Original article

A multicentre qualitative study assessing implementation of an Enhanced Recovery After Surgery program[☆] D. Martin^a, D. Roulin^a, F. Grass^a, V. Addor^a, O. Ljungqvist^b, N. Demartines^{a,*}, M. Hübner^a^a Department of Visceral Surgery, Lausanne University Hospital CHUV, Lausanne, Switzerland^b Faculty of Medicine and Health, School of Health and Medical Sciences, Department of Surgery, Örebro University, Örebro, Sweden

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SUMMARY

Background & aims: The existence of enhanced recovery specific guidelines (ERAS) is not enough to change patient management practice since many barriers exist to successful ERAS implementation. The present survey aimed to analyse motivations for implementation as well as encountered difficulties and challenges. Further, relevance and importance of perioperative care items and postoperative recovery targets were assessed.

Methods: A multicentre qualitative study was conducted between August and December 2016 among surgeons, anaesthesiologists and nurses from implemented ERAS centres in Switzerland (n = 16) and Sweden (n = 14). An online survey (31 closed questions) was sent by email, with reminders at 4, 8 and 12 weeks.

Results: Seventy-seven out of 146 experts completed the survey (response rate 52.7%). Main motivations to implement ERAS were the expectation to reduce complications (91%), higher patient satisfaction (73%) and shorter hospital stay (62%). The application of ERAS program represented major changes in clinical practice for 57% of participants without significant differences between various specialities (surgeons: 63%, nurses: 63%, anaesthesiologists: 36%, p = 0.185). The most important barriers for straightforward implementation were time restraints (69%), opposing colleagues (68%) and logistical reasons (66%). The 3 most frequently cited patient-related barriers to adopt ERAS were opposing personality (52%), co-morbidities (49%) and language barriers (31%).

Conclusions: Implementing ERAS care into practice was challenging and required important changes in clinical practice for all involved specialities. Main reasons for implementation were the expectation to reduce complications and hospital stay with improved patients' satisfaction. Main barriers were time restraints, reluctance to change and logistics.

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1. Introduction

Enhanced Recovery After Surgery (ERAS) pathways reduce overall morbidity, length of hospital stay and costs by incorporating multimodal optimization of perioperative care in colorectal, upper gastrointestinal, liver and pancreatic surgery, and more recently in urology, gynaecology and orthopaedic surgery [1–11].

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Previous research assessed adherence to the protocol and improvement of clinical outcomes to evaluate completeness and success of ERAS implementation [12–14]. In daily clinical practice, it may be complex to introduce and apply simultaneously a relatively high number of new interventions among many providers and across hospital services [15]. Qualitative studies allow to define those barriers and provide multidimensional additional information [16]. Implementation challenges have been attributed to a variety of key areas, namely related to patient, staff, practice and resources [17]. Therefore, evidence-based principles of ERAS are not widely adopted and implementation is lagging way behind the evidence [18].

The present survey aimed to analyse the reasons and motivations that made centres decide to implement ERAS as well as

difficulties encountered and challenges during implementation. Secondly, the relevance and importance of postoperative recovery targets and perioperative care items were assessed as well.

2. Material and methods

2.1. Study design and participants

A multicentre qualitative study was conducted among ERAS teams from centres in Switzerland ($n = 16$) and Sweden ($n = 14$) that had implemented ERAS principles by participating in the ERAS Society Implementation Program (www.erassociety.org [2,19]). Each centre had an ERAS coordinator on site. At least one member of the surgical, nursing and anaesthetic team, considered as trained in ERAS, was asked to participate in each institution. This survey concerned all different surgical specialities. The questions included participant demographics as well as difficulties and challenges during ERAS implementation. The relevance and importance of pre-defined postoperative recovery targets and perioperative care items were assessed by asking participants to rate each component on a semantic differential scale (not important at all: 0, very important: 10). ERAS perceived protocol deviation was also assessed with a similar scale (never: 0, every time: 10). This evaluation was compared between the different care providers. The survey was sent by email using online cloud-based software (Survey Monkey®, Palo Alto, CA, United States). Automatic reminders were sent at 4, 8 and 12 week intervals. The survey included 31 closed questions and took an estimated 10 min for completion. Data were collected between August and December 2016.

2.2. Statistical analyses

Descriptive statistics for categorical variables were reported as number and percentage, while continuous variables were reported as median and interquartile range (IQR) or means and standard deviation (SD) as appropriate. Pearson's chi square test was used for comparison of categorical variables. Continuous variables were compared with the Kruskal–Wallis test or Mann–Whitney U test when appropriate. A p value ≤ 0.05 was considered statistically significant. All statistical analyses were two-sided and performed using SPSS 22.0 software (SPSS Inc., Chicago, IL).

2.3. Ethics

This survey targeted medical staff only, and did not affect patients in any way. The local Committee for Medical and Health Research Ethics suggested that no formal ethical approval was required for this survey.

3. Results

3.1. Demographics

Seventy-seven out of 146 experts completed the survey yielding a response rate of 52.7%. Fifty-eight responses were from Swiss participants (response rate 63%) and 19 from Swedish participants (response rate 37%). Demographics of responding experts are summarized in Table 1. Response rate was not significantly different between specialities (surgeons 65%, anaesthesiologists 65% and nurses 57%, $p = 0.790$).

3.2. Reasons for ERAS implementation

The main reasons for initiating the ERAS implementation were the following expected benefits: reducing complications (91%),

Table 1
Demographics of the survey participants.

	Swiss, $n = 58$	Swedish, $n = 19$	Overall, $n = 77$
Mean age (SD)	44.1 (8.3)	46.1 (9.2)	44.7 (8.5)
Male gender, n (%)	31 (53)	9 (47)	40 (52)
Speciality, n (%)			
Surgeons	25 (43)	8 (42)	33 (43)
Anaesthesiologists	13 (22)	4 (21)	17 (22)
Nurses	20 (35)	7 (37)	27 (35)
Mean years working with ERAS (SD)	3.0 (1.6) ^a	4.9 (2.8) ^a	3.5 (2.1)

Abbreviation: SD, standard deviation.

^a Indicates statistical significance, p value ≤ 0.05 , Mann–Whitney U test.

higher patient satisfaction (73%), and shorter hospital stay (62%). Further, in descending order, the participants aimed for improved patients' quality of life (32%), reduced costs (26%) or workload (9%) and for publicity and marketing (6%).

3.3. Implementation challenges

The application of ERAS program represented major changes in clinical practice for 57% of the responding experts. A total of 63% of surgeons, 63% of nurses and 35% of anaesthesiologists ($p = 0.185$) stated that ERAS induced major changes in their practice. Preoperative ERAS-specific education required an additional 15–30 min for 49% of the responders, more than 30 min (42%) and less than 15 min (9%) and was delivered by nurses (60%), surgeons (10%), or both together (30%). Participants were asked to evaluate the perceived rate of intentional ERAS protocol deviation according to specialities, which is described in Fig. 1. Thirty-six participants (47%) claimed to conduct ERAS meetings once a month, 18% twice a month, 15% once a week and the remaining 20% less than once per month. In terms of importance for success of the implementation, patient's preoperative education was rated at 10/10 (IQR 8–10), the presence of an ERAS coordinator at 10/10 (IQR 8–10) and staff education at 9/10 (IQR 8–10). Forty-six participants (60%) felt that it was more difficult to change habits to ERAS for colleagues with training in more traditional care pathways compared to those with recent training.

3.4. Barriers to implementation

The most important barriers to ERAS implementation were time restraints (69%), opposition from colleagues (68%) and logistical reasons (composing/distributing memos and care maps, continuous training, 66%). Less important barriers were opposition from the administration, money restraints and patient-related factors (53%, 34% and 10%, respectively). The 3 most frequently cited patient-related barriers to implementation were opposing personality (52%), co-morbidities (49%) and language barriers (31%). The 3 most relevant co-morbidities impeding straightforward application of ERAS were mental illness (64%), cardiovascular disease (38%) and disability (27%). Barriers related to age and socio-cultural level were cited by 23% and 22% of participants, respectively. Forty percent of participants stated that ERAS could equally be applied regardless of age. In contrast, 42% of participants considered patients over 80 years of age to be unsuitable ERAS candidates. Early discharge was judged to be difficult by 22 experts (29%) due to insufficient resources (home care and rehabilitation centres). Conversely, in terms of importance for successful ERAS protocol compliance, patient personality was rated at 7/10 (IQR 6–8), co-morbidities at 7/10 (IQR 5–7) and age at 4/10 (IQR 2–7).

Fig. 1. ERAS perceived protocol deviation according to speciality.

3.5. ERAS postoperative recovery targets and perioperative care items

The relevance and importance of perioperative care items and postoperative recovery targets according to ERAS experts are described in Figs. 2 and 3. Most experts felt that ERAS implementation reduced length of stay by 3 days (26%), 2 days (25%),

more than 4 days (13%) and 1 day (9%). Fourteen participants did not know (18%) and 4 reported no decrease in length of stay (5%). Seventy-three participants (95%) believed that length of stay might still decrease following ERAS implementation.

4. Discussion

This survey among professionals involved in and leading ERAS pathways in their local hospital is one of the first analysing the motivation and difficulties of ERAS implementation in daily clinical practice. Some interesting discrepancies but also similarities of view between subjective feeling of ERAS care providers have been highlighted. In fact, implementation required important changes of clinical practice in order to achieve improved outcomes, and the amount of work and energy should not be underestimated. It starts

Preoperative items

Avoiding oral bowel preparation
Avoiding anaesthetic sedative medication
Fasting kept at absolute minimum
Oral carbohydrate loading
Counseling

Intraoperative items

Using epidural analgesia when indicated
Avoiding drain
Avoiding nasogastric tube
Antimicrobial prophylaxis and skin preparation
Optimising fluid balance

Postoperative items

Stimulating gut motility
Allowing normal diet at will after the operation
Promoting early and scheduled mobilisation

Fig. 2. Comparison of ERAS experts' rating of perioperative care items.

Fig. 3. Comparison of ERAS experts' rating of recovery targets.

with main barriers, namely time restraints, reluctance to change and logistics. Main factors in favour of ERAS implementation were the expectations to reduce complications and hospital stay as well as to improve patients' satisfaction.

Participants to this survey, considered as trained in ERAS, were well balanced in terms of demographics of the typical ERAS teams comprising of surgeons, anaesthesiologists and nurses. However, the Swedish group had a significantly longer experience with the ERAS program. Age and experience of professionals may have influenced attitude toward ERAS implementation, as described by a majority of participants (60%). Most centres conducted meetings once a month, which is less frequent than recommended by the ERAS Society and which risks to be insufficient [14,20]. At the outset during the actually implementation program, a unit should meet weekly to audit compliance and implement necessary changes. After some time, and with increased experience of the ERAS group, the frequency of the team meetings can be reduced, but attendance at meetings must remain an established commitment for every team member [20]. In this study, participants reported that the majority of patients received preoperative nursing education, which lasted usually between 15 and 30 min. Pearsall et al. conducted an exploratory study using interviews, and identified lack of education for patients and their family as a common problematic [21]. As a consequence, in our implemented hospitals, a patient education booklet and daily activity log were developed and handed to patients when they consented for surgery.

Surprisingly, intentional ERAS protocol deviation was perceived to be considerable (>50%) in the present study. In a consecutive cohort of patients undergoing elective colorectal surgery, the decision to deviate from the ERAS clinical pathway was mainly a medical decision [22]. However, reasons for non-compliance were medically justified in 78% of the study participants, which still leaves room for improvement in almost a quarter of deviations. Given the difficulty in determining the relative importance of each individual item, the idea of a flexible and individualised approach

rather than a rigid protocol has also been postulated [23–25]. However, it has repeatedly been shown that when variation of care is reduced and evidence based ERAS protocols are being instituted, outcomes improve. A minimal overall compliance of 70% was recently shown to be necessary to achieve improved clinical outcomes [26]. Thus, deviation from protocols should be done for a strong medical reason only. Another crucial point for successful implementation is the identification of an ideally enthusiastic team leader. As demonstrated in the present survey, the median importance of an ERAS coordinator was 10 out of 10 on a semantic differential scale. The ERAS coordinator, often a specialised nurse, fills a key role within ERAS team, with time devoted to spread information and managing practical matters [20].

Despite overwhelming evidences supporting ERAS, adoption and implementation of ERAS pathways remain scarce across Europe [23,27,28]. Several reasons might account for this low interest. A better understanding of potential barriers and drawbacks is one important factor [23,28,29]. In the present study, most important barriers to implementation were lack of time, opposing colleagues and logistical reasons. Two studies independently reported general resistance to change, time and staff restraints, as well as poor communication, collaboration and coordination between departments as main reasons for failure [21,30]. In an American retrospective study, 26% of barriers and enablers to ERAS implementation occurred at the site and unit levels, with a provider focus 26% of the time, a patient focus 26% of the time, and a system focus 22% of the time [19]. Concerning staff, lack of interest was reported, particularly among nurses and anaesthesiologists [31]. One possible explanation is that unlike surgeons, these latter do not follow patients from the beginning to the end of perioperative management, and do not necessarily see the actual benefits of the ERAS program. Large numbers of different caregivers including anaesthesiologists might impede straightforward implementation [15]. As demonstrated in this study, the application of ERAS program represented major changes in clinical practice for 63% of

surgeons, 63% of nurses and 35% of anaesthesiologists. Although these results are not statistically different, probably because of the small sample size, anaesthesiologists seem less concerned with the change in their practice generated by ERAS implementation. A recent comprehensive consensus review for anaesthesia practice in patients undergoing gastrointestinal surgery within an ERAS program aimed promulgating anaesthesiologists' involvement as mandatory in implementation process [32]. In the current literature, lack of education of the multidisciplinary team was also identified as drawback. To increase multi-institutional collaboration, regular conference calls to share best practice among sites and exchange about experiences and difficulties have been reported to be useful [21]. In an observational study, compliance to ERAS items was found to be low and affecting recovery and length of hospital stay due to different disciplines providing care for the same patients [23]. Implementation of protocol requires a dedicated ERAS team consisting of surgeons, anaesthesiologists and nursing staff, and needs a continuous education to sustain adherence [14,33,34].

In the present study and according to ERAS experts, barriers related to the patient were their opposing personality. However, a so-called opposing personality is rather the results of lack of understanding of the benefit of ERAS pathway. This may be corrected by improved information and discussion with the patient and his relative to empower the patient as supporting active actor for its entire perioperative process. This capital information requires time and patience as well as adequate communication skills. In addition, language difficulties and age above 80 years may increase the difficulty of understanding the process. For these reasons, individually adapted preadmission counselling is thus crucial to prepare patients to assume his active role [35]. Contrary as supposed by 42% of experts in the present study, elderly patients are well suited for ERAS pathway: a recently published retrospective study showed that adherence to the ERAS pathway was equally high in patients aged over 70 years [36]. Despite more co-morbidities, older patients did not experience more complications and recovery was similar. ERAS did therefore not require specific adaptations for elderly. Likewise, ERAS can be applied to emergent cases and appears to work also over the weekend even with reduced staff [37,38]. It has to be emphasized that inclusion of patient perspectives is critical to identify challenges and facilitators to implement ERAS [39].

The relative importance of ERAS postoperative recovery targets and perioperative care items was previously reported [40,41]. Nausea and pain free recovery and the ability to eat, drink and move quickly after surgery are of utmost importance. Concerning perioperative care, the items "preoperative counselling", "optimizing fluid balance", and "promoting early and scheduled mobilisation" received the highest scores in a survey conducted during the first international ERAS congress 2012 as well as in the present survey [40]. The reproducibility of these results indicates uniformity in the perception of recovery targets over time by ERAS experts and trainees [40]. Functional recovery, as food tolerance without nausea, adequate pain control and ability to mobilize, is consistently considered the most important target for recovery and might be used when defining the recovered patient in future research and audits, as concluded also by other surveys amongst international experts [41,42].

Several limitations of the present study need to be addressed. ERAS guidelines for colorectal surgery have been published before other specialities [43]. Most centres have therefore implemented ERAS for colorectal surgery first, then gradually the other specialities. This is especially valid for referral centres, but less for smaller peripheral centres, where ERAS is mainly applied to colorectal surgery, which represented most centres included in this study. This present survey concerned all different specialities, and might

explain why many barriers to implementation have been identified. Furthermore, not all members of the multidisciplinary perioperative ERAS team were interviewed. In particular, dieticians, physiotherapists, and especially residents who are important pillars for proper functioning of the perioperative team were not included. Moreover, patients themselves were not interviewed but their insights should be part of another study. The focus of the present study was on ERAS leaders which were supposed to be familiar with the pathway. The importance and role of each specialist in the implementation of ERAS was not evaluated. The response rate was surprisingly low for a survey among health care professionals who should be a priori particularly motivated for enhanced recovery, but provided the large amount of online surveys regularly sent around the web on various subject, responders are today more difficult to motivate, thus the response rate may be regarded as acceptable compared to other survey and is still representative [44]. Another potential explanation might be lack of time and especially lack of interest from some care providers, to which ERAS implementation could have been imposed. Finally, audit is an integral part of the ERAS Implementation Program and the only way to know whether there is improvement. The audit was performed at least every other week as part of the implementation program. However, the specific question regarding the value of audit was not assessed in this present survey.

In conclusion, implementing evidence-based ERAS care into practice was perceived as challenging and required important commitment and changes in clinical practice for all involved specialities. Main motivation to implement ERAS pathway was the expectation to reduce complications and hospital stay, as well as to improve patients' satisfaction. Functional recovery, as tolerance of food without nausea, adequate pain control and ability to mobilize, was consistently considered the most important target for recovery among involved specialities.

Conflict of interest

OL founded and owns stock in Encare AB, registered in Sweden that manages the ERAS Interactive Audit System. No other conflict of interest.

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Statement of authorship

All the authors contributed to the work and approved the final version of the manuscript. Particularly, contributions were: study design: DM, MH, OL, ND; Data collection: DM, DR, FG, VA; Data analyses and interpretation: DM, DR, FG, VA, OL, ND, MH; Manuscript draughting: DM, DR, FG, MH; Critical revision of the manuscript: DM, DR, FG, VA, OL, ND, MH.

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