Review Article

Enhanced recovery for upper gastrointestinal surgery: a review

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Abstract: In recent years, the popularity and application of the ERAS approach has expanded to cover a wide variety of surgical specialties and procedures. This has partly been driven by the ERAS Society, who have published a number of consensus guidelines for surgical procedures including gastrectomy and oesophagectomy. Upper gastrointestinal (GI) surgery includes some of the highest risk elective procedures performed on a routine basis, and consequently, has a lot to gain from the perceived benefits of ERAS. Evidence derived from several recent meta-analyses demonstrates a reduction in hospital length of stay, hospital costs and stress response to surgery through the implementation of ERAS principles in patients undergoing gastrectomy. Although the body of evidence concerning ERAS in oesophagectomy is not as large, analysis of the available data suggests that the application of ERAS principles may result in a reduction of hospital length of stay, pulmonary complications and anastomotic leakage. This review examines the consensus guidelines published by the ERAS Society for both gastrectomy and oesophagectomy and investigates the rationale for some of the recommendations made therein. Both sets of guidelines are comprised of a number of generic ERAS recommendations, common to enhanced recovery programmes across all specialties, as well as specific, evidence-based recommendations applicable to the two surgical procedures concerned. Whilst the advent of these publications represents a significant step forward in the perioperative management of patients undergoing these procedures, many questions still remain. Whether the widespread adoption and implementation of these pathways produces the same magnitude of benefit we have seen elsewhere, for instance in colorectal surgery, remains to be seen, but regardless of that, further research is required to clarify these issues. As new evidence emerges, so the guidelines may be refined and the potential for improving patient's quality of life and perhaps even overall survival will increase.

Keywords: Perioperative care; esophagectomy; gastrectomy; anesthesiology; quality improvement

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Introduction

Developed following the original work by Kehlet *et al.* (1) in colorectal surgery, the intervening years have seen the popularity and application of the ERAS approach grow and expand to use in a wide variety of other surgical specialties/procedures. Alongside the generic challenges to optimal patient recovery that undergoing any major surgical procedure presents, each new specialty to which ERAS is applied brings with it new, procedure-specific issues to address. The ERAS society, through a combination of systematic review of the evidence and an international collaboration of experts has, as of July 2019, published 21 specific ERAS guidelines, in open access form, on their website, including guidelines for both oesophagectomy (2) and gastrectomy (3).

The increase in uptake of ERAS pathways is largely in response to the growing body of evidence highlighting the positive impact that ERAS can have in terms of reducing the stress response to surgery (4), critical care length of stay (5), overall hospital length of stay (6) and perioperative complications (7). Whilst the bulk of published work has been in colorectal surgery there is now increasing evidence from across a range of surgical specialties (8-10). More recently there has been a great deal of focus upon the impact that the perioperative period may have upon the progression of cancer (11) through the impairment of cell-mediated immunity thereby weakening host defences against both circulating micrometastases and local tumour recurrence. Additionally, given that a reduction in hospital length of stay and rapid return to normal function is one of its primary goals it is plausible that ERAS may benefit oncological outcomes through facilitating patients' return to intended oncological therapy (RIOT).

The evolution of ERAS for upper gastrointestinal (GI) surgery

Rationale

There are approximately 1,700 oesophagectomies performed in the UK every year, and it remains one of the highest risk elective surgical procedures performed on a routine basis. Some sources cite an operative mortality of 12%, with a 60% incidence of postoperative complications such as respiratory failure and anastomotic breakdown (12). Patients undergoing oesophagectomy can expect a relatively prolonged hospital stay. Mean hospital length of stay has been reported as being 10 to 15 days in patients receiving conventional care (13-15). Additionally, even with uneventful surgery and clear resection margins, patients undergoing oesophagectomy for malignancy still have a high risk of recurrence. One recent study has demonstrated a 45.2% 5-year, recurrence free survival following oesophagectomy for either adenocarcinoma or squamous cell carcinoma (SCC) of the oesophagus (16). Given oesophagectomy represents the high-risk end of a spectrum of Upper GI surgical procedures, it is clear to see why the application of ERAS—a technique which may reduce perioperative morbidity, hospital stay and surgical stress response—is an appealing prospect.

Whilst the ERAS Society have published consensus guidelines for both oesophagectomy (2) and gastrectomy (3), they are yet to be universally adopted. When implementing a new pathway, it is tempting to 'cherry-pick' elements that might be deemed to be of greater importance, however there is growing evidence highlighting the importance of compliance with all pathway elements in producing improved outcomes (9). It seems that perhaps the benefits of ERAS are produced via the accumulation of small incremental gains, with overall pathway adherence being key, rather than any one particular intervention.

Impact

Following the initial work on ERAS in the early 2000s, ERAS programmes began to be adopted and developed internationally. Gradually their scope expanded to include an increasingly diverse range of surgical specialties and procedures. As its popularity has increased so has the body of evidence investigating its impact.

In 2014, a meta-analysis, consisting of 5 randomised controlled trials (RCTs) and a total of 400 patients was published examining fast-track surgery (FTS) in gastrectomy for gastric cancer (17). This demonstrated a significant reduction in hospital length of stay, hospital costs and time to first flatus, with increased quality of life scores in the FTS group compared to conventional care. Interestingly no significant differences were found in either complication rates or readmission rates between the two groups.

More recent systematic reviews have essentially echoed the findings described above. A 2017 meta-analysis (8 RCTs comprising of 801 patients) demonstrated a reduction in length of stay, hospital costs and time to passage of first flatus. Additionally, biochemical markers of the surgical stress response were found to be reduced in the ERAS group, with reduced interleukin 6 (IL-6) and C-reactive protein (CRP) postoperatively. No significant difference in postoperative complication rates were found when comparing ERAS with conventional care, however it should be noted that this study did highlight an increase in hospital readmission rate in the ERAS group (18).

A subsequent meta-analysis in 2018, comprising of 6 RCTs with a total of 400 patients undergoing laparoscopic gastrectomy for gastric cancer found that those enrolled in an ERAS programme had a reduced length of stay and reduced hospital costs, with no difference in either time to first flatus, or rate of complications (19).

Currently there is far less published evidence available for ERAS programmes pertaining to oesophagectomy. Two systematic reviews of ERAS for oesophagectomy were published in 2014. The first incorporated a total of six

Table 1 Summary of key non-procedure-specific elements of the ERAS guidelines for oesophagectomy and gastrectomy

ERAS Guideline	Non-procedure-specific elements
Elements common to both gastrectomy and oesophagectomy guidelines	Preoperative counselling
	Smoking and alcohol cessation
	Avoidance of oral bowel preparation
	Avoidance of prolonged preoperative fasting and consideration for carbohydrate preload
	Avoidance of long acting pre-anaesthetic anxiolytics
	Antithrombotic prophylaxis
	Control of postoperative nausea and vomiting
	Postoperative glycaemic control
	Multimodal stimulation of bowel movement
	Consider early removal of urinary catheters
	Avoidance of hypothermia
Elements unique to gastrectomy guideline	Anaesthetic management
	Antimicrobial prophylaxis and skin preparation
	Epidural analgesia
	Intravenous analgesia
	Neutral fluid balance
	Early and scheduled mobilisation
Elements unique to oesophagectomy guideline	Patient specific prophylaxis of atrial dysrhythmia
	Continuation of beta blockade if appropriate
	Cardiopulmonary assessment

studies, all non-randomised, 3 retrospective cohort studies and 3 retrospective case controls. The authors concluded that the current evidence for ERAS in oesophagectomy was low in volume and quality, although ERAS appears to be both safe and feasible (20). The second comprised of 1 RCT and 8 non-randomised comparative studies, with a total of 1,240 patients, 661 receiving conventional care, and 579 receiving enhanced recovery. Although the authors concluded that the data was generally of low quality, their analysis of the pooled data demonstrated a significant reduction in length of stay, pulmonary complications and anastomotic leak rate in the ERAS group, with no difference noted in either perioperative mortality or readmission rate (21).

Generic ERAS recommendations

The consensus guidelines for both gastrectomy and oesophagectomy make a series of recommendations in the absence of procedure-specific evidence of benefit. Their authors argue that such recommendations are both safe and feasible, and are largely based upon evidence derived from other ERAS guidelines. Their key components have been summarised in *Table 1*. Interestingly antibiotic prophylaxis and skin preparation is not included in the ERAS Guideline for oesophagectomy. This may result from the fact that antibiotic prophylaxis is typically included as part of the WHO Checklist prior to surgery, and therefore may be seen as being a normal standard of care.

Procedure-specific recommendations

Gastrectomy

Preoperative nutrition

The combined effect of cachexia and problems with gastric emptying make gastric cancer patients particularly vulnerable to preoperative malnutrition making the recommendations around perioperative nutrition in this guideline especially significant. The authors recommend using ESPEN guidelines to identify malnourished patients (22) and instituting nutritional supplementation where appropriate. Parenteral feeding should also be considered if the gastric mass occludes the gastric outlet. This follows evidence indicating that malnutrition is associated with increased perioperative risk (23), in addition to a higher 28-day ICU mortality (24). Additional evidence has since been published demonstrating a higher skin incision infection rate, lower 3-year overall survival and disease-free survival in malnourished patients undergoing radical gastrectomy (25).

Importantly there is insufficient evidence to recommend the use of artificial nutrition in patients without malnutrition (26). Additionally, whilst biologically appealing, there is no evidence that an immunomodulatory diet, termed pharmaconutrition, has a significant clinical impact in gastrectomy.

Surgical approach

Regarding distal gastrectomy, a laparoscopically-assisted approach is strongly recommended in cases of early gastric cancer (T1, any N category), on the basis that review of six

meta-analyses with a total of 8,834 patients demonstrated a significant reduction in surgical blood loss, hospital length of stay, postoperative morbidity and time to oral intake with laparoscopic surgery when with compared with open techniques. No difference in anastomotic complications was observed between laparoscopic and open approaches. Notably there was insufficient evidence to strongly recommend one approach over the other in cases of advanced disease (3).

Similarly, a laparoscopic technique is suggested for total gastrectomy, with the caveat that it should be undertaken in institutions where it has become established practice, and where surgeons have suitable experience in the technique. This follows retrospective evidence demonstrating a higher anastomotic leak rate in laparoscopic total gastrectomy when compared to open surgery (27). Further evidence from three meta-analyses, with a total of 2,983 patients, demonstrated a reduced blood loss and hospital length of stay with laparoscopic techniques (despite a longer duration of surgery) and no difference in 60-month disease free survival between laparoscopic and open groups (3).

Regional anaesthesia

Whilst the use of epidural analgesia is recommended, albeit weakly, as part of the Non-Procedure Specific Recommendations, the ERAS Society authors continue by examining the use of local anaesthetic wound catheters and transversus abdominis plane (TAP) blocks. They argue that the use of these alternatives negates the risks associated with epidural placement, such as epidural haematomas and abscess formation.

Whilst the evidence regarding wound catheters available to the ERAS Society guideline authors was relatively inconsistent and not specific to gastrectomy, an RCT has since been published investigating the use of continuous wound infiltration in patients undergoing open gastrectomy (28). This group randomised patients to receive either epidural analgesia, continuous wound infiltration or patient controlled intravenous opioids. They conclude that all three groups had similar pain VAS scores during the first 48 hours after surgery. Additionally, all three groups had comparable patient satisfaction scores and wound healing.

Unfortunately, there are no studies which specifically investigate the use of TAP blocks in gastrectomy, however they have been shown to be safe and effective at providing analgesia in the early postoperative period after a range of intra-abdominal procedures (29). Importantly it has been argued that the procedures investigated are notably less invasive than an open gastrectomy with lymph node dissection.

Pragmatically it can be argued that whichever regional technique is used, as long as the result is that the patient is provided with good, effective analgesia, the resultant reduction of postoperative parenteral opioids will be beneficial, both in terms of their side effect profile, and the theoretical benefit on cancer progression and outcome.

Nasogastric tube placement

The avoidance of routine nasogastric (NG) or nasojejunal (NJ) tubes for decompression is strongly recommended. This is in line with a Cochrane systematic review of the use of prophylactic nasogastric decompression after abdominal surgery (30). Additionally, a 2008 meta-analysis of 5 RCTs, with a total of 717 patients undergoing gastrectomy for gastric cancer, demonstrated postoperative complications (including anastomotic leak and pulmonary complications), hospital length of stay, morbidity and mortality were similar in those who did and those who did not have NG/NJ decompression. Here the authors concluded that routine NG/NJ decompression is unnecessary after gastrectomy for gastric cancer (31). Similarly, a more recent retrospective study in 2017 concluded that total gastrectomy without routine NG/NJ decompression is both safe and feasible (32).

Surgical drains

Avoiding the routine use of perianastomotic drains is strongly recommended. This follows a 2011 meta-analysis of 4 RCTS, with a total of 438 patients undergoing gastrectomy for advanced gastric cancer, which concluded that patients who did not receive a perianastomotic drain had a reduced incidence of postoperative complications and hospital length of stay. This meta-analysis also demonstrated no difference in time to first flatus, time to soft oral diet and mortality between patients who did and did not receive surgical drains (33). Again, these findings are in concordance with a Cochrane Collaboration review (34).

Postoperative nutrition

Here the traditional dogma of a nil-by-mouth period lasting several days postoperatively is challenged, with the recommendation that patients undergoing total gastrectomy should be advised to cautiously increase their oral intake from postoperative day (POD) 1. This follows there being no trial demonstrating an adverse outcome following attempts at the early introduction of food following gastrectomy. Interestingly, a 2008 RCT performed in

Norway demonstrated a positive benefit from early feeding, with a reduced time to normal bowel function, major complications and hospital length of stay (35).

The ERAS Society continue by recommending enteral feeding in circumstances where oral intake is not feasible, and suggest that parenteral nutrition only be considered where the gut is not functioning.

Oesophagectomy

Timing of surgery

An interval of 3–6 weeks between neoadjuvant chemotherapy and surgery is recommended. This is extended to 6–10 weeks if the patient has undergone neoadjuvant chemoradiotherapy.

With regard to neoadjuvant chemotherapy, the recommended time frame is felt to offer a suitable balance between the adverse effects of the chemotherapeutics and the risk of cancer progression. However, neoadjuvant chemoradiotherapy is now the mainstay neoadjuvant treatment worldwide. Analysis of the ChemoRadiotherapy for Oesophageal cancer followed by Surgery Study (CROSS) study population suggested that delaying surgery up to 12 weeks following chemoradiotherapy increased the probability of pathological complete response (pCR) (36) although notably evidence is not consistent hence the resultant compromise in the recommended interval period.

Surgical approach

The optimal surgical approach is currently unknown with open, minimally invasive, and hybrid surgery all currently used successfully in different centres and further evidence required.

The TIME Trial (Traditional Invasive *vs.* Minimally invasive Esophagectomy), an RCT comparing traditional oesophagectomy (midline laparotomy with right thoracotomy) with minimally invasive techniques (abdominal laparoscopy, right thoracoscopy and cervical incision) concluded that minimally invasive approaches yielded reduced pulmonary infections, hospital length of stay and quality of life (37).

Additionally, a 2017 study from the Netherlands examined 1,727 patients undergoing transthoracic oesophagectomy in a 4-year period. They concluded that mortality and pulmonary complications were similar when comparing traditional and minimally invasive approaches. However, it should be noted that in this study they also demonstrated a higher anastomotic leak rate and surgical reintervention rate in the minimally invasive group (38).

Choice of conduit

The guideline authors state that there is not a universally suitable technique with regard to choose of tissue for oesophageal conduit reconstruction. A systematic review of 2 RCTs and 5 cohort studies comparing different tissues used for conduit reconstruction suggested that a tubulized gastric conduit be considered as a first line option after finding an improved quality of life with reduced gastric reflux and delayed gastric emptying with this technique (39).

Lymphadenectomy

Owing to the high rate of lymph node metastasis of oesophageal cancer, lymph node dissection is typically performed alongside oesophageal resection. The extent of this dissection remains somewhat controversial, and often depends upon the philosophy of the operating surgeon and the culture of the surgical institution. The histological subtype of the oesophageal malignancy is also key, with a higher rate of lymph node metastasis in SCC when compared to adenocarcinoma of a similar stage.

At present, two field lymphadenectomies are recommended for adenocarcinoma of the middle and lower third of the oesophagus, without dissection of the lymph nodes of the recurrent laryngeal nerve. Three field lymphadenectomies should be considered for SCC of the upper third of the oesophagus, taking into account the extent of the disease at presentation.

Importantly, we are awaiting the results of an RCT investigating the use of three field lymphadenectomy in oesophageal cancer (NCT 00193817).

Perianastomotic drains

Avoidance of routine placement of perianastomotic drains at the cervical anastomosis is recommended after an RCT showed no benefit in their use (40).

No specific recommendation regarding the placement of a thoracic anastomosis drain is made. This follows retrospective analysis of 414 patients demonstrating similar leak rates between patients who did and did not receive a thoracic perianastomotic drain (41).

Routine nasogastric tube insertion

As with the ERAS guidelines for gastrectomy, reference is made to the 2007 Cochrane review (30). The authors continue by highlighting two RCTs which demonstrate that the incidence of pulmonary complications was higher in patients who had no NG tube, compared to patients who had an NG tube that was removed on postoperative

day (POD) 2. Interestingly there was no difference in complication rates when comparing patients who had their NG tubes removed on POD2 with patients who had delayed NG tube removal (42,43). Consequently, it is recommended that patients undergoing oesophagectomy have NG tube decompression at the time of resection, yet it is suggested that these tubes be removed on POD 2.

Chest drain management

It is recommended that the number of chest drains inserted at the time of resection be minimised where possible, and that they are removed if there is no evidence of an air or chyle leak as there is evidence that the presence of chest drains is associated with increased pain and ongoing reduced mobility following thoracic surgery (44).

No recommendations are made to the volume and duration thresholds required for chest drain removal, owing to ongoing debate and widespread differences in practice.

Routine use of enteric feeding tubes

The initiation of early enteral feeding, via either a feeding jejunostomy or nasojejunal/nasoduodenal tube is recommended—aiming to reach the target nutritional rate by POD 3–6. This avoids the well-known complications associated with parenteral nutrition. Additionally, a 2008 meta-analysis with a total of 2,552 patients undergoing GI surgery demonstrated a reduced rate of any complication, anastomotic leak, abdominal abscess and hospital length of stay with postoperative enteral feeding when compared to parenteral alternatives.

Perioperative fluid management

The key tenet of ERAS for GI surgery aims for a balanced approach to fluid management, aiming to avoid the complications associated with both excess and insufficient fluid administration. In the context of oesophagectomy, excess fluid therapy has been associated with increased postoperative respiratory complications and delayed extubation (45,46). The strategy to achieve this balanced approach remains controversial.

Although early meta-analyses examining goal directed fluid therapy (GDFT) in major abdominal surgery indicated a reduction in postoperative morbidity and length of stay when compared to conventional fluid therapy, more recent analyses have failed to demonstrate the same magnitude in these benefits. A 2016 meta-analysis investigating GDFT in elective major abdominal surgery concluded that GDFT may not be of benefit in this population, particularly in the context of an ERAS setting (47). In more general terms, a 2015 literature review suggests that stroke volume should be optimised during the abdominal phase of an oesophagectomy, and monitored, without excess fluid therapy during the thoracic phase of the operation (48).

With this in mind, the ERAS Society recommend that an optimal fluid balance should be the main focus with regard to perioperative fluid therapy, aiming to avoid a resultant weight gain of >2 kg/day. They additionally state that GDFT may be of benefit in those patients not part of a formal ERAS programme, and that a balanced crystalloid solution should be regarded as the fluid replacement of choice.

Anaesthetic conduct

The recommendations made regarding conduct of anaesthesia for oesophagectomy aim to minimise local and systemic inflammatory responses and facilitate early extubation. In turn, this should minimise postoperative pulmonary complications and facilitate early mobilisation.

No recommendation is made regarding the technique used for maintenance of anaesthesia, with both volatile and total intravenous anaesthetic techniques regarded as equally effective. However, careful titration of depth of anaesthesia, facilitated by bispectral index (BIS) monitoring is recommended, in combination with the avoidance of excessive neuromuscular blockade, in an attempt to facilitate early extubation.

A low-tidal volume (6–8 mL/kg predicted body weight) is recommended for the abdominal phase of the operation which utilises conventional two lung ventilation. Interestingly, these recommendations conclude that the role of routine of positive end expiratory pressure (PEEP) and recruitment manoeuvres is unclear given that these have not been linked to improved pulmonary outcomes in those patients without underlying lung pathology.

Following the commencement of one lung ventilation (OLV), a similarly low tidal volume strategy (5 mL/kg), in addition to the application of PEEP (5 cmH_2O) to the ventilated lung is recommended. This follows a 2006 RCT which demonstrated a reduction in the systemic inflammatory response and subsequent earlier extubation with this ventilation strategy (49). Additionally, although it may well obscure the surgical field, the application of continuous positive airway pressure (CPAP) to the non-ventilated lung should be considered given evidence to suggest this lowers the local immune response in the collapsed lung (50). These guidelines suggest a CPAP

Table 2 Summary of recommendations regarding postoperative analgesia in oesophagectomy

Analgesic	Recommendation
Paracetamol	Consider regular dosing
NSAIDs	Consider on a patient by patient basis
Opioids	Reserve for breakthrough pain
Gabapentinoids	Limited evidence, yet may be beneficial
Ketamine	Limited evidence, yet may be beneficial
Magnesium	Limited evidence, yet may be beneficial
Lignocaine infusion	Likely beneficial if patient does not have an epidural or a paravertebral block
Thoracic epidural analgesia	Consider as first line regional analgesia
Paravertebral block	A good alternative to thoracic epidural analgesia

of 5 cmH_2O. Finally, the avoidance of hyperoxia whilst permitting mild hypercapnia is suggested. Following the initiation of OLV, titration of the inspired FiO_2 to the minimum required to maintain an oxygen saturation of >92% is recommended.

Notably, we await the conclusion of the PROTHOR trial, an international, multicentre RCT investigating the use of PEEP and recruitment manoeuvres during OLV (51).

Critical care utilisation

It is recommended that patients be assessed on a patient by patient basis prior to admission to the intensive care unit (ICU). It is argued that oesophagectomy does not mandate ICU admission. Avoidance of routine sedation and ventilation may benefit the patient by way of avoiding sedation associated hypotension, and the subsequent fluid administration or vasopressor use. It may also have a significant impact on an institutional level, both economically and in terms of ICU bed pressures. It is suggested that admission to a suitable High Dependency Unit is a safe and feasible alternative in low risk patients.

Postoperative analgesia

The use of opioid-sparing, multimodal analgesia is recommended, whilst remaining aware of the fact that post-oesophagectomy analgesia poses challenges by virtue of the fact it is typically two cavity surgery with a significant degree of surgical dissection. The avoidance of opioids where possible is in line with the increasing body of evidence linking these drugs with tumour metastasis, angiogenesis and migration (52).

The ERAS Society make a number of recommendations regarding postoperative analgesia. A combination of regular paracetamol and non-steroidal anti-inflammatory drugs (NSAIDs) are recommended. Additionally, a variety of analgesic adjuncts are recommended, recognising the increase in popularity of magnesium, ketamine and intravenous lidocaine. Finally, regional analgesic techniques are recommended, with a thoracic epidural being suggested as a first line option, and a paravertebral block as an alternative. A summary of the key recommendations made regarding postoperative analgesia can be seen in *Table 2*.

Postoperative nutrition

Nutritional support may be required for a significant time following an oesophagectomy (53). Additionally, patients are at an increased risk of malnutrition preoperatively as a result of their presenting malignancy and the impact of neoadjuvant chemotherapy.

Early enteral nutrition (EN) is recommended following oesophagectomy. This follows a 2007 systematic review, including 29 studies and 2,552 patients, which demonstrated that EN was associated with reduced infectious complications, anastomotic leak, intraabdominal abscess and hospital length of stay (54). Importantly, an RCT comparing the use of early EN with parenteral nutrition (PN) prior to the initiation of oral intake on POD 6 following oesophagectomy, demonstrated a significantly reduced rate of life-threatening surgical complications in the early EN group (55). Here, early EN was defined as EN being started on POD 1, increasing to achieve the target nutritional rate by POD 6.

No recommendation is made as to the ideal route of EN administration, with the ERAS Society citing an RCT demonstrating a similar time to achieve target nutritional rate and overall duration of nutritional support when comparing EN delivered via a nasojejunal tube with EN delivered by a feeding jejunostomy.

Early postoperative mobilisation

Early mobilisation following surgery forms a key part of nearly all ERAS pathways. Whilst the benefits of early mobilisation are well documented (56), it will remain a challenge in patients who have undergone oesophagectomy due to their requirement for chest drains, invasive lines and the potential for postoperative pain. Nevertheless, a standardised and structured approach to early postoperative

mobilisation and physiotherapy is recommended.

Conclusions

The production of consensus guidelines for oesophagectomy and gastrectomy represents a significant step forward in the perioperative care of these two high-risk patient populations. With such a high incidence of postoperative morbidity and mortality following these procedures reported globally, the potential for patient benefit that successful implementation of ERAS pathways may produce is substantial. However, many key questions over the optimal perioperative management remain either unanswered or with only relatively low-quality evidence available to inform practice. Future research in this area must aim to elucidate these issues and allow further refinement of the guidelines, ultimately resulting in an improved quality and length of life for these patients.

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Footnote

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