted facilitator of consistent and sufficient communication, patient representatives in our study also stressed the potential barrier posed by poor or inconsistent information regarding ERATS. [17,18] The same pattern was observed regarding support in the transition hospital to home, which was viewed as a facilitator by all; the lack of support in this transition was reported as a barrier by those having to compensate for its absence: patients, their representatives and nurses. The importance of extending support beyond the hospital walls, has been described previously, but does not feature in the consensus statement nor the systematic review.[17,18,27] Our finding and the omission in both publications suggests a possible blind spot for HCPs regarding continuation of care after discharge. Empowering patients in preparation for discharge, as well as active post discharge surveillance has been shown to reduce ER visits and readmissions in ERAS patients.[28,29]

Support by management and department leadership was mentioned as essential facilitator for change in our study and is unequivocally supported by literature.[17,18] Lack of easily accessible audit and feedback data, to regularly evaluate ERATS implementation as well as patient experiences, was emphasised as a barrier; being able to show consequences of certain actions to HCP's, to provide patients with real data on what to expect and to justify investments in time and resourses to management and insurance companies, was stressed to be a key facilitator.

Having a clear and concise multidisciplinary ERATS protocol used across different specialties was thought to aid consistent execution by all involved.[18,27] High levels of protocol adherence are important to achieve the intended benefits for the patients.[10,15,16] This is, however, at odds with the call for some flexibility by some of our interviewees and in the previously mentioned patients as partners-study.[27] When individualised information or care for specific needs of a patient can be provided, high protocol adherence can still be achieved in a satisfactory manner for the patient.

Application/generalizability: Implications for practice & research

Our study adds to the body of knowledge regarding potential facilitators and barriers and their potential solutions for ERATS implementation, as discovered in the Dutch situation. In addition to the suggestions from the ERAS® Society consensus statement and the systematic review, several other implementation

strategies can be selected.[17,18] Even though there is no undisputed way to select implementation strategies, projects like the Expert Recommendations for Implementing Change (ERIC) project have created a set of well defined implementation strategies for (CFIR)-based contextual barriers that can be deployed.[30,31] The description of our methodology makes our approach transferable. This potentially aids analysis of the local situation and ERATS implementation in other contexts.[17,18]

The main take-aways from our study are that implementation strategies for ERATS in the Netherlands should put emphasis on communication between HCPs and patients supported by educational materials, preparing patients, as well as family members, to be active participants. Special provisions should be made to extend ERATS care beyond hospital wards, especially after discharge. Additional strategies should include optimisation of data collection, analysis and feedback to the ERATS Teams to regularly evaluate ERATS implementation data as well as patient experiences. Early measurable effects from implementation will motivate ERATS Teams during implementation and regular standardised evaluation of feedback data is thought to help continuous quality improvement.[32,33] Providing IT support and adequate data management will also provide data to justify the resources deployed for ERATS implementation.[34] The specific attention to these determinants will help tailor implementation strategies to the Dutch situation. A Dutch implementation study, the multicentre ERATS Trial, is currently ongoing to evaluate these implementation strategies.

Strengths & limitations

One strength of our study is data triangulation; using a wide range of stakeholders, we were able to obtain different perspectives on the Dutch situation. By definition of qualitative research is not generisable, in addition the results of our analysis are specific to the Dutch socio-political context. Yet, the research approach with semi-structured interviews and thematic analysis, makes this approach transferable to other fields, countries and contexts.

Another limitation is that the interviewers were both surgical HCPs; we tried to limit bias with the semi-structured nature of the interviews and the use of a predetermined topic list. Also, no board members and only one health insurance representative were interviewed, which might have biased the results. For this reason, socio-political factors, like reimbursement and costs, might have been underreported.

Conclusion

Based on a structured problem analysis among a wide selection of stakeholders, this study identified specific facilitators and barriers for implementing the ERATS protocol in the Netherlands. Based on our study, emphasis on consistent and sufficient communication, support in the transition from hospital to home and adequate audit and feedback data, in addition to known general guidelines on implementing ERAS®-type programmes, will enable a tailored approach to implementation of ERATS in the Dutch context.

CONFLICT OF INTEREST

Dr. von Meyenfeldt reports grants from Johnson&Johnson, outside the submitted work.

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The original data is available form the corresponding author, within the limits of the signed informed consent from the contributors. The interview guide and code book are available as supplementary material.

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564 **Table 1: Subject characteristics (N=18)**

Characteristics	N
Gender	
• Male	8
• Female	10
Age	
• 20-29	1
• 30-39	8
• 40-49	3
• 50-59	4
• >60	2
Occupation	
• General thoracic surgeon	2
• Cardiothoracic surgeon	1
• Anaesthesiologist	2
• Pulmonary physician	2
• Nurse	2
• Case manager	1
• Healthcare manager	3
• Patient representative	3
• Electronic Medical Record specialist	1
• Health insurance company representative	1
Years active in current role	
• 0-2	8
• 3-5	3
• 5-10	2
• >10	5
Organisation type of healthcare professionals/healthcare managers	N= 13
• Academic Medical Centre	2
• Teaching Hospital	10
• Regional hospital	1

Table 2: Thematical organisation of identified determinants for implementation of the Enhanced Recovery After Thoracic Surgery (ERATS) protocol in the Netherlands.

Theme	Sub theme
Communication HCP-Patient	• Consistent information • Liaison in the transition hospital-home • Use of patient experiences
HCP professional competencies and experience	• Different competencies and experience of a multidisciplinary team of HCPs • Accessibility and empathy of HCP • Coordination between HCP's/hospitals
Patient factors	• Patient autonomy • Situation at home • Physical condition and age
Factors influencing change in perioperative care delivery	• Support for change • Teamwork • Available time for HCPs • Data gathering and feedback
Usability of the ERATS protocol	• Concise multidisciplinary protocol • Clear goals • Flexibility • Clear logistics