

# Emergency Laparotomy



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## KEYWORDS

- Emergency laparotomy • Emergency general surgery • Enhanced recovery
- Surgical outcomes • Geriatric management

## KEY POINTS

- Emergency laparotomy is a high-risk surgical procedure with a high mortality.
- Patients frequently present with deranged physiology and sepsis.
- Outcomes have improved with measurement and targeted enhanced recovery type approaches, as described in this article.
- Many patients presenting for emergency laparotomy are elderly and frail, and geriatric conditions should be managed proactively.

## INTRODUCTION AND DEFINITION

Emergency laparotomy is an overarching term used for the exploration of the abdomen for many diverse underlying intraabdominal pathologies. The term, as used in this article, will be applied only to nontrauma, nonvascular emergency general surgery procedures. The commonest conditions requiring emergency laparotomy are hernias with obstruction or gangrene, bowel ischemia, bowel obstruction, peritonitis, and gastrointestinal ulcers.<sup>1</sup>

The publication of the international Enhanced Recovery After Surgery (ERAS) guidelines on emergency laparotomy in 2021 generated worldwide interest and are freely available through Open Access.<sup>2</sup> In addition, the AHRQ Safety program for Improving Surgical Care and Recovery (ISCR) published a technical evidence review in 2020 for emergency major abdominal surgery including emergency laparotomy.<sup>3</sup> Recent guidelines for anesthesia for colorectal surgery from ISCR<sup>4</sup> and updated elective ERAS colorectal guidelines overlap with key components of care for emergency

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laparotomy particularly in the intraoperative and postoperative phases.<sup>5</sup> This article does not duplicate the evidence in those guidelines but highlights specific considerations and components of care in the enhanced recovery emergency laparotomy pathway. The ERAS emergency laparotomy guidelines include consensus-based components, some of which are traditional ERAS steps such as early mobilization after surgery, and some aspects of care (particularly in Part One: Preoperative: Diagnosis, Rapid Assessment and Optimization) that are new to ERAS pathways, such as comprehensive geriatric management and delirium and postoperative neurocognitive disorder prevention.<sup>2</sup>

## HISTORY

In the United States (US) the burden of nontrauma emergency general surgery (EGS) is significant, with data showing that EGS accounts for 11% of total surgical cases but 47% of surgical deaths.<sup>6,7</sup> Emergency laparotomy is one of the highest mortality conditions contributing to this burden, with data published in 2012 from the National Surgical Quality Improvement (NSQIP) database showing mortality for emergency laparotomy of 14% at 30 days.<sup>8</sup> There has been a worldwide focus on emergency laparotomy in the past few years with programs such as the National Emergency Laparotomy Audit (NELA),<sup>9</sup> the Australian and New Zealand Emergency Laparotomy Audit (ANZELA), and the emergency surgery component of the American College of Surgeons Improving Surgical Care and Recovery (ISCR) project. With this dramatically increasing clinical focus and research interest, outcomes are improving for this previously overlooked group of patients. The Emergency Laparotomy Network, which preceded NELA in the United Kingdom, found mortality in 2012 of 14.9% at 30 days,<sup>10</sup> very similar to that reported on the NSQIP data.<sup>8</sup> The first 30-day mortality reported by NELA on more than 20,000 patients in 2015 was 11.8%; the mortality reported in 2021 on 2020 data had reduced further to 8.7%. The use of clinical pathways and an enhanced recovery approach has likely contributed to the improvements seen in the UK data. Another driver of improvement in the UK has been the setting of standards for emergency surgery and emergency laparotomy by national bodies. A call has been made for a similar approach to be taken in the US coupled with standardized EGS patient care using evidence-based guidelines and clinical care bundles.

### ***Background to an Enhanced Recovery Approach to Emergency Laparotomy***

Enhanced Recovery After Surgery (ERAS) approaches have usually been applied to elective surgical pathways, but there is mounting evidence that ERAS principles apply to high-risk emergency patients and help reduce morbidity and mortality. The preoperative phase of an enhanced recovery pathway is focused on getting the patient in the best possible condition for surgery. In the emergency setting, this still applies, but the time frame available must be truncated from days and weeks to just a few hours. The intraoperative and postoperative enhanced recovery approach of best possible management during surgery and optimal postoperative rehabilitation are equally applicable to emergency patients.

One of the first studies to demonstrate improved outcomes using an ERAS approach was the “ELPQuIC” or emergency laparotomy quality improvement care pathway study.<sup>11</sup> This relatively small quality improvement study focused on 5 evidence-based components within a care bundle thought to be essential to improving outcomes as part of an enhanced recovery type pathway. The 5 components were as follows:

- Early assessment and resuscitation

- Early antibiotics if signs of sepsis present
- Prompt diagnosis and early surgery
- Goal-directed fluid therapy for all patients
- Postoperative intensive care for all

As with any care bundle approach, part of the improvement was likely to be due to enhanced measurement and teamwork, as clinicians developed approaches to delivering the care components reliably to all patients. None of the 4 centers involved in ELP-QulC reached high reliability (that is more than 95% delivery) of any component. However, improvement did occur in the delivery of all care components with an associated significant reduction in risk-adjusted mortality. When this approach was scaled up and delivered across 28 major acute hospitals in the South of England in the Emergency Laparotomy Collaborative (ELC), a reduction in mortality and length of stay was seen when compared with baseline data.<sup>12</sup> For ELC the care bundle was modified and made more specific, with a 6-point bundle that included prompt measurement of blood lactate levels, early review and treatment of sepsis, transfer to the operating room (OR) within defined time goals after the decision to operate, use of goal-directed fluid therapy, postoperative admission to an intensive care unit (ICU), and multidisciplinary involvement of senior clinicians in the decision and delivery of perioperative care. Change management and leadership coaching were also provided to ELC leadership teams. At the end of the 2-year study, 30-day mortality had reduced to 8.7% following the intervention, from a baseline of 9.6%. Associated improvements in key process delivery such as lactate measurement and faster time to the OR were also seen.

Another major UK study called EPOCH—“Evidence-based Perioperative Care for the High-risk surgical patient”—focused on the delivery of a much more extensive pathway of care with 37 components (a similar number to most enhanced recovery pathways).<sup>13</sup> This study took the form of a stepped-wedge randomized controlled trial, and with that design, many of the 90 hospitals that participated had a very short period of time to engage in implementing the pathway. Although 279 of the potential 800 pathway components measured in the 90 hospitals improved,<sup>14</sup> that was not enough to reduce mortality at 90 days between the active pathway implementation and the control phase of the study. Lessons learnt from this study and ELC applicable to improving enhanced recovery pathways for high-risk patients include allowing adequate time for improvement, understanding the social aspects of change, and if time and resources are limited focusing on a small number of high impact changes.<sup>15</sup>

In the US, the final phase of the American College of Surgeons ISCR program is on EGS with emergency laparotomy as one of the key conditions.<sup>16</sup> This program also takes an enhanced recovery approach with a focus on preoperative detection and management of sepsis, multimodal pain management, care of the older patient, and patient and family education and shared decision-making. Results are not yet available.

### ***The Need for a Proactive Enhanced Recovery Approach for Older Patients Undergoing Emergency Laparotomy***

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Although the mortality for emergency laparotomy is very high and much higher than for a similar procedure performed electively, the deaths do not end in the hospital. Mortality for emergency laparotomy patients has always been much greater for older and frail patients. A fifth of older adults undergoing emergency laparotomy are frail, which is associated with greater mortality and morbidity. In 2015 Cooper and colleagues using Medicare data recorded mortality of 49% at 180 days for patients aged 85 years and older, 29.4% for those aged 75 to 84 years, and 20.8% for those aged 65 years and older.<sup>17</sup> Using an ERAS approach has been shown to improve outcomes to a greater

extent for older patients than for younger,<sup>11</sup> and the need for rapid proactive management of acute physiologic derangement emphasized in the ERAS emergency laparotomy guidelines<sup>2</sup> is likely to have a significant impact in older, frail patients with less physiologic resilience. A recent paper on US surgical trends has shown that outcomes are improving for older patients undergoing emergency colorectal procedures, encompassed by emergency laparotomy, but although a growing number survive, an increasing percentage are discharged to skilled nursing facilities.<sup>18</sup> Based on these poor outcomes the international ERAS guidelines include guidance on cognitive and frailty assessment preoperatively, as well as delirium screening and a reminder on the avoidance of Beers' criteria drugs such as benzodiazepines in older patients.<sup>2,19</sup> The rationale for inclusion preoperatively, even though it is acknowledged that multiple assessments may not be feasible in the preoperative period when correction of physiologic derangement is most pressing, is the need to alert perioperative care teams that these patients are very high risk and that geriatric conditions must be considered and managed as soon as possible.

### ***An Enhanced Recovery Approach to Emergency Laparotomy, Preoperative Considerations***

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All surgeries attract the surgical stress response, but with emergency abdominal surgery the response can be extreme and prolonged before presentation in the OR.<sup>20,21</sup> ERAS aims to attenuate the surgical stress response and minimize the physiologic insults that occur.<sup>22</sup> This approach works well in elective surgery, but the situation is very different in emergency abdominal surgery where the physiologic insult and potentially systemic inflammation response has already been triggered.<sup>20</sup> To overcome this, patients require a rapid pathway to diagnose and manage the underlying problem, with ERAS components modified to account for the ongoing physiologic stress.<sup>2</sup> Organization of care delivery before emergency abdominal surgery is very important. Patients undergo several tests, imaging, and assessments before they enter the emergency OR, which should be carried out with urgency. In addition to this, best practice should include open and clear communication with the patient and their advocates about the next steps and escalation.<sup>23</sup>

#### ***Key preoperative components***

- *Use Early Warning Scores to screen for physiologic derangement and deterioration*

In emergency abdominal surgery, the physiologic insult starts before the patient arrives in hospital.<sup>20,21</sup> The use of a physiologic track and trigger or Early Warning Score ensures timely and appropriate management of deteriorating patients by assigning a numeric value to several physiologic parameters, giving a composite score to identify a patient at risk of deterioration and facilitate communication among perioperative team members about patient risk and management.

- *Use a sepsis screening tool*

There is a high incidence of sepsis in patients presenting for emergency laparotomy, and this needs to be detected and managed proactively.<sup>2</sup> Patients should be screened for signs of sepsis using an appropriate scoring system and local management algorithms.

- *Measure and manage physiologic derangement*

Measure blood lactate that might be high due to anaerobic metabolism. There may be acute electrolyte disturbance, and fluid shifts may occur due to sepsis, an

inflammatory reaction, or bowel obstruction. The patients may be hypovolemic and may have vasoplegia.<sup>1,21</sup> Evidence suggests that surgery should not be delayed for optimization, rather that skilled clinicians should be resuscitating and optimizing the patient during the initial diagnostic phase and ongoing during surgery.<sup>11,24,25</sup>

- *Urgent diagnostic imaging*

Hospitals with a higher number of facilities for diagnostic imaging have improved outcomes for emergency laparotomy.<sup>1,26</sup> Early computed tomography scans facilitate surgical planning but should not cause undue delay to surgery.

- *Formal risk assessment*

Risk assessment helps with optimization of perioperative pathways and organization of services as well as adding to informed decision-making for emergency laparotomy care.<sup>2</sup> Use of a validated score is recommended, and several scores are available; however, the NELA risk score developed using several emergency laparotomy patient data in the National Emergency laparotomy database has been shown to be the best performing predictive model when compared with other scores.<sup>27</sup>

- *The need for a nasogastric tube* should be assessed on an individual patient basis, as patients may require gastric decompression<sup>2</sup>; this is different to elective colorectal surgery where it is discouraged to use nasogastric tubes for risk of respiratory infection as well as delay to feeding<sup>28</sup>
- *Reversal of anticoagulants and management of antiplatelet drugs*

Bleeding is the most common complication from EGS and the one that causes the most morbidity and mortality.<sup>29</sup> However, increasing numbers of patients are now on anticoagulants and antiplatelet drugs, some of which have no direct drug to reverse them. A balanced, patient-specific assessment should be carried out to reverse the antithrombotic medication based on the risk of bleeding, the risk of thromboembolism, and the urgency of the surgery.<sup>2</sup>

- *Venous thromboembolism prophylaxis*

Patients undergoing emergency intraabdominal surgery have an increased risk of venous thromboembolism and should be assessed preoperatively. If pharmacologic prophylaxis is not appropriate before surgery, mechanical prophylaxis should be initiated promptly.<sup>30</sup>

- *Age-related evaluation of frailty and cognitive assessment* should ideally be performed preoperatively; the ERAS guidelines<sup>2</sup> acknowledge this may not always be possible, but the perioperative care team should be aware of the impact of frailty and abnormal cognitive function on outcomes and take steps as early as possible to mitigate these issues. Baseline delirium screening should be performed and Beers criteria drugs such as benzodiazepines and anticholinergics avoided whenever possible in patients older than 65 years.
- *Patient and family education and shared decision-making*

This is one of the most important aspects of the surgical pathway and one that is the most difficult. There are multiple factors involved, with a high level of complexity with a short amount of time.<sup>31</sup> The discussions should include the risk of death and more detail on the morbidity that the patient could face, including quality of life, independent living, and other factors that affect a patient's life such as stoma formation.<sup>32</sup> Ceilings of care and advanced care directives should also be discussed. Guidance has been written on how best to have these difficult conversations, such as using the "best

case/worst case” scenario<sup>33</sup> or using the “Serious Illness Conversation Guide” from Ariadne Labs.<sup>34,35</sup> Using multiple facets of communication including written information and decision aids and ensuring detailed documentation of discussions is very important.

### **Key intraoperative components**

- *Antibiotic prophylaxis*

Usually, a single dose of antibiotic is delivered before the start of surgery to prevent surgical site infection, and a second dose is delivered if procedures last for more than 4 hours. However, in an emergency laparotomy, the patient may already be septic, antibiotics may have already been given, and appropriate further management may require consultation with a microbiologist. Compliance with on-time antibiotic administration in emergency patients is poor, with only 50% of patients receiving timely administration as compared with elective colectomy.<sup>36</sup>

- *Rapid sequence induction* is carried out to decrease the risk of gastric contents being aspirated during tracheal intubation. It consists of a short-acting induction agent (traditionally thiopentone) with a short-acting muscle relaxant (suxamethonium) and the application of cricoid pressure. However, there are no clear recommendations on whether a rapid sequence induction should be carried out in every emergency abdominal surgery. The technique of a rapid sequence intubation (RSI) has been modified with the use of propofol and rocuronium being used (the latter being reversed easily with sugammadex). In addition, there may be a nasogastric tube in situ that will prevent effective cricoid pressure. The principles of an RSI remain valid, to secure a safe airway with the least possible risks, but an individual assessment should be carried out to establish how to carry this out safely.<sup>37</sup>
- *Minimally invasive surgery*

In some centers, minimally invasive abdominal surgery may be undertaken depending on the pathology of the patient and the skill of the surgeon; this can improve post-operative recovery with lower pain scores, decreased blood loss, and early mobilization and when appropriate results in improved outcomes including shorter length of stay and decreased morbidity and mortality.<sup>3</sup> However, emergency laparotomy is usually an open procedure, traditionally with a large surgical incision, sometimes from xiphisternum to pubic symphysis, needed for access and ability to examine all the bowel in detail and to wash the abdomen out.

- *Prevention of intraoperative hypothermia*

Hypothermia is associated with poor wound healing, increased blood loss, and a high surgical stress response.<sup>38</sup> Warmed intravenous fluids, forced air warmer blankets, and invasive temperature monitoring can help with warming the patient. However, caution must be taken to the patient who is septic and has a high temperature. Usually, an open abdomen will cool the patient significantly.

- *Monitoring*

In addition to standard monitoring, invasive monitoring should be used on an individualized patient basis; this includes the use of arterial lines, central venous catheters and minimally invasive cardiac output monitoring. Arterial lines offer continuous blood pressure monitoring and arterial blood gas analysis, providing acid-base and electrolyte dysfunction. Cardiac output monitoring has been used extensively in emergency

surgery, and some quality improvement studies included it as part of the care bundle.<sup>11</sup>

- *Perioperative fluid management*

Goal-directed hemodynamic therapy is a term used to describe the optimization of intravascular volume, cardiac output, oxygen delivery, and maintenance of mean arterial pressure with vasopressors if needed. Minimally invasive cardiac output monitors can help ensure that stroke volume is optimized before vasopressors are used. Intravenous fluid administration should be a balanced solution such as PlasmaLyte, rather than 0.9% sodium chloride, to avoid hyperchloremic acidosis and increased risk of acute kidney injury.<sup>39</sup>

- *Analgesia*

Optimal analgesia reduces stress and aids restoration of function and mobility. No one technique is proved to be better than another in patients undergoing emergency laparotomy, but a multimodal opioid-sparing approach should be used. These patients may not be suitable for a neuraxial technique due to anticoagulation or deranged clotting studies due to sepsis. A rectus sheath catheter, continuous wound infusion catheter, or a transverse abdominal plane block may be appropriate.<sup>3</sup>

- *Choice of anesthesia*

Mode of anesthesia for emergency abdominal surgery is not widely studied despite the high workload in hospitals. General anesthesia is normal practice. Short-acting inhalational agents should be used. Bispectral Index monitoring to titrate anesthesia delivery to the lowest levels may be of advantage in the elderly to reduce the risk of delirium.<sup>40</sup>

- *Reversal of neuromuscular block*

With an increase in older patients undergoing emergency surgery, it is important to be mindful of age-related changes in physiology and drug distribution and clearance. Appropriate neuromuscular monitoring should be used to guide the administration of neuromuscular blockers, and neuromuscular blocking agent reversal drugs should be given<sup>5</sup>; this can be with anticholinesterase drugs such as neostigmine or with newer agents such as sugammadex for aminosteroidal agents such as rocuronium. Residual neuromuscular blockade is higher in elderly patients, leading to hypoxic events and increased postoperative pulmonary complications and airway obstruction<sup>41</sup> and increased adverse events in all patient groups.<sup>42</sup>

### ***Postoperative Considerations in an Enhanced Recovery Approach to Emergency Laparotomy***

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Patients who have undergone emergency laparotomy are likely to have ongoing requirements for monitoring and management of physiologic derangement, acidosis, hypothermia and fluid shifts, and vasopressors. These patients are at significant risk of reintubation in the early postoperative period and of postoperative pulmonary complications (PPC) and failure to rescue for several days following surgery. Therefore, a careful assessment and evaluation should be made before extubation, and plans should be made for management in a high care area or ICU postoperatively. Some published standards suggest repeating a risk score before the end of surgery to provide an objective score of patient risk and guide discussion among the surgical, anesthesia, and ICU team if appropriate, about postoperative management.

Other components of postoperative care are similar to those for elective colorectal enhanced recovery pathways with a focus on early oral feeding, removal of drains and

catheters, and mobilization as soon as possible. The large numbers of older patients undergoing emergency laparotomy demand a proactive comprehensive geriatric approach to ensure an increased likelihood of returning home, rather than deconditioning and discharge to a skilled nursing facility. Investment in such an approach has been shown to improve outcomes for older patients and to be cost-effective.<sup>43,44</sup>

### **Key postoperative components**

- *ICU/ high dependency unit (HDU)*

Evidence has shown that when emergency laparotomy patients go to a monitored high care area with a high patient to nurse ratio such as an ICU or surgical high dependency unit (HDU) postoperatively as part of a care bundle, there is a decrease in mortality.<sup>11,12</sup> The National Emergency Laparotomy Audit in the United Kingdom recommends patients who have a mortality risk of greater or equal to 5% to go to an ICU or HDU.<sup>9</sup> Local bed availability and policies will dictate resources, but teams should develop protocols for managing these patients proactively, in appropriate care areas following surgery.

- *Failure to rescue*

Patients who have undergone emergency laparotomy are particularly at risk of “failure to rescue.”<sup>45</sup> An initial complication, if not detected and managed early, develops into a cascade of events that can lead to a poor outcome. Complications continue for several days after surgery, requiring close monitoring and protocols for escalation.

- *Postoperative multimodal analgesia*

Multimodal analgesia based on opioid-sparing regimens has been a component of enhanced recovery for many years; this is to decrease the side effects of ileus and respiratory depression as well as removing the addiction potential.<sup>3,46</sup> Regular acetaminophen (paracetamol) is used combined with other opioid-sparing drugs and local anesthetic nerve blocks. The use of epidural analgesia has also been found to be associated with a decreased risk of mortality in emergency abdominal surgery but can be difficult to manage effectively due to hypotension and the need for vasopressors<sup>47</sup> as well as the increased risk of epidural hematoma and infection due to systemic sepsis and coagulopathy. Regional techniques such as rectus sheath catheters, transversus abdominal plane blocks, and wound catheters can be efficacious and reduce opioid requirements.

- *Removal of urinary catheter*

Although there is little evidence in emergency laparotomy patients, extrapolation from elective pathways<sup>5</sup> suggests that early removal, unless needed for monitoring, is appropriate.

- *Early mobilization*

Early mobilization decreases skeletal muscle loss and improves respiratory and gastrointestinal function; this will be facilitated by an adequate analgesic regimen and physiotherapists to help mobilize patients. Again, there is little direct supporting evidence for emergency laparotomy; recommendations are taken from the elective colorectal and ICU literature.<sup>5</sup>

- *Comprehensive geriatric management and discharge evaluation*

Several recent major studies have shown the importance of involving geriatric physicians in the management of emergency laparotomy patients at the earliest



opportunity. They can also take over the care of the patient once surgical and critical care is no longer required.<sup>43,44</sup>

### Discussion

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There has been a great deal of progress in the management of the emergency laparotomy patient in the last few years, with the publication of the international ERAS Society guidelines on emergency laparotomy and technical evidence reviews from the AHRQ ISCR program. In addition, large quality improvement studies have added to the knowledge around what changes can affect outcomes for these high-risk patients and how change can be achieved.

The adaptation of the UK national emergency laparotomy audit in Australia and New Zealand and the final phase of the American College of Surgeons ISCR program focused on EGS have raised awareness about the high mortality and complication rate for this group of patients.

Anesthesiologists have an important role to play in improving outcomes for emergency laparotomy patients. In the preoperative phase, this should include assessment and management of deranged physiology and sepsis before transferring to the OR and continuing management and resuscitation in the OR. In the OR these patients require optimal management of fluids and electrolytes and close monitoring of hemodynamics and perfusion. The patients' physiologic status at the end of surgery and the findings at surgery must be considered before extubation, and the high risk of reintubation and postoperative pulmonary complications should inform where the patient is managed in the immediate postoperative phase. Optimal intraoperative and postoperative analgesia is likely to facilitate pulmonary function and early mobilization.

### NONBENEFICIAL SURGERY AND END-OF-LIFE CARE

Despite recent progress, challenges remain in the management of patients undergoing emergency laparotomy. With an aging population, inevitably, there are large numbers of older patients undergoing emergency abdominal surgery. There needs to be a balance between the urgent nature of the surgery, versus ensuring that the surgery is the best treatment option, avoiding surgery that is ultimately nonbeneficial. Emergency surgery can increase the risk of nonbeneficial surgery. There is no formal definition for nonbeneficial surgery but usually, it is death within 48 to 72 hours after an emergency operation.<sup>48</sup> Most risk scoring tools predict 30-day mortality and very few give predictions for early death.<sup>12</sup> Patients can develop complications related to the underlying condition before admission to the hospital, adding to their premorbid state and their increased risk of death. Conversations between patients and doctors can be hasty in a bid to get the patient into the OR, with more junior members of the team often carrying out the discussion without using information such as risk prediction, including detailed morbidity and frailty measurement. Such difficult conversations might be avoided altogether.<sup>49</sup>

UK guidelines have advocated for an ad-hoc multidisciplinary meeting when predicted mortality for a patient is 25% or greater, with intensivists, surgeons, anesthesiologists and care of the elderly physicians all involved as required; however, of course there are major challenges of organizing such a meeting within a limited time frame.

It has been reported that almost two-thirds of the US population already had baseline palliative care needs before their emergency laparotomy.<sup>50,51</sup> Patients who are eligible for an emergency laparotomy but do not undergo it are not as widely understood as those who undergo surgery. Those that undergo the nonoperative path should have palliative care specialists involved early.<sup>52</sup> There are still very few studies

recording outcomes of all patients referred for surgery and comparing those who are operated on with those who are not. More work is required in this area.

### QUALITY OF LIFE

Health-related quality of life measurements are just as important to measure as binary outcomes such as mortality. Patient's self report their quality of life with tools such as EQ-5D, which has an extensive evidence base for use in elective surgery and is increasingly being used in emergency surgery (<http://www.euroqol.org>). Some work has been carried out looking into the quality of life after emergency surgery using EQ-5D tool.<sup>53</sup> Investigating quality of life after emergency abdominal surgery will help plan care postoperatively but also help shape the discussions that are needed before the surgery and lead to a decrease in nonbeneficial surgery.

### SUMMARY

There has been a rapid synthesis of a lot of studies in the last 10 years on emergency laparotomy patients. Evidence-based pathway-driven care for patients has been demonstrated to improve outcomes. Compliance with ERAS pathways is important for optimal outcomes, and the outcomes of emergency laparotomy patients seems also to depend on addressing, optimizing, and treating many different physiologic issues. The age and comorbidity of the patient are also key factors affecting outcomes.

### CLINICS CARE POINTS

- The morbidity and mortality for emergency laparotomy is high although data show that outcomes are improving.
- An enhanced recovery pathway approach seems beneficial to these very high-risk patients, and studies using ERAS have shown reductions in morbidity and mortality.
- An initial approach with rapid identification, correction of acute physiologic derangement and management of sepsis, and minimal delays to surgical intervention is essential for optimal outcomes.
- Consideration and management of the impact of age-related conditions such as frailty and cognitive dysfunction should begin as early as possible in the ERAS pathway.

### DISCLOSURE

C.J. Peden has received consultancy fees from the Institute for Healthcare Improvement and the American College of Surgeons. She is a shareholder and advisory board member of Somnus Scientific. M. Scott has received consultancy fees, Honoraria, and travel expenses from Edwards, Deltex, Baxter, Trevena, and Merck and Grant funding for Studies from NIHR, United Kingdom, Merck, United States, Merck, Fresenius, Lidco, and Deltex Medical.

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