

BMJ Open

BMJ Open is committed to open peer review. As part of this commitment we make the peer review history of every article we publish publicly available.

When an article is published we post the peer reviewers' comments and the authors' responses online. We also post the versions of the paper that were used during peer review. These are the versions that the peer review comments apply to.

The versions of the paper that follow are the versions that were submitted during the peer review process. They are not the versions of record or the final published versions. They should not be cited or distributed as the published version of this manuscript.

BMJ Open is an open access journal and the full, final, typeset and author-corrected version of record of the manuscript is available on our site with no access controls, subscription charges or pay-per-view fees (<http://bmjopen.bmj.com>).

If you have any questions on BMJ Open's open peer review process please email info.bmjopen@bmj.com

BMJ Open

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

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2021-051513
Article Type:	Original research
Date Submitted by the Author:	27-Mar-2021
Complete List of Authors:	Meyenfeldt, Erik M. von; Albert Schweitzer Hospital, Department of Thoracic Surgery; Amsterdam UMC VUMC Site, 2. Department of Public and Occupational Health and Amsterdam Public Health research institute van Nassau, Femke; Amsterdam University Medical Centres, Vrije Universiteit Amsterdam, Department of Public and Occupational health, Amsterdam Public Health Institute de Betue, Carlijn T.I.; Albert Schweitzer Hospital, Department of Thoracic Surgery Barberio, L.; Longkanker Nederland Schreurs, Wilhelmina H.; Noordwest Ziekenhuisgroep, Department of Thoracic Surgery Marres, Geertruid M.H.; Albert Schweitzer Hospital, Department of Thoracic Surgery Bonjer, H.; Amsterdam UMC - Locatie VUMC, Department of Surgery Anema, Johannes; Amsterdam UMC - Locatie VUMC, Public and Occupational health
Keywords:	Thoracic surgery < SURGERY, QUALITATIVE RESEARCH, MEDICAL EDUCATION & TRAINING, Respiratory tract tumours < ONCOLOGY

SCHOLARONE™
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

1
2
3 1 Implementing an Enhanced Recovery After Thoracic Surgery programme in
4
5
6 2 the Netherlands: a qualitative study investigating facilitators and barriers for
7
8
9 3 implementation.
10

11 4
12 5 Erik M. von Meyenfeldt^{1,2}, F. Van Nassau², Carlijn T.I. de Betue¹, L. Barberio³, Wilhelmina H. Schreurs
13 6 MD⁴, Geertruid M.H. Marres¹, H.J. Bonjer⁵, J.R. Anema²

- 14 7
15 8
16 9
17 10
18 11
19 12
20 13
21 14
22 15
23 16
24 17
25 18
26 19
27 20
28 21
29 22
30 23
31 24
32 25
33 26
34 27
35 28
36 29
37 30
38 31
39 32
40 33
41 34
42 35
43 36
44 37
45 38
46 39
47 40
48 41
49 42
50 43
51 44
52 45
53 46
54 47
55 48
56 49
57 50
58 51
59 52
60 53
1. Department of Thoracic Surgery, Lung Cancer Centre, Albert Schweitzer Hospital, Dordrecht, The Netherlands
 2. Department of Public and Occupational Health and Amsterdam Public Health research institute, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands
 3. Longkanker Nederland, The Netherlands
 4. Department of Thoracic Surgery, Northwest Clinics, Alkmaar, The Netherlands
 5. Department of Surgery, Amsterdam Academic Medical Centre, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands

34 16 **Word count:** 4078

35 18 No Conflicts of interest / No Funding to declare

36 20 Corresponding Author:

37 21 Erik M. von Meyenfeldt,

38 22 Albert Schweitzer Hospital,

39 23 PO box 444

40 24 3300 AK Dordrecht

41 25 The Netherlands

42 26 Tel: + 31 (0)78 654 11 11

43 27 Email: e.m.von.meyenfeldt@asz.nl

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

29 Abstract

30 Objectives:

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

34

35 Setting:

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

40

41 Participants:

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

45

46 Interventions

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

50

51 Outcome measures:

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

53

54 Results:

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

60

61 Conclusions:

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

68

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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

For peer review only

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

72 STRENGTHS AND LIMITATIONS

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

peer review only

86 INTRODUCTION

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

95 In order to take full advantage of the curative potential of surgical treatment of NSCLC, focussing on
96 optimal recovery after surgery is essential. Limiting the impact of operations by optimising and
97 standardising perioperative care, as propagated by the Enhanced Recovery After Surgery (ERAS®)
98 Society, has shown to reduce length of stay, complications and costs in several other surgical fields.
99 Limited series of ERAS®-type programmes show promising results in lung resection patients.[7–11]
100 In absence of a Dutch clinical guideline on perioperative care in lung resection patients, practice variation
101 exists for these patients.[12] This variation in perioperative care is associated with variation in clinical
102 outcomes, for example length of stay and complications.[3,4] Due to the mandatory registration in the
103 Dutch national lung surgery audit (DLCAs), reliable national data is available regarding the number of
104 anatomical lung resections per year (over 2,200), length of stay (4-8 days) and complications (30%) in
105 the Netherlands.[3,4]

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

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

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

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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

1
2
3 164 the users/health care professional (HCP), determinants regarding the organisation, and the socio-political
4 165 context.[20] Depending on the role of the subject, different aspects of the topic guide were explored more
5 166 or less extensively. When no new insights were discovered in the last 3 interviews, it was considered that
6 167 sampling saturation was reached.
7
8

10 169 **Process**

11
12 170 During a 3-month period (October- December 2019), the first author (EvM) conducted 14 interviews, with
13 171 occasional assistance of CdB. EvM is a general thoracic surgeon, working in a teaching hospital and lead
14 172 of the national ERATS implementation effort; CdB is a resident in general surgery. Two interviews were
15 173 conducted as a face-to-face group interview, the remaining 12 were conducted one-to-one, mostly by
16 174 telephone. Audio was recorded from all interviews and additional notes were taken during the sessions.
17
18
19 175

20 176 **Analysis**

21
22 177 With verbatim transcription of the recordings, two of the authors (EvM and FvN) created a consensus
23 178 based codebook [Supplementary table 2], by analysing two interviews independently.[22] This codebook
24 179 was used to code all interviews in ATLAS.ti 8 [ATLAS.ti Scientific Software Development GmbH, Berlin,
25 180 Germany]. Next, the codes were sorted and grouped together into different themes, following a thematic
26 181 analysis by two of the authors (EvM and FvN).[23] To detect patterns in responses as well as for data
27 182 triangulation, data was organised according to subject group as well: patient representatives, nurses,
28 183 case manager, physicians, management/supportive within hospital, supportive outside hospital
29 184 (Insurance/EMR).[24] The most relevant and illustrative quotes were selected after discussion among the
30 185 research team.
31
32
33
34
35 186

36 187 **Ethics**

37
38 188 All subjects received study information for participants in writing, informing them of their right to withdraw
39 189 their cooperation without explanation. Confidentiality was secured by limiting access to the transcripts
40 190 and data to 2 of the authors (EvM and FvN), erasing recordings of the interviews after transcription and
41 191 erasing identifying information from the transcripts. All participants signed an informed consent form prior
42 192 to the interview. The Medical Ethics Review Committee of VU University Medical Center deemed the
43 193 Medical Research Involving Human Subjects Act (WMO) not applicable and confirmed that an official
44 194 approval by the committee was not required (MERC ref. 2019.488).
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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

1
2
3 236 insurance company level. "...getting a wider spread of knowledge among patients. The best thing is when
4 237 patients themselves start asking for what they want and how they want their care to be provided.
5
6 238 Stimulating this is a role we have fulfil...". (insurance company representative)
7
8 239

9 240 **Theme 2: HCP professional competencies and experience**

10 241 This theme encompasses the competencies of individual HCPs, both regarding HCPs' medical expertise
11
12 242 as well as HCPs' communicator skills regarding accessibility and empathy.[25]
13 243

14 244 ***Different competencies and experience of a multidisciplinary team of HCPs***

15
16 245 HCPs having the medical expertise to deliver the necessary care within their role was mentioned as an
17
18 246 important facilitator in protocol implementation, and sometimes the lack of expertise was mentioned as a
19 247 barrier. "... often they, one more than the other, will dig their heels in. It will also depend on the training
20 248 level [of the nursing staff] [...] I have found that having a good team on the nursing ward is essential for
21
22 249 patient wellbeing.] (Patient 1). Participation of HCPs with many years of experience was judged to
23 250 enhance protocol implementation by being able to tailor the generic protocol to individual needs within a
24
25 251 certain bandwidth.
26 252

27 253 ***Accessibility and empathy of HCP***

28
29 254 Accessibility and HCP's empathy -or the lack thereof- were mentioned as facilitators and barriers
30
31 255 respectively. However, not all HCPs were automatically expected to be able to provide these qualities all
32 256 the time, as long as all needs were met by the team as a whole. "... it would have been nice if he
33 257 [physician] would have been more empathetic; sometimes he tries to be and I crack up laughing, thinking
34
35 258 "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
36 259 the oncology nurse." (Patient 1).
37
38 260

39 261 ***Coordination between HCPs***

40 262 Good quality handovers and coordination between HCPs lead to a consistent treatment plan. The
41
42 263 experience of being treated by one team with one clear plan is expected, but when this coordination
43 264 among HCPs is lacking it is deemed a barrier for implementation.
44
45 265

46 266 **Theme 3: Patient factors**

47
48 267 The third theme concerns the baseline physical and psychological condition of the patient before surgery,
49 268 as well as the social context of the patient; these can be both facilitators and barriers. The factors
50
51 269 mentioned within this theme, were predominately put forward by the patient representatives.
52 270

53 271 ***Patient autonomy***

54
55 272 Patient autonomy was mentioned by patients as well as several HCPs as a tool in perioperative care;
56 273 respecting patients' autonomy in making the decision to undergo surgery was mentioned as an example
57
58 274 of how to achieve motivation for the perioperative care programme. Providing patients with information
59 275 about preoperative preparation and sharing responsibility for optimisation of physical condition can
60

1
2
3 276 contribute to empowerment to make decisions and was deemed another factor that influences
4 277 implementation.

5 278
6 279 **Situation at home**

7 280 When the home situation does not allow for early discharge after surgery, or no measures can be taken
8 281 to improve home situation, this poses a potential barrier, influencing the willingness of a patient to
9 282 actively participate. Young parents, having to take care of their infants and patients with a partner with
10 283 special needs were mentioned as an example, as well as older patients. *"The feeling of being discharged*
11 284 *from hospital before they were ready. That is not good, obviously. That stings."* (Pulmonary Physician 2).

12 285
13 286 **Physical condition and age**

14 287 While age was mentioned by some, the physical condition was mentioned by surgeons and patient
15 288 representatives alike. Since patients, considered for lung resections, already are screened for the
16 289 physical ability to undergo such a resection, the comments mostly referred to the physical ability after
17 290 surgery or limitations in daily life. *"...the fitter you are, going into an operation, the easier your recovery*
18 291 *will be."* (Patient 2). Physical condition and age however, can influence the expectations of the healthcare
19 292 professionals, as well as the expectations of the patients regarding their ability to adhere to the ERATS
20 293 protocol.

21 294
22 295 **Theme 4: Factors influencing change in perioperative care delivery**

23 296 In order to implement the ERATS-protocol, HCP's have to be able to change the way they work. The
24 297 facilitators and barriers that were mentioned mainly concern determinants at the HCP's team level, but
25 298 also organisational factors associated with the change process.

26 299
27 300 **Support for change**

28 301 Implementation of ERATS cannot be achieved by HCPs alone; support from management is essential to
29 302 adopt a multidisciplinary protocol. At management and insurance company level, socio-economic factors
30 303 will come into play, where the benefits at the level of individual patients should also translate into cost-
31 304 effectiveness. *"... the patient is number one, quality of medical care is two and cost is three. Those are*
32 305 *the three pillars of our "sensible care" programme [...] a protocol like the one you have developed*
33 306 *[ERATS] follows these pillars seamlessly."* (Insurance representative).

34 307
35 308 **Teamwork**

36 309 Having a multidisciplinary team that works according to the same protocol was generally considered a
37 310 facilitator for ERATS implementation, generating support for individual HCPs to follow ERATS. Previous
38 311 negative experiences by individual HCPs with early discharge or perceived contraindications for ERATS,
39 312 like advanced age, can limit the willingness to implement ERATS. *"Yes, in theory everybody [HCP] can*
40 313 *know what is expected of them, but this "you've had a big operation, so take it easy for another day"-*
41 314 *approach to patients will keep emerging. So old habits and old emotions."* (Pulmonary Physician 2).

42 315
43 316
44 317
45 318
46 319
47 320
48 321
49 322
50 323
51 324
52 325
53 326
54 327
55 328
56 329
57 330
58 331
59 332
60

1
2
3 316 The perceived benefits of ERATS and the team effort to achieve multidisciplinary improvement in care
4 317 were mentioned as facilitator. Another facilitator mentioned was having a clear implementation plan,
5 318 aided with training sessions, educational materials for both HCPs and patients, so all HCPs know when
6 319 ERATS has started.
7
8
9 320

10 321 **Available time for HCPs**

11 322 Workload was mentioned as a barrier by several HCPs. Not having time to gather the ERATS team and
12 323 discuss implementation is one factor, perceived extra work by ward nurses or physiotherapists in
13 324 delivering ERATS another. *"Everybody is so busy; nobody has time to sit down and discuss topics like
14 325 this [ERATS]". (Surgeon 2).*

15 326 The realisation of the expected benefits of following the ERATS protocol, like reduction of complications,
16 327 regarding workload can act as a facilitator as well: *"when a patient catches pneumonia, it will mean a lot
17 328 more work [for the nurses] [...], than just helping them mobilise early." (Quality improvement officer).*
18 329

19 330 Receiving support by colleagues, leadership and management, declaring ERATS implementation a
20 331 priority and providing logistic and administrative support was mentioned as a facilitator. Even though
21 332 insurance companies do not want to get involved in specific medical decisions, they can act as a
22 333 facilitator by supporting quality improvement projects like ERATS implementation in their contract
23 334 negotiations.
24
25
26
27
28
29
30
31

32 336 **Data collection and feedback**

33 337 Insight into the effects of ERATS helps to inform patients about what to expect after an anatomical lung
34 338 resection. And in turn, it also aids implementation by helping HCPs understand the consequences of their
35 339 actions. *"We never look at 30-day outcome data, we're quite bad at that. We really are focused on short
36 340 term effects.[...] We have difficulty understanding the influence of all our actions in the operating theatre
37 341 on the 30-day outcome." (Anesthesiologist 2).*

38 342 The work necessary for data extraction from EMRs, data processing and structured feedback sessions
39 343 poses a significant barrier. While EMR companies are working on better data extraction capabilities, for
40 344 now, lack of automated data extraction is deemed a barrier.
41
42
43
44
45
46

47 346 **Theme 5: Usability of the ERATS protocol**

48 347 While all interviewees agreed on knowledge of the protocol by the HCPs as a facilitator, the HCPs also
49 348 acknowledged the potential barriers created in case of a voluminous, unclear and/or inconsistent
50 349 protocol.
51
52

53 351 **Concise multidisciplinary protocol**

54 352 Clear instructions on procedures and guidelines were mentioned by all interviewees. Having one
55 353 multidisciplinary protocol was mentioned as a facilitator in eliminating different styles of different HCPs
56 354 and therefore a facilitator in adopting ERATS. Specifically, standardised, rather than physician
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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

357

358 **Clear goals**

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

363

364 **Flexibility**

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

370

371 **Clear logistics**

372 The ERATS protocol is thought to provide guidance and enhance the logistic preoperative processes,
373 while keeping time to surgery to a minimum. Postoperatively, well prepared patients are expected to be
374 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 resources 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

1

2

3 416 (ERIC) project have created a set of well defined implementation strategies for (CFIR)-based contextual
4 417 barriers that can be deployed.[30,31]

6 418 The main take-aways from our study are that implementation strategies for ERATS in the Netherlands
7 419 should put emphasis on communication between HCPs and patients supported by educational materials,
8 420 preparing patients, as well as family members, to be active participants. Special provisions should be
9 421 made to extend ERATS care beyond hospital wards, especially after discharge. Additional strategies
10 422 should include optimisation of data collection, analysis and feedback to the ERATS Teams to regularly
11 423 evaluate ERATS implementation data as well as patient experiences. Early measurable effects from
12 424 implementation will motivate ERATS Teams during implementation and regular standardised evaluation
13 425 of feedback data is thought to help continuous quality improvement.[32,33] Providing IT support and
14 426 adequate data management will also provide data to justify the resources deployed for ERATS
15 427 implementation.[34] The specific attention to these determinants will help tailor implementation strategies
16 428 to the Dutch situation.

21 429

23 430 **Strengths & limitations**

24 431 One strength of our study is data triangulation; using a wide range of stakeholders, we were able to
25 432 obtain different perspectives on the Dutch situation. By definition of qualitative research is not
26 433 generisable, in addition the results of our analysis are specific to the Dutch socio-political context. Yet,
27 434 the research approach with semi-structured interviews and thematic analysis, makes this approach
28 435 transferable to other fields, countries and contexts.

29 436 Another limitation is that the interviewees were both surgical HCPs; we tried to limit bias with the semi-
30 437 structured nature of the interviews and the use of a predetermined topic list. Most of the interviewed
31 438 stakeholders were health care professionals and patients; no board members and only one health
32 439 insurance representative were interviewed, which might have biased the results. For this reason, socio-
33 440 political factors, like reimbursement and costs, might have been underreported.

34 441

36 442 **Conclusion**

37 443 Based on a structured problem analysis among a wide selection of stakeholders, this study identified
38 444 specific facilitators and barriers for implementing the ERATS protocol in the Netherlands. Based on our
39 445 study, emphasis on consistent and sufficient communication, support in the transition from hospital to
40 446 home and adequate audit and feedback data, in addition to known general guidelines on implementing
41 447 ERAS®-type programmes, will enable a tailored approach to implementation of ERATS in the Dutch
42 448 context.

43 449

44

45

46

47

48

49

50

51

52

53

54

55

56

57

58

59

60

1
2
3 451 **CONFLICT OF INTEREST**

4
5 452 Dr. von Meyenfeldt reports grants from Johnson&Johnson, outside the submitted work.

6
7 453 Dr. Barberio, in her capacity as director of Longkanker Nederland, reports subsidies from KWF

8
9 454 kankerbestrijding and PGO subsidie, grants from Abbvie, grants from AMGEN, grants from Astra Zeneca,

10
11 455 grants from Boehringer Ingelheim, grants from BM-S, grants from Janssen-Cilag, grants from MSD,

12
13 456 grants from Novartis, grants from Pfizer, grants from Roche, grants from Takeda; all outside the

14
15
16 457 submitted work.

17
18 458 Prof. Anema reports grants from Various, grants from Various, grants from Pfizer & ZonMw, personal

19
20 459 grant from Dutch Social Security Agency, personal fees from Various and personal fees from Evalua Ltd,

21
22 460 outside the submitted work; and he was an invited co-opted member of the guideline development group

23
24 461 for the Dutch Occupational Medicine guideline for low back pain and the Dutch national Insurance

25
26 462 Medicine protocol for Lumbosacral syndrome. He is appointed in 2016 as president of the Work disability

27
28
29 463 Prevention and Integration committee of the International Commission on Occupational Health (ICOH).

30
31 464
32 465 **AUTHOR STATEMENT:**

33
34 466 Conception and design of the study: Erik M. von Meyenfeldt, F. Van Nassau, J.R. Anema

35 467 Acquisition of data: Erik M. von Meyenfeldt, Carlijn T.I. de Betue, L. Barberio

36 468 Analysis and/or interpretation of data: Erik M. von Meyenfeldt, F. Van Nassau, Carlijn T.I. de Betue,

37
38 469 L. Barberio, Wilhelmina H. Schreurs, Geertruid M.H. Marres, H.J. Bonjer, J.R. Anema

39 470 Drafting the manuscript: Erik M. von Meyenfeldt, F. Van Nassau,

40
41 471 Revising the manuscript critically for important intellectual content: Erik M. von Meyenfeldt, F. Van

42 472 Nassau, Carlijn T.I. de Betue, L. Barberio, Wilhelmina H. Schreurs, Geertruid M.H. Marres, H.J. Bonjer,

43
44 473 J.R. Anema

45 474 All authors approved the version of the manuscript to be published.

46
47 475
48 476 **DATA STATEMENT:**

49 477 The original data is available from the corresponding author, within the limits of the signed informed

50
51 478 consent from the contributors. The interview guide and code book are available as supplementary

52 479 material.

53
54 480
55 481 **FUNDING**

56
57 482 **Not Applicable**

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

REFERENCES

- 1 Bray F, Ferlay J, Soerjomataram I, *et al.* Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2018;**68**:394–424.
- 2 Thorsteinsson H, Alexandersson A, Oskarsdottir GN, *et al.* Resection Rate and Outcome of Pulmonary Resections for Non – Small-Cell Lung Cancer. *JTO Acquis* 2012;**7**:1164–9.
- 3 Von Meyenfeldt EM, Hoeijmakers F, Marres GMH, *et al.* Variation in length of stay after minimally invasive lung resection: A reflection of perioperative care routines? *Eur J Cardio-thoracic Surg* 2020;**57**:747–53.
- 4 von Meyenfeldt EM, Marres GMH, van Thiel E, *et al.* Variation in length of hospital stay after lung cancer surgery in the Netherlands†. *Eur J Cardio-Thoracic Surg* 2018;**54**:560–4.
- 5 Wang S, Li X, Li Y, *et al.* The long-term impact of postoperative pulmonary complications after video-assisted thoracic surgery lobectomy for lung cancer. *J Thorac Dis* 2017;**9**:5143–52.
- 6 Templeton R, Greenhalgh D. Preoperative rehabilitation for thoracic surgery. *Curr Opin Anaesthesiol* 2019;**32**:23–8.
- 7 Ljungqvist O, Scott M, Fearon KC. Enhanced Recovery After Surgery. *JAMA Surg* 2017;**152**:292–8.
- 8 Senturk JC, Kristo G, Gold J, *et al.* The Development of ERAS Across Surgical Specialties. *J Laparoendosc Adv Surg Tech* 2017;**27**:863–70.
- 9 Brunelli A, Imperatori A, Droghetti A. Enhanced recovery pathways version 2.0 in thoracic surgery. *J Thorac Dis* 2018;**10**:S497–8.
- 10 Rogers LJ, Bleetman D, Messenger DE, *et al.* The impact of enhanced recovery after surgery (ERAS) protocol compliance on morbidity from resection for primary lung cancer. *J Thorac Cardiovasc Surg* 2018;**155**:1843–52.
- 11 Hubert J, Bourdages-Pageau E, Paradis Garneau CA, *et al.* Enhanced recovery pathways in thoracic surgery: The Quebec experience. *J Thorac Dis* 2018;**10**:S583–90.
- 12 von Meyenfeldt EM, de Betue CTI, van den Berg R, *et al.* Wide Variation in Perioperative Care in Anatomical Lung Resections in the Netherlands: A National Survey. *Semin Thorac Cardiovasc Surg* 2020;**32**:1101–10.
- 13 Batchelor TJP, Rasburn NJ, Abdelnour-Berchtold E, *et al.* Guidelines for enhanced recovery after lung surgery: recommendations of the Enhanced Recovery After Surgery (ERAS®) Society and the European Society of Thoracic Surgeons (ESTS). *Eur J Cardio-Thoracic Surg* 2019;**55**:91–115.
- 14 Kehlet H, Wilmore DW. Evidence-based surgical care and the evolution of fast-track surgery. *Ann Surg* 2008;**248**:189–98.
- 15 Currie A, Burch J, Jenkins JT, *et al.* The impact of enhanced recovery protocol compliance on elective colorectal cancer resection: Results from an international registry. *Ann Surg* 2015;**261**:1153–9.
- 16 Arrick L, Mayson K, Hong T, *et al.* Enhanced recovery after surgery in colorectal surgery: Impact of protocol adherence on patient outcomes. *J Clin Anesth* 2019;**55**:7–12.
- 17 Francis NK, Walker T, Carter F, *et al.* Consensus on Training and Implementation of Enhanced

- 1
2
3 524 Recovery After Surgery: A Delphi Study. *World J Surg* 2018;**42**:1919–28.
- 4
5 525 18 Stone AB, Yuan CT, Rosen MA, *et al.* Barriers to and facilitators of implementing enhanced
6 526 recovery pathways using an implementation framework: A systematic review. *JAMA Surg*
7 527 2018;**153**:270–8.
- 8
9 528 19 Mazza F, Venturino M, Turello D, *et al.* Enhanced recovery after surgery: adherence and
10 529 outcomes in elderly patients undergoing VATS lobectomy. *Gen Thorac Cardiovasc Surg*
11 530 2020;**68**:1003–10.
- 12
13 531 20 Fleuren M, Wiefferink K, Paulussen T. Determinants of innovation within health care
14 532 organizations. Literature review and Delphi study. *Int. J. Qual. Heal. Care.* 2004;**16**:107–23.
- 15
16 533 21 Fleuren MAH, Paulussen TGWM, Dommelen ., *et al.* Towards a measurement instrument for
17 534 determinants of innovations. *Int J Qual Heal Care* 2014;**26**:501–10.
- 18
19 535 22 Mays N, Pope C. Assessing quality in qualitative research. *Br Med J* 2000;**320**:50–2.
- 20
21 536 23 Castleberry A, Nolen A. Thematic analysis of qualitative research data: Is it as easy as it sounds?
22 537 *Curr Pharm Teach Learn* 2018;**10**:807–15.
- 23
24 538 24 Braun V. What can “ thematic analysis ” offer health and wellbeing researchers ? *Int J Qual Stud*
25 539 *Health Well-being* 2014;**1**:9–10.
- 26
27 540 25 Frank JR, Snell L, Sherbino J E. CanMEDS 2015. *CanMEDS 2015 Physician Competency Fram*
28 541 *Ottawa R Coll Physicians Surg Canada* 2015;:1–30.
- 29
30 542 <http://www.royalcollege.ca/portal/page/portal/rc/canmeds/resources/publications>
- 31
32 543 26 Damschroder LJ, Aron DC, Keith RE, *et al.* Fostering implementation of health services research
33 544 findings into practice: A consolidated framework for advancing implementation science. *Implement*
34 545 *Sci* 2009;**4**:1–15.
- 35
36 546 27 Gillis C, Gill M, Marlett N, *et al.* Patients as partners in Enhanced Recovery after Surgery: A
37 547 qualitative patient-led study. *BMJ Open* 2017;**7**:1–10.
- 38
39 548 28 Borsuk DJ, AL-Khamis A, Geiser AJ, *et al.* S128: Active post discharge surveillance program as a
40 549 part of Enhanced Recovery After Surgery protocol decreases emergency department visits and
41 550 readmissions in colorectal patients. *Surg Endosc* 2019;**33**:3816–27.
- 42
43 551 29 Braet A, Weltens C, Sermeus W. Effectiveness of discharge interventions from hospital to home
44 552 on hospital readmissions: a systematic review. *JBI database Syst Rev Implement reports*
45 553 Published Online First: 2016.
- 46
47 554 30 Powell, B.J., Waltz, T.J., Chinman, M.J., Damschroder, L.J., Smith, J.L., Matthieu, M.M., Proctor,
48 555 E.K. K, J.E. A refined compilation of implementation strategies: results from the Expert
49 556 Recommendations for Implementing Change (ERIC) project. *Implement Sci* 2015;1–14.
- 50
51 557 31 Waltz TJ, Powell BJ, Fernández ME, *et al.* Choosing implementation strategies to address
52 558 contextual barriers: Diversity in recommendations and future directions. *Implement Sci* 2019;**14**:1–
53 559 15.
- 54
55 560 32 Gotlib Conn L, McKenzie M, Pearsall EA, *et al.* Successful implementation of an enhanced
56 561 recovery after surgery programme for elective colorectal surgery: A process evaluation of
57 562 champions’ experiences. *Implement Sci* 2015;**10**:1–11.
- 58
59 563 33 McLeod RS, Aarts MA, Chung F, *et al.* Development of an enhanced recovery after surgery
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

564 guideline and implementation strategy based on the knowledge-to-action cycle. *Ann Surg*
565 2015;**262**:1016–25.
566 34 McEvoy MD, Wanderer JP, King AB, *et al*. A perioperative consult service results in reduction in
567 cost and length of stay for colorectal surgical patients: evidence from a healthcare redesign
568 project. *Perioper Med* 2016;**5**:1–10.

For peer review only

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

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

573
574

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	<ul style="list-style-type: none"> • Consistent information • Liaison in the transition hospital-home • Use of patient experiences
HCP professional competencies and experience	<ul style="list-style-type: none"> • Different competencies and experience of a multidisciplinary team of HCPs • Accessibility and empathy of HCP • Coordination between HCP's/hospitals
Patient factors	<ul style="list-style-type: none"> • Patient autonomy • Situation at home • Physical condition and age
Factors influencing change in perioperative care delivery	<ul style="list-style-type: none"> • Support for change • Teamwork • Available time for HCPs • Data gathering and feedback
Usability of the ERATS protocol	<ul style="list-style-type: none"> • Concise multidisciplinary protocol • Clear goals • Flexibility • Clear logistics

575

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)

- 1
- 2
- 3 • Are there conflicting goals between different professional groups? If a professional group does not
- 4 want to work in accordance with ERATS, are there financial consequences? For example, professional
- 5 groups benefit from longer admission / or more invasive treatments (ICU? Anesthesia?).
- 6
- 7
- 8
- 9 • How do you think we can best fit ERATS into daily practice? What is needed for incorporation into daily
- 10 practice?
- 11

12 Prompts:

- 13 ○ Do you consider it part of your task to follow ERATS? (MIDI D10)
- 14 ○ Do you think you can manage your ERATS tasks? (MIDI D16)
- 15 ○ What information do you need to be able to implement ERATS properly? (MIDI D27)
- 16 ○ Who expects you to work according to ERATS? (MIDI D15)
- 17 ○ Whose opinion is important to you (MIDI D15)
- 18 ○ What is the role of feedback on the results achieved with ERATS? What data do you need?
- 19 How should this data be collected? (MIDI D6)
- 20 ○ What is the role of feedback on the progress of ERATS implementation in your organization?
- 21 (MIDI D28)
- 22
- 23
- 24
- 25
- 26
- 27
- 28
- 29
- 30
- 31
- 32
- 33
- 34
- 35
- 36
- 37
- 38
- 39
- 40
- 41
- 42
- 43
- 44
- 45
- 46
- 47
- 48
- 49
- 50
- 51
- 52
- 53
- 54
- 55
- 56
- 57
- 58
- 59
- 60

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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Everyone has their own ways Colleague tells something different / varying stories
3 Team Factors	3.2 Case manager	Case manager F	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Inadequate referral to pain team Presence of cross-team consultation Good handovers between HCPs Short lines between HCPs Good cooperation with anaesthesiology department Explanation of the process by lung specialist
3 Team Factors	3.4 contact post-discharge	Post-discharge contact F Post-discharge contact B	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Stricter guidance by physiotherapist Clear appointments with physiotherapist Strict and clear guidance by nurses
3 Team Factors	3.6 Work pressure Ward	Work pressure ward B	<ul style="list-style-type: none"> Overburdened nurses/limited time



3 Team Factors	3.7 Willingness to change	Willingness to change F Willingness to change B	<ul style="list-style-type: none"> • Rigidity by ward personnel • Being early adopters • Initiative for change with the surgeons
3 Team Factors	3.8 Support team leaders	Support team leader F Support team leader B	
3 Team Factors	3.9 Use of patient experiences	Use patient experiences F Use patient experiences B	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • The old protocol is very extensive
4 Protocol Factors	4.2 Flexibility within bandwidth	Flexibility within bandwidth F Flexibility within bandwidth B	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Limited time for preparation by physiotherapist/dietician • Rigid guideline regarding time between MDT-Operation • Limited time between intake-operation
4 Protocol Factors	4.4 knowledge of the protocol by HCP	knowledge of the protocol by HCP F knowledge of the protocol by HCP B	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Strive for a minimally invasive technique



1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46

4 Protocol Factors	4.7 Protocol discharge criteria clear	Protocol discharge criteria clear F	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 possible
5 Hospital Factors	5.3 Added value data feedback	Added value data feedback F Added value data feedback B	<ul style="list-style-type: none"> • Limited motivation for data registration (without data feedback) • Iimited to financial data • Data feedback can improve care • Feedback data/3months



			<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Support from departmental management • Support from quality improvement officers
5 Hospital Factors	5.5 Complete dataset for ERATS	Complete dataset for ERATS	<ul style="list-style-type: none"> • No established 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • HCP/Surgeon available at the bedside • 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

<p>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</p>	P1/L1-3
<p>Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions</p>	P2/L29-67

Introduction

<p>Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement</p>	P5/L86-120
<p>Purpose or research question - Purpose of the study and specific objectives or questions</p>	P5/L120-122

Methods

<p>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**</p>	P6-P7/L160-166 P7/L176-184
<p>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</p>	P7/L168-173
<p>Context - Setting/site and salient contextual factors; rationale**</p>	P5/L134-137
<p>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**</p>	P6/L128-134 P6/L160-162 P7/L166-167
<p>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</p>	P7/L188-194
<p>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**</p>	P7/L170-174

1 2 3 4 5	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
6 7 8	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
9 10 11 12	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
13 14 15 16	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
17 18 19 20	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

23 24 25 26	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
27 28 29	Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	P8-P12/L196-374

Discussion

32 33 34 35 36 37	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
38 39	Limitations - Trustworthiness and limitations of findings	P14/L430-440

Other

42 43 44	Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	P15/L451-464
45 46	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.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

**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
DOI: 10.1097/ACM.0000000000000388

For peer review only

BMJ Open

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

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2021-051513.R1
Article Type:	Original research
Date Submitted by the Author:	04-Nov-2021
Complete List of Authors:	Meyenfeldt, Erik M. von; Albert Schweitzer Hospital, Surgery; Amsterdam UMC VUMC Site, 2. Department of Public and Occupational Health and Amsterdam Public Health research institute van Nassau, Femke; Amsterdam University Medical Centres, Vrije Universiteit Amsterdam, Department of Public and Occupational health, Amsterdam Public Health Institute de Betue, Carlijn T.I.; Albert Schweitzer Hospital, Department of Thoracic Surgery Barberio, L.; Longkanker Nederland Schreurs, Wilhelmina H.; Noordwest Ziekenhuisgroep, Department of Thoracic Surgery Marres, Geertruid M.H.; Albert Schweitzer Hospital, Department of Thoracic Surgery Bonjer, H.; Amsterdam UMC - Locatie VUMC, Department of Surgery Anema, Johannes; Amsterdam UMC - Locatie VUMC, Public and Occupational health
Primary Subject Heading:	Surgery
Secondary Subject Heading:	Medical education and training, Medical management, Oncology, Patient-centred medicine, Qualitative research
Keywords:	Thoracic surgery < SURGERY, QUALITATIVE RESEARCH, MEDICAL EDUCATION & TRAINING, Respiratory tract tumours < ONCOLOGY, Organisational development < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Protocols & guidelines < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

SCHOLARONE™
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

1
2
3 1 Implementing an Enhanced Recovery After Thoracic Surgery programme in
4
5
6 2 the Netherlands: a qualitative study investigating facilitators and barriers for
7
8
9 3 implementation.

10
11 4
12 5 Erik M. von Meyenfeldt^{1,2}, F. Van Nassau², Carlijn T.I. de Betue¹, L. Barberio³, Wilhelmina H. Schreurs
13 6 MD⁴, Geertruid M.H. Marres¹, H.J. Bonjer⁵, J.R. Anema²

- 14 7
15 8
16 9
17 10
18 11
19 12
20 13
21 14
22 15
23 16
24 17
25 18
26 19
27 20
28 21
29 22
30 23
31 24
32 25
33 26
34 27
35 28
36 29
37 30
38 31
39 32
40 33
41 34
42 35
43 36
44 37
45 38
46 39
47 40
48 41
49 42
50 43
51 44
52 45
53 46
54 47
55 48
56 49
57 50
58 51
59 52
60 53
1. Department of Thoracic Surgery, Lung Cancer Centre, Albert Schweitzer Hospital, Dordrecht, The Netherlands
 2. Department of Public and Occupational Health and Amsterdam Public Health research institute, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands
 3. Longkanker Nederland, The Netherlands
 4. Department of Thoracic Surgery, Northwest Clinics, Alkmaar, The Netherlands
 5. Department of Surgery, Amsterdam Academic Medical Centre, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands

16 Word count: 3991

18 No Conflicts of interest / No Funding to declare

20 Corresponding Author:

21 Erik M. von Meyenfeldt,
22 Albert Schweitzer Hospital,
23 PO box 444
24 3300 AK Dordrecht
25 The Netherlands
26 Tel: + 31 (0)78 654 11 11
27 Email: e.vonmeyenfeldt@amsterdamumc.nl

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

29 Abstract

30 Objectives:

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

34

35 Setting:

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

40

41 Participants:

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

45

46 Interventions

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

50

51 Outcome measures:

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

53

54 Results:

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

60

61 Conclusions:

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

68

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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

For peer review only

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

72 STRENGTHS AND LIMITATIONS

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

peer review only

86 INTRODUCTION

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

95 Therefore, focussing on optimal recovery after surgery is essential. Limiting the impact of operations by
96 optimising and standardising perioperative care, as propagated by the Enhanced Recovery After Surgery
97 (ERAS®) Society, has shown to reduce length of stay, complications and costs in several other surgical
98 fields. Limited series of ERAS®-type programmes show promising results in lung resection patients.[7–
99 11]

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

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

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

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

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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

1
2
3 164 the adoption, implementation and maintenance of an innovation within the healthcare sector. It
4 165 recognises four different categories: the determinants related to the innovation itself, factors concerning
5 166 the users/health care professional (HCP), determinants regarding the organisation, and the socio-political
6 167 context.[20] Depending on the role of the subject, different aspects of the topic guide were explored more
7 168 or less extensively. When no new insights were discovered in the last 3 interviews, it was considered that
8 169 sampling saturation was reached.
9
10
11
12 170

13 171 **Process**

14 172 During a 3-month period (October- December 2019), the first author (EvM) conducted 14 interviews, with
15 173 occasional assistance of CdB. EvM is a general thoracic surgeon, working in a teaching hospital and lead
16 174 of the national ERATS implementation effort; CdB is a resident in general surgery. Two interviews were
17 175 conducted as a face-to-face group interview, the remaining 12 were conducted one-to-one, mostly by
18 176 telephone. Audio was recorded from all interviews and additional notes were taken during the sessions.
19
20
21
22 177

23 178 **Analysis**

24 179 With verbatim transcription of the recordings, two of the authors (EvM and FvN) created a consensus
25 180 based codebook [Supplementary table 2], by analysing two interviews independently.[22] This codebook
26 181 was used to code all interviews in ATLAS.ti 8 [ATLAS.ti Scientific Software Development GmbH, Berlin,
27 182 Germany]. Next, the codes were sorted and grouped together into different themes, following a thematic
28 183 analysis by two of the authors (EvM and FvN).[23] To detect patterns in responses as well as for data
29 184 triangulation, data was organised according to subject group as well: patient representatives, nurses,
30 185 case manager, physicians, management/supportive within hospital, supportive outside hospital
31 186 (Insurance/EMR).[24] The most relevant and illustrative quotes were selected after discussion among the
32 187 research team.
33
34
35
36
37
38 188

39 189 **Ethics**

40 190 All subjects received study information for participants in writing, informing them of their right to withdraw
41 191 their cooperation without explanation. Confidentiality was secured by limiting access to the transcripts
42 192 and data to 2 of the authors (EvM and FvN), erasing recordings of the interviews after transcription and
43 193 erasing identifying information from the transcripts. All participants signed an informed consent form prior
44 194 to the interview. The Medical Ethics Review Committee of VU University Medical Center deemed the
45 195 Medical Research Involving Human Subjects Act (WMO) not applicable and confirmed that an official
46 196 approval by the committee was not required (MERC ref. 2019.488).
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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]

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

238

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.

247

Accessibility and empathy of HCP

Accessibility and HCP'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).

255

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.

260

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.

265

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.

272

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

1

2

3 277 *discharged from hospital before they were ready. That is not good, obviously. That stings.*" (Pulmonary
4 278 *Physician 2).*

5 279

6 280

7 280

8 281

9 282

10 283

11 284

12 285

13 286

14 287

15 288

16 289

17 290

18 291

19 292

20 293

21 294

22 295

23 296

24 297

25 298

26 299

27 300

28 301

29 302

30 303

31 304

32 305

33 306

34 307

35 308

36 309

37 310

38 311

39 312

40 313

41 314

42 315

43 316

44 317

45 318

46 319

47 320

48 321

49 322

50 323

51 324

52 325

53 326

54 327

55 328

56 329

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 recovery 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 habits 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

1
2
3 315 Not having time to gather the ERATS team and discuss implementation is one barrier, perceived extra
4 316 work by ward nurses or physiotherapists in delivering ERATS another. *“Everybody is so busy; nobody
5 317 has time to sit down and discuss topics like this [ERATS]”. (Surgeon 2).*

7 318 The realisation of the expected benefits of following the ERATS protocol, like reduction of complications,
8 319 regarding workload can act as a facilitator as well: *“when a patient catches pneumonia, it will mean a lot
9 320 more work [for the nurses] [...], than just helping them mobilise early.” (Quality improvement officer).*

12 321
13 322 Receiving support by colleagues, leadership and management, declaring ERATS implementation a
14 323 priority and providing logistic and administrative support was mentioned as a facilitator. Even though
15 324 insurance companies do not want to get involved in specific medical decisions, they can act as a
16 325 facilitator by supporting quality improvement projects like ERATS implementation in their contract
17 326 negotiations.

20 327 21 328 **Data collection and feedback**

23 329 Insight into the effects of ERATS helps to inform patients about what to expect after an anatomical lung
24 330 resection. And in turn, it also aids implementation by helping HCPs understand the consequences of their
25 331 actions. *“We never look at 30-day outcome data, we’re quite bad at that. We really are focused on short
26 332 term effects.[...] We have difficulty understanding the influence of all our actions in the operating theatre
27 333 on the 30-day outcome.” (Anesthesiologist 2).*

30 334 The work necessary for data extraction from EMRs, data processing and structured feedback sessions
31 335 poses a significant barrier. While EMR companies are working on better data extraction capabilities, for
32 336 now, lack of automated data extraction is deemed a barrier.

34 337 35 338 **Theme 5: Usability of the ERATS protocol**

36 339 While all interviewees agreed on knowledge of the protocol by the HCPs as a facilitator, the HCPs also
37 340 acknowledged the potential barriers created in case of a voluminous, unclear and/or inconsistent
38 341 protocol.

40 342 41 343 **Concise multidisciplinary protocol**

43 344 Clear instructions on procedures and guidelines were mentioned by all interviewees. Having one
44 345 multidisciplinary protocol was mentioned as a facilitator in eliminating different styles of different HCPs
45 346 and therefore a facilitator in adopting ERATS. Specifically, standardised, rather than physician
46 347 dependent, use of minimally invasive surgical techniques and clear step by step instructions regarding
47 348 pain management, were mentioned specifically as determinants of successful implementation.

49 349 50 350 **Clear goals**

52 351 Another sub-theme touched on having clear recovery goals to work towards by following the protocol. By
53 352 informing patients and HCPs about these goals, they can be engaged to help achieve them. In contrast,
54 353 sending mixed signals, due to lack of clarity of the goals of the protocol, was deemed a barrier.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

355 **Flexibility**

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

362 **Clear logistics**

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

For peer review only

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 resources 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

1
2
3 407 strategies can be selected.[17,18] Even though there is no undisputed way to select implementation
4 408 strategies, projects like the Expert Recommendations for Implementing Change (ERIC) project have
5 409 created a set of well defined implementation strategies for (CFIR)-based contextual barriers that can be
6 410 deployed.[30,31] The description of our methodology makes our approach transferable. This potentially
7 411 aids analysis of the local situation and ERATS implementation in other contexts.[17,18]
8
9 412 The main take-aways from our study are that implementation strategies for ERATS in the Netherlands
10 413 should put emphasis on communication between HCPs and patients supported by educational materials,
11 414 preparing patients, as well as family members, to be active participants. Special provisions should be
12 415 made to extend ERATS care beyond hospital wards, especially after discharge. Additional strategies
13 416 should include optimisation of data collection, analysis and feedback to the ERATS Teams to regularly
14 417 evaluate ERATS implementation data as well as patient experiences. Early measurable effects from
15 418 implementation will motivate ERATS Teams during implementation and regular standardised evaluation
16 419 of feedback data is thought to help continuous quality improvement.[32,33] Providing IT support and
17 420 adequate data management will also provide data to justify the resources deployed for ERATS
18 421 implementation.[34] The specific attention to these determinants will help tailor implementation strategies
19 422 to the Dutch situation. A Dutch implementation study, the multicentre ERATS Trial, is currently ongoing to
20 423 evaluate these implementation strategies.
21
22 424

29 425 **Strengths & limitations**

30 426 One strength of our study is data triangulation; using a wide range of stakeholders, we were able to
31 427 obtain different perspectives on the Dutch situation. By definition of qualitative research is not
32 428 generalisable, in addition the results of our analysis are specific to the Dutch socio-political context. Yet,
33 429 the research approach with semi-structured interviews and thematic analysis, makes this approach
34 430 transferable to other fields, countries and contexts.

35 431 Another limitation is that the interviewees were both surgical HCPs; we tried to limit bias with the semi-
36 432 structured nature of the interviews and the use of a predetermined topic list. Also, no board members and
37 433 only one health insurance representative were interviewed, which might have biased the results. For this
38 434 reason, socio-political factors, like reimbursement and costs, might have been underreported.
39
40 435

45 436 **Conclusion**

46 437 Based on a structured problem analysis among a wide selection of stakeholders, this study identified
47 438 specific facilitators and barriers for implementing the ERATS protocol in the Netherlands. Based on our
48 439 study, emphasis on consistent and sufficient communication, support in the transition from hospital to
49 440 home and adequate audit and feedback data, in addition to known general guidelines on implementing
50 441 ERAS®-type programmes, will enable a tailored approach to implementation of ERATS in the Dutch
51 442 context.
52
53 443
54
55
56
57
58
59
60

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).

AUTHOR STATEMENT:

Conception and design of the study: Erik M. von Meyenfeldt, F. Van Nassau, J.R. Anema

Acquisition of data: Erik M. von Meyenfeldt, Carlijn T.I. de Betue, L. Barberio

Analysis and/or interpretation of data: Erik M. von Meyenfeldt, F. Van Nassau, Carlijn T.I. de Betue,

L. Barberio, Wilhelmina H. Schreurs, Geertruid M.H. Marres, H.J. Bonjer, J.R. Anema

Drafting the manuscript: Erik M. von Meyenfeldt, F. Van Nassau,

Revising the manuscript critically for important intellectual content: Erik M. von Meyenfeldt, F. Van

Nassau, Carlijn T.I. de Betue, L. Barberio, Wilhelmina H. Schreurs, Geertruid M.H. Marres, H.J. Bonjer,

J.R. Anema

All authors approved the version of the manuscript to be published.

DATA STATEMENT:

The original data is available from 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.

FUNDING

Not Applicable

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60**REFERENCES**

- 1 Bray F, Ferlay J, Soerjomataram I, *et al.* Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2018;**68**:394–424.
- 2 Thorsteinsson H, Alexandersson A, Oskarsdottir GN, *et al.* Resection Rate and Outcome of Pulmonary Resections for Non – Small-Cell Lung Cancer. *JTO Acquis* 2012;**7**:1164–9.
- 3 Von Meyenfeldt EM, Hoeijmakers F, Marres GMH, *et al.* Variation in length of stay after minimally invasive lung resection: A reflection of perioperative care routines? *Eur J Cardio-thoracic Surg* 2020;**57**:747–53.
- 4 von Meyenfeldt EM, Marres GMH, van Thiel E, *et al.* Variation in length of hospital stay after lung cancer surgery in the Netherlands†. *Eur J Cardio-Thoracic Surg* 2018;**54**:560–4.
- 5 Wang S, Li X, Li Y, *et al.* The long-term impact of postoperative pulmonary complications after video-assisted thoracic surgery lobectomy for lung cancer. *J Thorac Dis* 2017;**9**:5143–52.
- 6 Templeton R, Greenhalgh D. Preoperative rehabilitation for thoracic surgery. *Curr Opin Anaesthesiol* 2019;**32**:23–8.
- 7 Ljungqvist O, Scott M, Fearon KC. Enhanced Recovery After Surgery. *JAMA Surg* 2017;**152**:292–8.
- 8 Senturk JC, Kristo G, Gold J, *et al.* The Development of ERAS Across Surgical Specialties. *J Laparoendosc Adv Surg Tech* 2017;**27**:863–70.
- 9 Brunelli A, Imperatori A, Droghetti A. Enhanced recovery pathways version 2.0 in thoracic surgery. *J Thorac Dis* 2018;**10**:S497–8.
- 10 Rogers LJ, Bleetman D, Messenger DE, *et al.* The impact of enhanced recovery after surgery (ERAS) protocol compliance on morbidity from resection for primary lung cancer. *J Thorac Cardiovasc Surg* 2018;**155**:1843–52.
- 11 Hubert J, Bourdages-Pageau E, Paradis Garneau CA, *et al.* Enhanced recovery pathways in thoracic surgery: The Quebec experience. *J Thorac Dis* 2018;**10**:S583–90.
- 12 von Meyenfeldt EM, de Betue CTI, van den Berg R, *et al.* Wide Variation in Perioperative Care in Anatomical Lung Resections in the Netherlands: A National Survey. *Semin Thorac Cardiovasc Surg* 2020;**32**:1101–10.
- 13 Batchelor TJP, Rasburn NJ, Abdelnour-Berchtold E, *et al.* Guidelines for enhanced recovery after lung surgery: recommendations of the Enhanced Recovery After Surgery (ERAS®) Society and the European Society of Thoracic Surgeons (ESTS). *Eur J Cardio-Thoracic Surg* 2019;**55**:91–115.
- 14 Kehlet H, Wilmore DW. Evidence-based surgical care and the evolution of fast-track surgery. *Ann Surg* 2008;**248**:189–98.
- 15 Currie A, Burch J, Jenkins JT, *et al.* The impact of enhanced recovery protocol compliance on elective colorectal cancer resection: Results from an international registry. *Ann Surg* 2015;**261**:1153–9.
- 16 Arrick L, Mayson K, Hong T, *et al.* Enhanced recovery after surgery in colorectal surgery: Impact of protocol adherence on patient outcomes. *J Clin Anesth* 2019;**55**:7–12.
- 17 Francis NK, Walker T, Carter F, *et al.* Consensus on Training and Implementation of Enhanced

- 1
2
3 518 Recovery After Surgery: A Delphi Study. *World J Surg* 2018;**42**:1919–28.
- 4 519 18 Stone AB, Yuan CT, Rosen MA, *et al.* Barriers to and facilitators of implementing enhanced
5 520 recovery pathways using an implementation framework: A systematic review. *JAMA Surg*
6 521 2018;**153**:270–8.
- 7 522 19 Mazza F, Venturino M, Turello D, *et al.* Enhanced recovery after surgery: adherence and
8 523 outcomes in elderly patients undergoing VATS lobectomy. *Gen Thorac Cardiovasc Surg*
9 524 2020;**68**:1003–10.
- 10 525 20 Fleuren M, Wiefferink K, Paulussen T. Determinants of innovation within health care
11 526 organizations. Literature review and Delphi study. *Int. J. Qual. Heal. Care.* 2004;**16**:107–23.
- 12 527 21 Fleuren MAH, Paulussen TGWM, Dommelen ., *et al.* Towards a measurement instrument for
13 528 determinants of innovations. *Int J Qual Heal Care* 2014;**26**:501–10.
- 14 529 22 Mays N, Pope C. Assessing quality in qualitative research. *Br Med J* 2000;**320**:50–2.
- 15 530 23 Castleberry A, Nolen A. Thematic analysis of qualitative research data: Is it as easy as it sounds?
16 531 *Curr Pharm Teach Learn* 2018;**10**:807–15.
- 17 532 24 Braun V. What can “ thematic analysis ” offer health and wellbeing researchers ? *Int J Qual Stud*
18 533 *Health Well-being* 2014;**1**:9–10.
- 19 534 25 Frank JR, Snell L, Sherbino J E. CanMEDS 2015. *CanMEDS 2015 Physician Competency Fram*
20 535 *Ottawa R Coll Physicians Surg Canada* 2015;:1–30.
- 21 536 <http://www.royalcollege.ca/portal/page/portal/rc/canmeds/resources/publications>
- 22 537 26 Damschroder LJ, Aron DC, Keith RE, *et al.* Fostering implementation of health services research
23 538 findings into practice: A consolidated framework for advancing implementation science. *Implement*
24 539 *Sci* 2009;**4**:1–15.
- 25 540 27 Gillis C, Gill M, Marlett N, *et al.* Patients as partners in Enhanced Recovery after Surgery: A
26 541 qualitative patient-led study. *BMJ Open* 2017;**7**:1–10.
- 27 542 28 Borsuk DJ, AL-Khamis A, Geiser AJ, *et al.* S128: Active post discharge surveillance program as a
28 543 part of Enhanced Recovery After Surgery protocol decreases emergency department visits and
29 544 readmissions in colorectal patients. *Surg Endosc* 2019;**33**:3816–27.
- 30 545 29 Braet A, Weltens C, Sermeus W. Effectiveness of discharge interventions from hospital to home
31 546 on hospital readmissions: a systematic review. *JBI database Syst Rev Implement reports*
32 547 Published Online First: 2016.
- 33 548 30 Powell, B.J., Waltz, T.J., Chinman, M.J., Damschroder, L.J., Smith, J.L., Matthieu, M.M., Proctor,
34 549 E.K. K, J.E. A refined compilation of implementation strategies: results from the Expert
35 550 Recommendations for Implementing Change (ERIC) project. *Implement Sci* 2015;1–14.
- 36 551 31 Waltz TJ, Powell BJ, Fernández ME, *et al.* Choosing implementation strategies to address
37 552 contextual barriers: Diversity in recommendations and future directions. *Implement Sci* 2019;**14**:1–
38 553 15.
- 39 554 32 Gotlib Conn L, McKenzie M, Pearsall EA, *et al.* Successful implementation of an enhanced
40 555 recovery after surgery programme for elective colorectal surgery: A process evaluation of
41 556 champions’ experiences. *Implement Sci* 2015;**10**:1–11.
- 42 557 33 McLeod RS, Aarts MA, Chung F, *et al.* Development of an enhanced recovery after surgery
43 558
44 559
45 560

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

558 guideline and implementation strategy based on the knowledge-to-action cycle. *Ann Surg*
559 2015;**262**:1016–25.

560 34 McEvoy MD, Wanderer JP, King AB, *et al*. A perioperative consult service results in reduction in
561 cost and length of stay for colorectal surgical patients: evidence from a healthcare redesign
562 project. *Perioper Med* 2016;**5**:1–10.

For peer review only

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

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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

Theme	Sub theme
Communication HCP-Patient	<ul style="list-style-type: none"> • Consistent information • Liaison in the transition hospital-home • Use of patient experiences
HCP professional competencies and experience	<ul style="list-style-type: none"> • Different competencies and experience of a multidisciplinary team of HCPs • Accessibility and empathy of HCP • Coordination between HCP's/hospitals
Patient factors	<ul style="list-style-type: none"> • Patient autonomy • Situation at home • Physical condition and age
Factors influencing change in perioperative care delivery	<ul style="list-style-type: none"> • Support for change • Teamwork • Available time for HCPs • Data gathering and feedback
Usability of the ERATS protocol	<ul style="list-style-type: none"> • 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)

- 1
- 2
- 3 • Are there conflicting goals between different professional groups? If a professional group does not
- 4 want to work in accordance with ERATS, are there financial consequences? For example, professional
- 5 groups benefit from longer admission / or more invasive treatments (ICU? Anesthesia?).
- 6
- 7
- 8
- 9 • How do you think we can best fit ERATS into daily practice? What is needed for incorporation into daily
- 10 practice?
- 11

12 Prompts:

- 13 Do you consider it part of your task to follow ERATS? (MIDI D10)
- 14 Do you think you can manage your ERATS tasks? (MIDI D16)
- 15 What information do you need to be able to implement ERATS properly? (MIDI D27)
- 16 Who expects you to work according to ERATS? (MIDI D15)
- 17 Whose opinion is important to you (MIDI D15)
- 18 What is the role of feedback on the results achieved with ERATS? What data do you need?
- 19 How should this data be collected? (MIDI D6)
- 20 What is the role of feedback on the progress of ERATS implementation in your organization?
- 21 (MIDI D28)
- 22
- 23
- 24
- 25
- 26
- 27
- 28
- 29
- 30
- 31
- 32
- 33
- 34
- 35
- 36
- 37
- 38
- 39
- 40
- 41
- 42
- 43
- 44
- 45
- 46
- 47
- 48
- 49
- 50
- 51
- 52
- 53
- 54
- 55
- 56
- 57
- 58
- 59
- 60

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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Everyone has their own ways Colleague tells something different / varying stories
3 Team Factors	3.2 Case manager	Case manager F	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Inadequate referral to pain team Presence of cross-team consultation Good handovers between HCPs Short lines between HCPs Good cooperation with anaesthesiology department Explanation of the process by lung specialist
3 Team Factors	3.4 contact post-discharge	Post-discharge contact F Post-discharge contact B	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Stricter guidance by physiotherapist Clear appointments with physiotherapist Strict and clear guidance by nurses
3 Team Factors	3.6 Work pressure Ward	Work pressure ward B	<ul style="list-style-type: none"> Overburdened nurses/limited time



3 Team Factors	3.7 Willingness to change	Willingness to change F Willingness to change B	<ul style="list-style-type: none"> • Rigidity by ward personnel • Being early adopters • Initiative for change with the surgeons
3 Team Factors	3.8 Support team leaders	Support team leader F Support team leader B	
3 Team Factors	3.9 Use of patient experiences	Use patient experiences F Use patient experiences B	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • The old protocol is very extensive
4 Protocol Factors	4.2 Flexibility within bandwidth	Flexibility within bandwidth F Flexibility within bandwidth B	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Limited time for preparation by physiotherapist/dietician • Rigid guideline regarding time between MDT-Operation • Limited time between intake-operation
4 Protocol Factors	4.4 knowledge of the protocol by HCP	knowledge of the protocol by HCP F knowledge of the protocol by HCP B	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Strive for a minimally invasive technique



4 Protocol Factors	4.7 Protocol discharge criteria clear	Protocol discharge criteria clear F	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 possible
5 Hospital Factors	5.3 Added value data feedback	Added value data feedback F Added value data feedback B	<ul style="list-style-type: none"> • Limited motivation for data registration (without data feedback) • Iimited to financial data • Data feedback can improve care • Feedback data/3months



			<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Support from departmental management • Support from quality improvement officers
5 Hospital Factors	5.5 Complete dataset for ERATS	Complete dataset for ERATS	<ul style="list-style-type: none"> • No established 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • HCP/Surgeon available at the bedside • 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

<p>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</p>	P1/L1-3
<p>Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions</p>	P2/L30-68

Introduction

<p>Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement</p>	P5/L88-117
<p>Purpose or research question - Purpose of the study and specific objectives or questions</p>	P5/L118-123

Methods

<p>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**</p>	P6-P7/L165-172 P7/L182-190
<p>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</p>	P7/L174-179
<p>Context - Setting/site and salient contextual factors; rationale**</p>	P5/L137-142
<p>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**</p>	P6/L132-137 P6-P7/L165-167 P7/L171-172
<p>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</p>	P7/L193-199
<p>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**</p>	P7/L175-179

1 2 3 4 5	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
6 7 8	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
9 10 11 12	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
13 14 15 16	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
17 18 19 20	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

23 24 25 26	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
27 28 29	Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	P8-P12/L202-402

Discussion

32 33 34 35 36 37	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
38 39	Limitations - Trustworthiness and limitations of findings	P14/L464-472

Other

42 43 44	Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	P15/L486-498
45 46	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.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

**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
DOI: 10.1097/ACM.0000000000000388

For peer review only

BMJ Open

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

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2021-051513.R2
Article Type:	Original research
Date Submitted by the Author:	03-Dec-2021
Complete List of Authors:	Meyenfeldt, Erik M. von; Amsterdam UMC Locatie VUmc, Public and Occupational health; Albert Schweitzer Hospital, Surgery van Nassau, Femke; Amsterdam University Medical Centres, Vrije Universiteit Amsterdam, Department of Public and Occupational health, Amsterdam Public Health Institute de Betue, Carlijn T.I.; Albert Schweitzer Hospital, Department of Thoracic Surgery Barberio, L.; Longkanker Nederland Schreurs, Wilhelmina H.; Noordwest Ziekenhuisgroep, Department of Thoracic Surgery Marres, Geertruid M.H.; Albert Schweitzer Hospital, Department of Thoracic Surgery Bonjer, H.; Amsterdam UMC - Locatie VUMC, Department of Surgery Anema, Johannes; Amsterdam UMC - Locatie VUMC, Public and Occupational health
Primary Subject Heading:	Surgery
Secondary Subject Heading:	Medical education and training, Medical management, Oncology, Patient-centred medicine, Qualitative research
Keywords:	Thoracic surgery < SURGERY, QUALITATIVE RESEARCH, MEDICAL EDUCATION & TRAINING, Respiratory tract tumours < ONCOLOGY, Organisational development < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Protocols & guidelines < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

SCHOLARONE™
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

1
2
3 1 Implementing an Enhanced Recovery After Thoracic Surgery programme in
4
5
6 2 the Netherlands: a qualitative study investigating facilitators and barriers for
7
8
9 3 implementation.

10
11 4
12 5 Erik M. von Meyenfeldt^{1,2}, F. Van Nassau², Carlijn T.I. de Betue¹, L. Barberio³, Wilhelmina H. Schreurs
13 6 MD⁴, Geertruid M.H. Marres¹, H.J. Bonjer⁵, J.R. Anema²

- 14 7
15 8
16 9
17 10
18 11
19 12
20 13
21 14
22 15
23 16
24 17
25 18
26 19
27 20
28 21
29 22
30 23
31 24
32 25
33 26
34 27
35 28
36 29
37 30
38 31
39 32
40 33
41 34
42 35
43 36
44 37
45 38
46 39
47 40
48 41
49 42
50 43
51 44
52 45
53 46
54 47
55 48
56 49
57 50
58 51
59 52
60 53
1. Department of Thoracic Surgery, Lung Cancer Centre, Albert Schweitzer Hospital, Dordrecht, The Netherlands
 2. Department of Public and Occupational Health and Amsterdam Public Health research institute, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands
 3. Longkanker Nederland, The Netherlands
 4. Department of Thoracic Surgery, Northwest Clinics, Alkmaar, The Netherlands
 5. Department of Surgery, Amsterdam Academic Medical Centre, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands

16 Word count: 3991

18 No Conflicts of interest / No Funding to declare

20 Corresponding Author:

21 Erik M. von Meyenfeldt,

22 Albert Schweitzer Hospital,

23 PO box 444

24 3300 AK Dordrecht

25 The Netherlands

26 Tel: + 31 (0)78 654 11 11

27 Email: e.vonmeyefeldt@vumc.nl

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

29 Abstract

30 Objectives:

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

34

35 Setting:

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

40

41 Participants:

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

45

46 Interventions

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

50

51 Outcome measures:

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

53

54 Results:

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

60

61 Conclusions:

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

68

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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

For peer review only

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

72 STRENGTHS AND LIMITATIONS

- 73 • Strength: our research approach using semi-structured interviews with a wide range of
74 stakeholders and subsequent thematic analysis to identify facilitators and barriers for successful
75 implementation of the ERATS protocol, makes our approach transferable to other fields,
76 countries and contexts.
- 77 • Strength: data triangulation; due to interviews with a wide range of stakeholders, we were able to
78 obtain different perspectives on the Dutch situation.
- 79 • Limitation: the interviewers were both surgical HCPs; we tried to limit bias with the semi-
80 structured nature of the interviews and the use of a predetermined topic list.
- 81 • Limitation: no hospital board members and only one health insurance representative were
82 interviewed, which might have biased the results by potentially underreporting of socio-political
83 factors, like reimbursement and costs.
- 84

85 INTRODUCTION

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

94 Therefore, focussing on optimal recovery after surgery is essential. Limiting the impact of operations by
95 optimising and standardising perioperative care, as propagated by the Enhanced Recovery After Surgery
96 (ERAS®) Society, has shown to reduce length of stay, complications and costs in several other surgical
97 fields. Limited series of ERAS®-type programmes show promising results in lung resection patients.[7–
98 11]

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

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

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

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

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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

1
2
3 163 the adoption, implementation and maintenance of an innovation within the healthcare sector. It
4 164 recognises four different categories: the determinants related to the innovation itself, factors concerning
5 165 the users/health care professional (HCP), determinants regarding the organisation, and the socio-political
6 166 context.[20] Depending on the role of the subject, different aspects of the topic guide were explored more
7 167 or less extensively. When no new insights were discovered in the last 3 interviews, it was considered that
8 168 sampling saturation was reached.
9 169

13 170 **Process**

14 171 During a 3-month period (October- December 2019), the first author (EvM) conducted 14 interviews, with
15 172 occasional assistance of CdB. EvM is a general thoracic surgeon, working in a teaching hospital and lead
16 173 of the national ERATS implementation effort; CdB is a resident in general surgery. Two interviews were
17 174 conducted as a face-to-face group interview, the remaining 12 were conducted one-to-one, mostly by
18 175 telephone. Audio was recorded from all interviews and additional notes were taken during the sessions.
19 176

23 177 **Analysis**

24 178 With verbatim transcription of the recordings, two of the authors (EvM and FvN) created a consensus
25 179 based codebook [Supplementary table 2], by analysing two interviews independently.[22] This codebook
26 180 was used to code all interviews in ATLAS.ti 8 [ATLAS.ti Scientific Software Development GmbH, Berlin,
27 181 Germany]. Next, the codes were sorted and grouped together into different themes, following a thematic
28 182 analysis by two of the authors (EvM and FvN).[23] To detect patterns in responses as well as for data
29 183 triangulation, data was organised according to subject group as well: patient representatives, nurses,
30 184 case manager, physicians, management/supportive within hospital, supportive outside hospital
31 185 (Insurance/EMR).[24] The most relevant and illustrative quotes were selected after discussion among the
32 186 research team.
33 187

39 188 **Ethics**

40 189 All subjects received study information for participants in writing, informing them of their right to withdraw
41 190 their cooperation without explanation. Confidentiality was secured by limiting access to the transcripts
42 191 and data to 2 of the authors (EvM and FvN), erasing recordings of the interviews after transcription and
43 192 erasing identifying information from the transcripts. All participants signed an informed consent form prior
44 193 to the interview. The Medical Ethics Review Committee of VU University Medical Center deemed the
45 194 Medical Research Involving Human Subjects Act (WMO) not applicable and confirmed that an official
46 195 approval by the committee was not required (MERC ref. 2019.488).
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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 HCP'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

1

2

3 276 *discharged from hospital before they were ready. That is not good, obviously. That stings.*" (Pulmonary
4 277 *Physician 2).*

6 278

7 279 **Physical condition and age**

9 280 While age was mentioned by some, the physical condition was mentioned by surgeons and patient
10 281 representatives alike. Since patients, considered for lung resections, already are screened for the
11 282 physical ability to undergo such a resection, the comments mostly referred to the physical ability after
12 283 surgery or limitations in daily life. "...*the fitter you are, going into an operation, the easier your recovery*
13 284 *will be.*" (Patient 2). Physical condition and age however, can influence the expectations of the healthcare
14 285 professionals, as well as the expectations of the patients regarding their ability to adhere to the ERATS
15 286 protocol.

19 287

20 288 **Theme 4: Factors influencing change in perioperative care delivery**

22 289 In order to implement the ERATS-protocol, HCP's have to be able to change the way they work. The
23 290 facilitators and barriers that were mentioned mainly concern determinants at the HCP's team level, but
24 291 also organisational factors associated with the change process.

26 292

27 293 **Support for change**

29 294 Implementation of ERATS cannot be achieved by HCPs alone; support from management is essential to
30 295 adopt a multidisciplinary protocol. At management and insurance company level, socio-economic factors
31 296 will come into play, where the benefits at the level of individual patients should also translate into cost-
32 297 effectiveness. "... *the patient is number one, quality of medical care is two and cost is three. Those are*
33 298 *the three pillars of our "sensible care" programme [...] a protocol like the one you have developed*
34 299 *[ERATS] follows these pillars seamlessly.*" (Insurance representative).

38 300

39 301 **Teamwork**

40 302 Having a multidisciplinary team that works according to the same protocol was generally considered a
41 303 facilitator, generating support for individual HCPs to follow ERATS. Previous negative experiences by
42 304 individual HCPs or perceived contraindications for ERATS, like advanced age, can limit the willingness to
43 305 implement ERATS. "... *but this "you've had a big operation, so take it easy for another day"-approach to*
44 306 *patients will keep emerging. So old habits and old emotions.*" (Pulmonary Physician 2).

48 307

49 308 The perceived benefits of ERATS and the team effort to achieve multidisciplinary improvement in care
50 309 were mentioned as facilitator. Another facilitator mentioned was having a clear implementation plan,
51 310 aided with training sessions, educational materials for both HCPs and patients, so all HCPs know when
52 311 ERATS has started.

55 312

56 313 **Available time for HCPs**

57

58

59

60

1
2
3 314 Not having time to gather the ERATS team and discuss implementation is one barrier, perceived extra
4 315 work by ward nurses or physiotherapists in delivering ERATS another. *“Everybody is so busy; nobody*
5 316 *has time to sit down and discuss topics like this [ERATS]”.* (Surgeon 2).

7 317 The realisation of the expected benefits of following the ERATS protocol, like reduction of complications,
8 318 regarding workload can act as a facilitator as well: *“when a patient catches pneumonia, it will mean a lot*
9 319 *more work [for the nurses] [...], than just helping them mobilise early.”* (Quality improvement officer).
10 320

13 321 Receiving support by colleagues, leadership and management, declaring ERATS implementation a
14 322 priority and providing logistic and administrative support was mentioned as a facilitator. Even though
15 323 insurance companies do not want to get involved in specific medical decisions, they can act as a
16 324 facilitator by supporting quality improvement projects like ERATS implementation in their contract
17 325 negotiations.
18 326

22 327 **Data collection and feedback**

23 328 Insight into the effects of ERATS helps to inform patients about what to expect after an anatomical lung
24 329 resection. And in turn, it also aids implementation by helping HCPs understand the consequences of their
25 330 actions. *“We never look at 30-day outcome data, we’re quite bad at that. We really are focused on short*
26 331 *term effects.[...] We have difficulty understanding the influence of all our actions in the operating theatre*
27 332 *on the 30-day outcome.”* (Anesthesiologist 2).

30 333 The work necessary for data extraction from EMRs, data processing and structured feedback sessions
31 334 poses a significant barrier. While EMR companies are working on better data extraction capabilities, for
32 335 now, lack of automated data extraction is deemed a barrier.
33 336

36 337 **Theme 5: Usability of the ERATS protocol**

37 338 While all interviewees agreed on knowledge of the protocol by the HCPs as a facilitator, the HCPs also
38 339 acknowledged the potential barriers created in case of a voluminous, unclear and/or inconsistent
39 340 protocol.
40 341

43 342 **Concise multidisciplinary protocol**

44 343 Clear instructions on procedures and guidelines were mentioned by all interviewees. Having one
45 344 multidisciplinary protocol was mentioned as a facilitator in eliminating different styles of different HCPs
46 345 and therefore a facilitator in adopting ERATS. Specifically, standardised, rather than physician
47 346 dependent, use of minimally invasive surgical techniques and clear step by step instructions regarding
48 347 pain management, were mentioned specifically as determinants of successful implementation.
49 348

53 349 **Clear goals**

54 350 Another sub-theme touched on having clear recovery goals to work towards by following the protocol. By
55 351 informing patients and HCPs about these goals, they can be engaged to help achieve them. In contrast,
56 352 sending mixed signals, due to lack of clarity of the goals of the protocol, was deemed a barrier.
57 353
58 354
59 355
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

354 **Flexibility**

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

361 **Clear logistics**

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

For peer review only

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 resources 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

1

2

3 406 strategies can be selected.[17,18] Even though there is no undisputed way to select implementation
4 407 strategies, projects like the Expert Recommendations for Implementing Change (ERIC) project have
5 408 created a set of well defined implementation strategies for (CFIR)-based contextual barriers that can be
6 409 deployed.[30,31] The description of our methodology makes our approach transferable. This potentially
7 410 aids analysis of the local situation and ERATS implementation in other contexts.[17,18]

10 411 The main take-aways from our study are that implementation strategies for ERATS in the Netherlands
11 412 should put emphasis on communication between HCPs and patients supported by educational materials,
13 413 preparing patients, as well as family members, to be active participants. Special provisions should be
14 414 made to extend ERATS care beyond hospital wards, especially after discharge. Additional strategies
16 415 should include optimisation of data collection, analysis and feedback to the ERATS Teams to regularly
17 416 evaluate ERATS implementation data as well as patient experiences. Early measurable effects from
18 417 implementation will motivate ERATS Teams during implementation and regular standardised evaluation
20 418 of feedback data is thought to help continuous quality improvement.[32,33] Providing IT support and
21 419 adequate data management will also provide data to justify the resources deployed for ERATS
23 420 implementation.[34] The specific attention to these determinants will help tailor implementation strategies
24 421 to the Dutch situation. A Dutch implementation study, the multicentre ERATS Trial, is currently ongoing to
26 422 evaluate these implementation strategies.

27

28 423

29 424

30 425

31 426

32 427

33 428

34 429

35 430

36 431

37 432

38 433

39 434

40 435

41 436

42 437

43 438

44 439

45 440

46 441

47 442

48 443

49 444

50 445

51 446

52 447

53 448

54 449

55 450

56 451

57 452

58 453

59 454

60 455

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 generalisable, 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 interviewees 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.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

444 **CONFLICT OF INTEREST**

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

446 Dr. Barberio, in her capacity as director of Longkanker Nederland, reports subsidies from KWF

447 kankerbestrijding and PGO subsidie, grants from Abbvie, grants from AMGEN, grants from Astra Zeneca,

448 grants from Boehringer Ingelheim, grants from BM-S, grants from Janssen-Cilag, grants from MSD,

449 grants from Novartis, grants from Pfizer, grants from Roche, grants from Takeda; all outside the

450 submitted work.

451 Prof. Anema reports grants from Various, grants from Pfizer & ZonMw, personal grant from Dutch Social

452 Security Agency, personal fees from Various and personal fees from Evalua Ltd and Ikherstel Ltd,

453 outside the submitted work; and he was an invited co-opted member of the guideline development group

454 for the Dutch Occupational Medicine guideline for low back pain and the Dutch national Insurance

455 Medicine protocol for Lumbosacral syndrome. He is appointed in 2016 as president of the Work disability

456 Prevention and Integration committee of the International Commission on Occupational Health (ICOH).

458 **AUTHOR STATEMENT:**

459 Conception and design of the study: Erik M. von Meyenfeldt, F. Van Nassau, J.R. Anema

460 Acquisition of data: Erik M. von Meyenfeldt, Carlijn T.I. de Betue, L. Barberio

461 Analysis and/or interpretation of data: Erik M. von Meyenfeldt, F. Van Nassau, Carlijn T.I. de Betue,

462 L. Barberio, Wilhelmina H. Schreurs, Geertruid M.H. Marres, H.J. Bonjer, J.R. Anema

463 Drafting the manuscript: Erik M. von Meyenfeldt, F. Van Nassau,

464 Revising the manuscript critically for important intellectual content: Erik M. von Meyenfeldt, F. Van

465 Nassau, Carlijn T.I. de Betue, L. Barberio, Wilhelmina H. Schreurs, Geertruid M.H. Marres, H.J. Bonjer,

466 J.R. Anema

467 All authors approved the version of the manuscript to be published.

469 **DATA STATEMENT:**

470 The original data is available from the corresponding author, within the limits of the signed informed

471 consent from the contributors. The interview guide and code book are available as supplementary

472 material.

474 **FUNDING**

475 **Not Applicable**

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

REFERENCES

- 1 Bray F, Ferlay J, Soerjomataram I, *et al.* Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2018;**68**:394–424.
- 2 Thorsteinsson H, Alexandersson A, Oskarsdottir GN, *et al.* Resection Rate and Outcome of Pulmonary Resections for Non – Small-Cell Lung Cancer. *JTO Acquis* 2012;**7**:1164–9.
- 3 Von Meyenfeldt EM, Hoeijmakers F, Marres GMH, *et al.* Variation in length of stay after minimally invasive lung resection: A reflection of perioperative care routines? *Eur J Cardio-thoracic Surg* 2020;**57**:747–53.
- 4 von Meyenfeldt EM, Marres GMH, van Thiel E, *et al.* Variation in length of hospital stay after lung cancer surgery in the Netherlands†. *Eur J Cardio-Thoracic Surg* 2018;**54**:560–4.
- 5 Wang S, Li X, Li Y, *et al.* The long-term impact of postoperative pulmonary complications after video-assisted thoracic surgery lobectomy for lung cancer. *J Thorac Dis* 2017;**9**:5143–52.
- 6 Templeton R, Greenhalgh D. Preoperative rehabilitation for thoracic surgery. *Curr Opin Anaesthesiol* 2019;**32**:23–8.
- 7 Ljungqvist O, Scott M, Fearon KC. Enhanced Recovery After Surgery. *JAMA Surg* 2017;**152**:292–8.
- 8 Senturk JC, Kristo G, Gold J, *et al.* The Development of ERAS Across Surgical Specialties. *J Laparoendosc Adv Surg Tech* 2017;**27**:863–70.
- 9 Brunelli A, Imperatori A, Droghetti A. Enhanced recovery pathways version 2.0 in thoracic surgery. *J Thorac Dis* 2018;**10**:S497–8.
- 10 Rogers LJ, Bleetman D, Messenger DE, *et al.* The impact of enhanced recovery after surgery (ERAS) protocol compliance on morbidity from resection for primary lung cancer. *J Thorac Cardiovasc Surg* 2018;**155**:1843–52.
- 11 Hubert J, Bourdages-Pageau E, Paradis Garneau CA, *et al.* Enhanced recovery pathways in thoracic surgery: The Quebec experience. *J Thorac Dis* 2018;**10**:S583–90.
- 12 von Meyenfeldt EM, de Betue CTI, van den Berg R, *et al.* Wide Variation in Perioperative Care in Anatomical Lung Resections in the Netherlands: A National Survey. *Semin Thorac Cardiovasc Surg* 2020;**32**:1101–10.
- 13 Batchelor TJP, Rasburn NJ, Abdelnour-Berchtold E, *et al.* Guidelines for enhanced recovery after lung surgery: recommendations of the Enhanced Recovery After Surgery (ERAS®) Society and the European Society of Thoracic Surgeons (ESTS). *Eur J Cardio-Thoracic Surg* 2019;**55**:91–115.
- 14 Kehlet H, Wilmore DW. Evidence-based surgical care and the evolution of fast-track surgery. *Ann Surg* 2008;**248**:189–98.
- 15 Currie A, Burch J, Jenkins JT, *et al.* The impact of enhanced recovery protocol compliance on elective colorectal cancer resection: Results from an international registry. *Ann Surg* 2015;**261**:1153–9.
- 16 Arrick L, Mayson K, Hong T, *et al.* Enhanced recovery after surgery in colorectal surgery: Impact of protocol adherence on patient outcomes. *J Clin Anesth* 2019;**55**:7–12.
- 17 Francis NK, Walker T, Carter F, *et al.* Consensus on Training and Implementation of Enhanced

- 1
2
3 517 Recovery After Surgery: A Delphi Study. *World J Surg* 2018;**42**:1919–28.
- 4 518 18 Stone AB, Yuan CT, Rosen MA, *et al*. Barriers to and facilitators of implementing enhanced
5 519 recovery pathways using an implementation framework: A systematic review. *JAMA Surg*
6 520 2018;**153**:270–8.
- 7 521 19 Mazza F, Venturino M, Turello D, *et al*. Enhanced recovery after surgery: adherence and
8 522 outcomes in elderly patients undergoing VATS lobectomy. *Gen Thorac Cardiovasc Surg*
9 523 2020;**68**:1003–10.
- 10 524 20 Fleuren M, Wiefferink K, Paulussen T. Determinants of innovation within health care
11 525 organizations. Literature review and Delphi study. *Int. J. Qual. Heal. Care.* 2004;**16**:107–23.
- 12 526 21 Fleuren MAH, Paulussen TGWM, Dommelen ., *et al*. Towards a measurement instrument for
13 527 determinants of innovations. *Int J Qual Heal Care* 2014;**26**:501–10.
- 14 528 22 Mays N, Pope C. Assessing quality in qualitative research. *Br Med J* 2000;**320**:50–2.
- 15 529 23 Castleberry A, Nolen A. Thematic analysis of qualitative research data: Is it as easy as it sounds?
16 530 *Curr Pharm Teach Learn* 2018;**10**:807–15.
- 17 531 24 Braun V. What can “ thematic analysis ” offer health and wellbeing researchers ? *Int J Qual Stud*
18 532 *Health Well-being* 2014;**1**:9–10.
- 19 533 25 Frank JR, Snell L, Sherbino J E. CanMEDS 2015. *CanMEDS 2015 Physician Competency Fram*
20 534 *Ottawa R Coll Physicians Surg Canada* 2015;:1–30.
- 21 535 <http://www.royalcollege.ca/portal/page/portal/rc/canmeds/resources/publications>
- 22 536 26 Damschroder LJ, Aron DC, Keith RE, *et al*. Fostering implementation of health services research
23 537 findings into practice: A consolidated framework for advancing implementation science. *Implement*
24 538 *Sci* 2009;**4**:1–15.
- 25 539 27 Gillis C, Gill M, Marlett N, *et al*. Patients as partners in Enhanced Recovery after Surgery: A
26 540 qualitative patient-led study. *BMJ Open* 2017;**7**:1–10.
- 27 541 28 Borsuk DJ, AL-Khamis A, Geiser AJ, *et al*. S128: Active post discharge surveillance program as a
28 542 part of Enhanced Recovery After Surgery protocol decreases emergency department visits and
29 543 readmissions in colorectal patients. *Surg Endosc* 2019;**33**:3816–27.
- 30 544 29 Braet A, Weltens C, Sermeus W. Effectiveness of discharge interventions from hospital to home
31 545 on hospital readmissions: a systematic review. *JBI database Syst Rev Implement reports*
32 546 Published Online First: 2016.
- 33 547 30 Powell, B.J., Waltz, T.J., Chinman, M.J., Damschroder, L.J., Smith, J.L., Matthieu, M.M., Proctor,
34 548 E.K. K, J.E. A refined compilation of implementation strategies: results from the Expert
35 549 Recommendations for Implementing Change (ERIC) project. *Implement Sci* 2015;1–14.
- 36 550 31 Waltz TJ, Powell BJ, Fernández ME, *et al*. Choosing implementation strategies to address
37 551 contextual barriers: Diversity in recommendations and future directions. *Implement Sci* 2019;**14**:1–
38 552 15.
- 39 553 32 Gotlib Conn L, McKenzie M, Pearsall EA, *et al*. Successful implementation of an enhanced
40 554 recovery after surgery programme for elective colorectal surgery: A process evaluation of
41 555 champions’ experiences. *Implement Sci* 2015;**10**:1–11.
- 42 556 33 McLeod RS, Aarts MA, Chung F, *et al*. Development of an enhanced recovery after surgery
43 557
44 558
45 559
46 560

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

557 guideline and implementation strategy based on the knowledge-to-action cycle. *Ann Surg*
558 2015;**262**:1016–25.

34 McEvoy MD, Wanderer JP, King AB, *et al*. A perioperative consult service results in reduction in
560 cost and length of stay for colorectal surgical patients: evidence from a healthcare redesign
561 project. *Perioper Med* 2016;**5**:1–10.

For peer review only

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

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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

Theme	Sub theme
Communication HCP-Patient	<ul style="list-style-type: none"> • Consistent information • Liaison in the transition hospital-home • Use of patient experiences
HCP professional competencies and experience	<ul style="list-style-type: none"> • Different competencies and experience of a multidisciplinary team of HCPs • Accessibility and empathy of HCP • Coordination between HCP's/hospitals
Patient factors	<ul style="list-style-type: none"> • Patient autonomy • Situation at home • Physical condition and age
Factors influencing change in perioperative care delivery	<ul style="list-style-type: none"> • Support for change • Teamwork • Available time for HCPs • Data gathering and feedback
Usability of the ERATS protocol	<ul style="list-style-type: none"> • 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)

- 1
- 2
- 3 • Are there conflicting goals between different professional groups? If a professional group does not
- 4 want to work in accordance with ERATS, are there financial consequences? For example, professional
- 5 groups benefit from longer admission / or more invasive treatments (ICU? Anesthesia?).
- 6
- 7
- 8
- 9 • How do you think we can best fit ERATS into daily practice? What is needed for incorporation into daily
- 10 practice?
- 11

12 Prompts:

- 13 ○ Do you consider it part of your task to follow ERATS? (MIDI D10)
- 14 ○ Do you think you can manage your ERATS tasks? (MIDI D16)
- 15 ○ What information do you need to be able to implement ERATS properly? (MIDI D27)
- 16 ○ Who expects you to work according to ERATS? (MIDI D15)
- 17 ○ Whose opinion is important to you (MIDI D15)
- 18 ○ What is the role of feedback on the results achieved with ERATS? What data do you need?
- 19 How should this data be collected? (MIDI D6)
- 20 ○ What is the role of feedback on the progress of ERATS implementation in your organization?
- 21 (MIDI D28)
- 22
- 23
- 24
- 25
- 26
- 27
- 28
- 29
- 30
- 31
- 32
- 33
- 34
- 35
- 36
- 37
- 38
- 39
- 40
- 41
- 42
- 43
- 44
- 45
- 46
- 47
- 48
- 49
- 50
- 51
- 52
- 53
- 54
- 55
- 56
- 57
- 58
- 59
- 60

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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Everyone has their own ways Colleague tells something different / varying stories
3 Team Factors	3.2 Case manager	Case manager F	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Stricter guidance by physiotherapist Clear appointments with physiotherapist Strict and clear guidance by nurses
3 Team Factors	3.6 Work pressure Ward	Work pressure ward B	<ul style="list-style-type: none"> Overburdened nurses/limited time



3 Team Factors	3.7 Willingness to change	Willingness to change F Willingness to change B	<ul style="list-style-type: none"> • Rigidity by ward personnel • Being early adopters • Initiative for change with the surgeons
3 Team Factors	3.8 Support team leaders	Support team leader F Support team leader B	
3 Team Factors	3.9 Use of patient experiences	Use patient experiences F Use patient experiences B	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • The old protocol is very extensive
4 Protocol Factors	4.2 Flexibility within bandwidth	Flexibility within bandwidth F Flexibility within bandwidth B	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Limited time for preparation by physiotherapist/dietician • Rigid guideline regarding time between MDT-Operation • Limited time between intake-operation
4 Protocol Factors	4.4 knowledge of the protocol by HCP	knowledge of the protocol by HCP F knowledge of the protocol by HCP B	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Strive for a minimally invasive technique



4 Protocol Factors	4.7 Protocol discharge criteria clear	Protocol discharge criteria clear F	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 possible
5 Hospital Factors	5.3 Added value data feedback	Added value data feedback F Added value data feedback B	<ul style="list-style-type: none"> • Limited motivation for data registration (without data feedback) • Iimited to financial data • Data feedback can improve care • Feedback data/3months



			<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Support from departmental management • Support from quality improvement officers
5 Hospital Factors	5.5 Complete dataset for ERATS	Complete dataset for ERATS	<ul style="list-style-type: none"> • No established 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • HCP/Surgeon available at the bedside • 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

<p>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</p>	P1/L1-3
<p>Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions</p>	P2/L30-68

Introduction

<p>Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement</p>	P5/L88-117
<p>Purpose or research question - Purpose of the study and specific objectives or questions</p>	P5/L118-123

Methods

<p>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**</p>	P6-P7/L165-172 P7/L182-190
<p>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</p>	P7/L174-179
<p>Context - Setting/site and salient contextual factors; rationale**</p>	P5/L137-142
<p>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**</p>	P6/L132-137 P6-P7/L165-167 P7/L171-172
<p>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</p>	P7/L193-199
<p>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**</p>	P7/L175-179

1 2 3 4 5	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
6 7 8	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
9 10 11 12	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
13 14 15 16	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
17 18 19 20	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

23 24 25 26	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
27 28 29	Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	P8-P12/L202-402

Discussion

32 33 34 35 36 37	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
38 39	Limitations - Trustworthiness and limitations of findings	P14/L464-472

Other

42 43 44	Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	P15/L486-498
45 46	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.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

**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
DOI: 10.1097/ACM.0000000000000388

For peer review only

1
2
3 1 Implementing an Enhanced Recovery After Thoracic Surgery programme in
4
5
6 2 the Netherlands: a qualitative study investigating facilitators and barriers for
7
8
9 3 implementation.
10

11 4
12 5 Erik M. von Meyenfeldt^{1,2}, F. Van Nassau², Carlijn T.I. de Betue¹, L. Barberio³, Wilhelmina H. Schreurs
13 6 MD⁴, Geertruid M.H. Marres¹, H.J. Bonjer⁵, J.R. Anema²

- 14 7
15 8
16 9
17 10
18 11
19 12
20 13
21 14
22 15
23 16
24 17
25 18
26 19
27 20
28 21
29 22
30 23
31 24
32 25
33 26
34 27
35 28
36 29
37 30
38 31
39 32
40 33
41 34
42 35
43 36
44 37
45 38
46 39
47 40
48 41
49 42
50 43
51 44
52 45
53 46
54 47
55 48
56 49
57 50
58 51
59 52
60 53
1. Department of Thoracic Surgery, Lung Cancer Centre, Albert Schweitzer Hospital, Dordrecht, The Netherlands
 2. Department of Public and Occupational Health and Amsterdam Public Health research institute, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands
 3. Longkanker Nederland, The Netherlands
 4. Department of Thoracic Surgery, Northwest Clinics, Alkmaar, The Netherlands
 5. Department of Surgery, Amsterdam Academic Medical Centre, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands

16 Word count: 3991

18 No Conflicts of interest / No Funding to declare

20 Corresponding Author:

21 Erik M. von Meyenfeldt,
22 Albert Schweitzer Hospital,
23 PO box 444
24 3300 AK Dordrecht
25 The Netherlands
26 Tel: + 31 (0)78 654 11 11
27 Email: e.vonmeyenfeldt@amsterdamumc.nl

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

29 Abstract

30 Objectives:

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

34

35 Setting:

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

40

41 Participants:

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

45

46 Interventions

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

50

51 Outcome measures:

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

53

54 Results:

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

60

61 Conclusions:

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

68

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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

For peer review only

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

72 STRENGTHS AND LIMITATIONS

- 73 • Strength: our research approach using semi-structured interviews with a wide range of
74 stakeholders and subsequent thematic analysis to identify facilitators and barriers for successful
75 implementation of the ERATS protocol, makes our approach transferable to other fields,
76 countries and contexts.
- 77 • Strength: data triangulation; due to interviews with a wide range of stakeholders, we were able to
78 obtain different perspectives on the Dutch situation.
- 79 • Limitation: the interviewers were both surgical HCPs; we tried to limit bias with the semi-
80 structured nature of the interviews and the use of a predetermined topic list.
- 81 • Limitation: no hospital board members and only one health insurance representative were
82 interviewed, which might have biased the results by potentially underreporting of socio-political
83 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 successfully, 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 successful implementation of the ERATS protocol in the Netherlands. These insights can be used to develop tailored implementation strategies to support implementation in practice.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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

1
2
3 163 the adoption, implementation and maintenance of an innovation within the healthcare sector. It
4 164 recognises four different categories: the determinants related to the innovation itself, factors concerning
5 165 the users/health care professional (HCP), determinants regarding the organisation, and the socio-political
6 166 context.[20] Depending on the role of the subject, different aspects of the topic guide were explored more
7 167 or less extensively. When no new insights were discovered in the last 3 interviews, it was considered that
8 168 sampling saturation was reached.
9 169

13 170 **Process**

14 171 During a 3-month period (October- December 2019), the first author (EvM) conducted 14 interviews, with
15 172 occasional assistance of CdB. EvM is a general thoracic surgeon, working in a teaching hospital and lead
16 173 of the national ERATS implementation effort; CdB is a resident in general surgery. Two interviews were
17 174 conducted as a face-to-face group interview, the remaining 12 were conducted one-to-one, mostly by
18 175 telephone. Audio was recorded from all interviews and additional notes were taken during the sessions.
19 176

23 177 **Analysis**

24 178 With verbatim transcription of the recordings, two of the authors (EvM and FvN) created a consensus
25 179 based codebook [Supplementary table 2], by analysing two interviews independently.[22] This codebook
26 180 was used to code all interviews in ATLAS.ti 8 [ATLAS.ti Scientific Software Development GmbH, Berlin,
27 181 Germany]. Next, the codes were sorted and grouped together into different themes, following a thematic
28 182 analysis by two of the authors (EvM and FvN).[23] To detect patterns in responses as well as for data
29 183 triangulation, data was organised according to subject group as well: patient representatives, nurses,
30 184 case manager, physicians, management/supportive within hospital, supportive outside hospital
31 185 (Insurance/EMR).[24] The most relevant and illustrative quotes were selected after discussion among the
32 186 research team.
33 187

39 188 **Ethics**

40 189 All subjects received study information for participants in writing, informing them of their right to withdraw
41 190 their cooperation without explanation. Confidentiality was secured by limiting access to the transcripts
42 191 and data to 2 of the authors (EvM and FvN), erasing recordings of the interviews after transcription and
43 192 erasing identifying information from the transcripts. All participants signed an informed consent form prior
44 193 to the interview. The Medical Ethics Review Committee of VU University Medical Center deemed the
45 194 Medical Research Involving Human Subjects Act (WMO) not applicable and confirmed that an official
46 195 approval by the committee was not required (MERC ref. 2019.488).
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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 HCP'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

1

2

3 276 *discharged from hospital before they were ready. That is not good, obviously. That stings.*" (Pulmonary
4 277 *Physician 2).*

6 278

7 279 **Physical condition and age**

9 280 While age was mentioned by some, the physical condition was mentioned by surgeons and patient
10 281 representatives alike. Since patients, considered for lung resections, already are screened for the
11 282 physical ability to undergo such a resection, the comments mostly referred to the physical ability after
12 283 surgery or limitations in daily life. "...*the fitter you are, going into an operation, the easier your recovery*
13 284 *will be.*" (Patient 2). Physical condition and age however, can influence the expectations of the healthcare
14 285 professionals, as well as the expectations of the patients regarding their ability to adhere to the ERATS
15 286 protocol.

19 287

20 288 **Theme 4: Factors influencing change in perioperative care delivery**

22 289 In order to implement the ERATS-protocol, HCP's have to be able to change the way they work. The
23 290 facilitators and barriers that were mentioned mainly concern determinants at the HCP's team level, but
24 291 also organisational factors associated with the change process.

26 292

27 293 **Support for change**

29 294 Implementation of ERATS cannot be achieved by HCPs alone; support from management is essential to
30 295 adopt a multidisciplinary protocol. At management and insurance company level, socio-economic factors
31 296 will come into play, where the benefits at the level of individual patients should also translate into cost-
32 297 effectiveness. "... *the patient is number one, quality of medical care is two and cost is three. Those are*
33 298 *the three pillars of our "sensible care" programme [...] a protocol like the one you have developed*
34 299 *[ERATS] follows these pillars seamlessly.*" (Insurance representative).

38 300

39 301 **Teamwork**

40 302 Having a multidisciplinary team that works according to the same protocol was generally considered a
41 303 facilitator, generating support for individual HCPs to follow ERATS. Previous negative experiences by
42 304 individual HCPs or perceived contraindications for ERATS, like advanced age, can limit the willingness to
43 305 implement ERATS. "... *but this "you've had a big operation, so take it easy for another day"-approach to*
44 306 *patients will keep emerging. So old habits and old emotions.*" (Pulmonary Physician 2).

48 307

49 308 The perceived benefits of ERATS and the team effort to achieve multidisciplinary improvement in care
50 309 were mentioned as facilitator. Another facilitator mentioned was having a clear implementation plan,
51 310 aided with training sessions, educational materials for both HCPs and patients, so all HCPs know when
52 311 ERATS has started.

55 312

56 313 **Available time for HCPs**

57

58

59

60

1
2
3 314 Not having time to gather the ERATS team and discuss implementation is one barrier, perceived extra
4 315 work by ward nurses or physiotherapists in delivering ERATS another. *“Everybody is so busy; nobody*
5 316 *has time to sit down and discuss topics like this [ERATS]”.* (Surgeon 2).

7 317 The realisation of the expected benefits of following the ERATS protocol, like reduction of complications,
8 318 regarding workload can act as a facilitator as well: *“when a patient catches pneumonia, it will mean a lot*
9 319 *more work [for the nurses] [...], than just helping them mobilise early.”* (Quality improvement officer).
10 320

13 321 Receiving support by colleagues, leadership and management, declaring ERATS implementation a
14 322 priority and providing logistic and administrative support was mentioned as a facilitator. Even though
15 323 insurance companies do not want to get involved in specific medical decisions, they can act as a
16 324 facilitator by supporting quality improvement projects like ERATS implementation in their contract
17 325 negotiations.
18 326

22 327 **Data collection and feedback**

23 328 Insight into the effects of ERATS helps to inform patients about what to expect after an anatomical lung
24 329 resection. And in turn, it also aids implementation by helping HCPs understand the consequences of their
25 330 actions. *“We never look at 30-day outcome data, we’re quite bad at that. We really are focused on short*
26 331 *term effects.[...] We have difficulty understanding the influence of all our actions in the operating theatre*
27 332 *on the 30-day outcome.”* (Anesthesiologist 2).

30 333 The work necessary for data extraction from EMRs, data processing and structured feedback sessions
31 334 poses a significant barrier. While EMR companies are working on better data extraction capabilities, for
32 335 now, lack of automated data extraction is deemed a barrier.
33 336

36 337 **Theme 5: Usability of the ERATS protocol**

37 338 While all interviewees agreed on knowledge of the protocol by the HCPs as a facilitator, the HCPs also
38 339 acknowledged the potential barriers created in case of a voluminous, unclear and/or inconsistent
39 340 protocol.
40 341

43 342 **Concise multidisciplinary protocol**

44 343 Clear instructions on procedures and guidelines were mentioned by all interviewees. Having one
45 344 multidisciplinary protocol was mentioned as a facilitator in eliminating different styles of different HCPs
46 345 and therefore a facilitator in adopting ERATS. Specifically, standardised, rather than physician
47 346 dependent, use of minimally invasive surgical techniques and clear step by step instructions regarding
48 347 pain management, were mentioned specifically as determinants of successful implementation.
49 348

53 349 **Clear goals**

54 350 Another sub-theme touched on having clear recovery goals to work towards by following the protocol. By
55 351 informing patients and HCPs about these goals, they can be engaged to help achieve them. In contrast,
56 352 sending mixed signals, due to lack of clarity of the goals of the protocol, was deemed a barrier.
57 353
58 354
59 355
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

354 **Flexibility**

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

361 **Clear logistics**

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

For peer review only

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 resources 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

1
2
3 406 strategies can be selected.[17,18] Even though there is no undisputed way to select implementation
4 407 strategies, projects like the Expert Recommendations for Implementing Change (ERIC) project have
5 408 created a set of well defined implementation strategies for (CFIR)-based contextual barriers that can be
6 409 deployed.[30,31] The description of our methodology makes our approach transferable. This potentially
7 410 aids analysis of the local situation and ERATS implementation in other contexts.[17,18]
8
9 411 The main take-aways from our study are that implementation strategies for ERATS in the Netherlands
10 412 should put emphasis on communication between HCPs and patients supported by educational materials,
11 413 preparing patients, as well as family members, to be active participants. Special provisions should be
12 414 made to extend ERATS care beyond hospital wards, especially after discharge. Additional strategies
13 415 should include optimisation of data collection, analysis and feedback to the ERATS Teams to regularly
14 416 evaluate ERATS implementation data as well as patient experiences. Early measurable effects from
15 417 implementation will motivate ERATS Teams during implementation and regular standardised evaluation
16 418 of feedback data is thought to help continuous quality improvement.[32,33] Providing IT support and
17 419 adequate data management will also provide data to justify the resources deployed for ERATS
18 420 implementation.[34] The specific attention to these determinants will help tailor implementation strategies
19 421 to the Dutch situation. A Dutch implementation study, the multicentre ERATS Trial, is currently ongoing to
20 422 evaluate these implementation strategies.
21
22 423

23 424 **Strengths & limitations**

24 425 One strength of our study is data triangulation; using a wide range of stakeholders, we were able to
25 426 obtain different perspectives on the Dutch situation. By definition of qualitative research is not
26 427 generalisable, in addition the results of our analysis are specific to the Dutch socio-political context. Yet,
27 428 the research approach with semi-structured interviews and thematic analysis, makes this approach
28 429 transferable to other fields, countries and contexts.

29 430 Another limitation is that the interviewers were both surgical HCPs; we tried to limit bias with the semi-
30 431 structured nature of the interviews and the use of a predetermined topic list. Also, no board members and
31 432 only one health insurance representative were interviewed, which might have biased the results. For this
32 433 reason, socio-political factors, like reimbursement and costs, might have been underreported.
33 434

34 435 **Conclusion**

35 436 Based on a structured problem analysis among a wide selection of stakeholders, this study identified
36 437 specific facilitators and barriers for implementing the ERATS protocol in the Netherlands. Based on our
37 438 study, emphasis on consistent and sufficient communication, support in the transition from hospital to
38 439 home and adequate audit and feedback data, in addition to known general guidelines on implementing
39 440 ERAS®-type programmes, will enable a tailored approach to implementation of ERATS in the Dutch
40 441 context.
41 442
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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).

AUTHOR STATEMENT:

Conception and design of the study: Erik M. von Meyenfeldt, F. Van Nassau, J.R. Anema

Acquisition of data: Erik M. von Meyenfeldt, Carlijn T.I. de Betue, L. Barberio

Analysis and/or interpretation of data: Erik M. von Meyenfeldt, F. Van Nassau, Carlijn T.I. de Betue, L. Barberio, Wilhelmina H. Schreurs, Geertruid M.H. Marres, H.J. Bonjer, J.R. Anema

Drafting the manuscript: Erik M. von Meyenfeldt, F. Van Nassau,

Revising the manuscript critically for important intellectual content: Erik M. von Meyenfeldt, F. Van Nassau, Carlijn T.I. de Betue, L. Barberio, Wilhelmina H. Schreurs, Geertruid M.H. Marres, H.J. Bonjer, J.R. Anema

All authors approved the version of the manuscript to be published.

DATA STATEMENT:

The original data is available from 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.

FUNDING

Not Applicable

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

REFERENCES

- 1 Bray F, Ferlay J, Soerjomataram I, *et al*. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2018;**68**:394–424.
- 2 Thorsteinsson H, Alexandersson A, Oskarsdottir GN, *et al*. Resection Rate and Outcome of Pulmonary Resections for Non – Small-Cell Lung Cancer. *JTO Acquis* 2012;**7**:1164–9.
- 3 Von Meyenfeldt EM, Hoeijmakers F, Marres GMH, *et al*. Variation in length of stay after minimally invasive lung resection: A reflection of perioperative care routines? *Eur J Cardio-thoracic Surg* 2020;**57**:747–53.
- 4 von Meyenfeldt EM, Marres GMH, van Thiel E, *et al*. Variation in length of hospital stay after lung cancer surgery in the Netherlands†. *Eur J Cardio-Thoracic Surg* 2018;**54**:560–4.
- 5 Wang S, Li X, Li Y, *et al*. The long-term impact of postoperative pulmonary complications after video-assisted thoracic surgery lobectomy for lung cancer. *J Thorac Dis* 2017;**9**:5143–52.
- 6 Templeton R, Greenhalgh D. Preoperative rehabilitation for thoracic surgery. *Curr Opin Anaesthesiol* 2019;**32**:23–8.
- 7 Ljungqvist O, Scott M, Fearon KC. Enhanced Recovery After Surgery. *JAMA Surg* 2017;**152**:292–8.
- 8 Senturk JC, Kristo G, Gold J, *et al*. The Development of ERAS Across Surgical Specialties. *J Laparoendosc Adv Surg Tech* 2017;**27**:863–70.
- 9 Brunelli A, Imperatori A, Droghetti A. Enhanced recovery pathways version 2.0 in thoracic surgery. *J Thorac Dis* 2018;**10**:S497–8.
- 10 Rogers LJ, Bleetman D, Messenger DE, *et al*. The impact of enhanced recovery after surgery (ERAS) protocol compliance on morbidity from resection for primary lung cancer. *J Thorac Cardiovasc Surg* 2018;**155**:1843–52.
- 11 Hubert J, Bourdages-Pageau E, Paradis Garneau CA, *et al*. Enhanced recovery pathways in thoracic surgery: The Quebec experience. *J Thorac Dis* 2018;**10**:S583–90.
- 12 von Meyenfeldt EM, de Betue CTI, van den Berg R, *et al*. Wide Variation in Perioperative Care in Anatomical Lung Resections in the Netherlands: A National Survey. *Semin Thorac Cardiovasc Surg* 2020;**32**:1101–10.
- 13 Batchelor TJP, Rasburn NJ, Abdelnour-Berchtold E, *et al*. Guidelines for enhanced recovery after lung surgery: recommendations of the Enhanced Recovery After Surgery (ERAS®) Society and the European Society of Thoracic Surgeons (ESTS). *Eur J Cardio-Thoracic Surg* 2019;**55**:91–115.
- 14 Kehlet H, Wilmore DW. Evidence-based surgical care and the evolution of fast-track surgery. *Ann Surg* 2008;**248**:189–98.
- 15 Currie A, Burch J, Jenkins JT, *et al*. The impact of enhanced recovery protocol compliance on elective colorectal cancer resection: Results from an international registry. *Ann Surg* 2015;**261**:1153–9.
- 16 Arrick L, Mayson K, Hong T, *et al*. Enhanced recovery after surgery in colorectal surgery: Impact of protocol adherence on patient outcomes. *J Clin Anesth* 2019;**55**:7–12.
- 17 Francis NK, Walker T, Carter F, *et al*. Consensus on Training and Implementation of Enhanced

- 1
2
3 517 Recovery After Surgery: A Delphi Study. *World J Surg* 2018;**42**:1919–28.
- 4 518 18 Stone AB, Yuan CT, Rosen MA, *et al.* Barriers to and facilitators of implementing enhanced
5 519 recovery pathways using an implementation framework: A systematic review. *JAMA Surg*
6 520 2018;**153**:270–8.
- 7 521 19 Mazza F, Venturino M, Turello D, *et al.* Enhanced recovery after surgery: adherence and
8 522 outcomes in elderly patients undergoing VATS lobectomy. *Gen Thorac Cardiovasc Surg*
9 523 2020;**68**:1003–10.
- 10 524 20 Fleuren M, Wiefferink K, Paulussen T. Determinants of innovation within health care
11 525 organizations. Literature review and Delphi study. *Int. J. Qual. Heal. Care.* 2004;**16**:107–23.
- 12 526 21 Fleuren MAH, Paulussen TGWM, Dommelen ., *et al.* Towards a measurement instrument for
13 527 determinants of innovations. *Int J Qual Heal Care* 2014;**26**:501–10.
- 14 528 22 Mays N, Pope C. Assessing quality in qualitative research. *Br Med J* 2000;**320**:50–2.
- 15 529 23 Castleberry A, Nolen A. Thematic analysis of qualitative research data: Is it as easy as it sounds?
16 530 *Curr Pharm Teach Learn* 2018;**10**:807–15.
- 17 531 24 Braun V. What can “ thematic analysis ” offer health and wellbeing researchers ? *Int J Qual Stud*
18 532 *Health Well-being* 2014;**1**:9–10.
- 19 533 25 Frank JR, Snell L, Sherbino J E. CanMEDS 2015. *CanMEDS 2015 Physician Competency Fram*
20 534 *Ottawa R Coll Physicians Surg Canada* 2015;:1–30.
- 21 535 <http://www.royalcollege.ca/portal/page/portal/rc/canmeds/resources/publications>
- 22 536 26 Damschroder LJ, Aron DC, Keith RE, *et al.* Fostering implementation of health services research
23 537 findings into practice: A consolidated framework for advancing implementation science. *Implement*
24 538 *Sci* 2009;**4**:1–15.
- 25 539 27 Gillis C, Gill M, Marlett N, *et al.* Patients as partners in Enhanced Recovery after Surgery: A
26 540 qualitative patient-led study. *BMJ Open* 2017;**7**:1–10.
- 27 541 28 Borsuk DJ, AL-Khamis A, Geiser AJ, *et al.* S128: Active post discharge surveillance program as a
28 542 part of Enhanced Recovery After Surgery protocol decreases emergency department visits and
29 543 readmissions in colorectal patients. *Surg Endosc* 2019;**33**:3816–27.
- 30 544 29 Braet A, Weltens C, Sermeus W. Effectiveness of discharge interventions from hospital to home
31 545 on hospital readmissions: a systematic review. *JBI database Syst Rev Implement reports*
32 546 Published Online First: 2016.
- 33 547 30 Powell, B.J., Waltz, T.J., Chinman, M.J., Damschroder, L.J., Smith, J.L., Matthieu, M.M., Proctor,
34 548 E.K. K, J.E. A refined compilation of implementation strategies: results from the Expert
35 549 Recommendations for Implementing Change (ERIC) project. *Implement Sci* 2015;1–14.
- 36 550 31 Waltz TJ, Powell BJ, Fernández ME, *et al.* Choosing implementation strategies to address
37 551 contextual barriers: Diversity in recommendations and future directions. *Implement Sci* 2019;**14**:1–
38 552 15.
- 39 553 32 Gotlib Conn L, McKenzie M, Pearsall EA, *et al.* Successful implementation of an enhanced
40 554 recovery after surgery programme for elective colorectal surgery: A process evaluation of
41 555 champions’ experiences. *Implement Sci* 2015;**10**:1–11.
- 42 556 33 McLeod RS, Aarts MA, Chung F, *et al.* Development of an enhanced recovery after surgery
43 557
44 558
45 559
46 560

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

557 guideline and implementation strategy based on the knowledge-to-action cycle. *Ann Surg*
558 2015;**262**:1016–25.

34 McEvoy MD, Wanderer JP, King AB, *et al*. A perioperative consult service results in reduction in
560 cost and length of stay for colorectal surgical patients: evidence from a healthcare redesign
561 project. *Perioper Med* 2016;**5**:1–10.

For peer review only

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

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

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

Theme	Sub theme
Communication HCP-Patient	<ul style="list-style-type: none"> • Consistent information • Liaison in the transition hospital-home • Use of patient experiences
HCP professional competencies and experience	<ul style="list-style-type: none"> • Different competencies and experience of a multidisciplinary team of HCPs • Accessibility and empathy of HCP • Coordination between HCP's/hospitals
Patient factors	<ul style="list-style-type: none"> • Patient autonomy • Situation at home • Physical condition and age
Factors influencing change in perioperative care delivery	<ul style="list-style-type: none"> • Support for change • Teamwork • Available time for HCPs • Data gathering and feedback
Usability of the ERATS protocol	<ul style="list-style-type: none"> • Concise multidisciplinary protocol • Clear goals • Flexibility • Clear logistics