NELA
National Emergency Laparotomy Audit

Sixth Patient Report of the National Emergency Laparotomy Audit

December 2018 to November 2019

RCOA Royal College of Anaesthetists | NIAA National Institute of Academic Anaesthesia HSRC Health Services Research Centre | Royal College of Surgeons ADVANCING SURGICAL CARE | HQIP Healthcare Quality Improvement Partnership

November 2020

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An emergency laparotomy (emergency bowel surgery) is a surgical operation for patients, often with severe abdominal pain, to find the cause of the problem and treat it. General anaesthetic is used and usually an incision made to gain access to the abdomen. Emergency bowel surgery can be carried out to clear a bowel obstruction, close a bowel perforation and stop bleeding in the abdomen, or to treat complications of previous surgery. These conditions could be life-threatening. The National Emergency Laparotomy Audit was started in 2013 because studies showed this is one of the most risky types of emergency operation and lives could be saved and quality of life for survivors enhanced by measuring and improving the care delivered.

Executive Summary

Results from 2018–2019, the sixth year of the National Emergency Laparotomy Audit

Principal performance statistics are available here

1. **24,823** patients had emergency laparotomies in England and Wales

National **30-day mortality rate** has fallen to **9.3%** (11.8% in Year 1)

2. Improvements in care have reduced patients' average hospital stay from **19.2 days** in **2013** to **15.4 days** in **2019**

19.2 days
15.4 days

3. **84% of patients** now receive **a preoperative assessment of risk** (up from 77% last year, and 56% in Year 1)

4. **97% of high-risk patients** had **consultant surgeon** input before surgery (95% in Year 4)

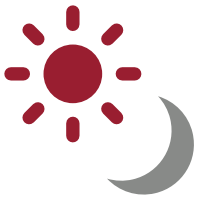
94% of high-risk patients had **consultant anaesthetist** input before surgery (88% in Year 4)

5. **85%** of high-risk patients admitted to critical care (80% in Year 4)

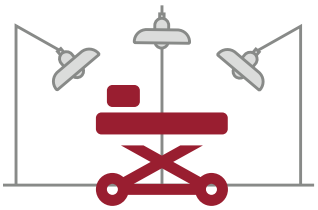
6. **90.5% of patients** received a preoperative CT scan

62% of these patients had their scan reported by a consultant radiologist

7. Both **anaesthetic and surgeon consultant presence** intraoperatively is at 88.5%, but only **77.4% out of hours**



8. **Over 1/4 of patients** needing the most **urgent of surgery** did not get to the operating theatre in the **recommended time frame**



9. **85% of patients** **with sepsis** reached theatres in the appropriate **timeframe**

10. **Time to antibiotics in patients with sepsis** remains poor with **79.7%** not receiving antibiotics **within one hour**

11. **56% of patients** are over the age of 65

Only 28.8% of frail patients over 65 had geriatrician input

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The Emergency Laparotomy patient perioperative journey

1 Arrival
Most patients are admitted to hospital after initially being seen and assessed in the Emergency Department.

2 Sepsis management
If you have signs of sepsis you should receive antibiotics within one hour of arrival to hospital.

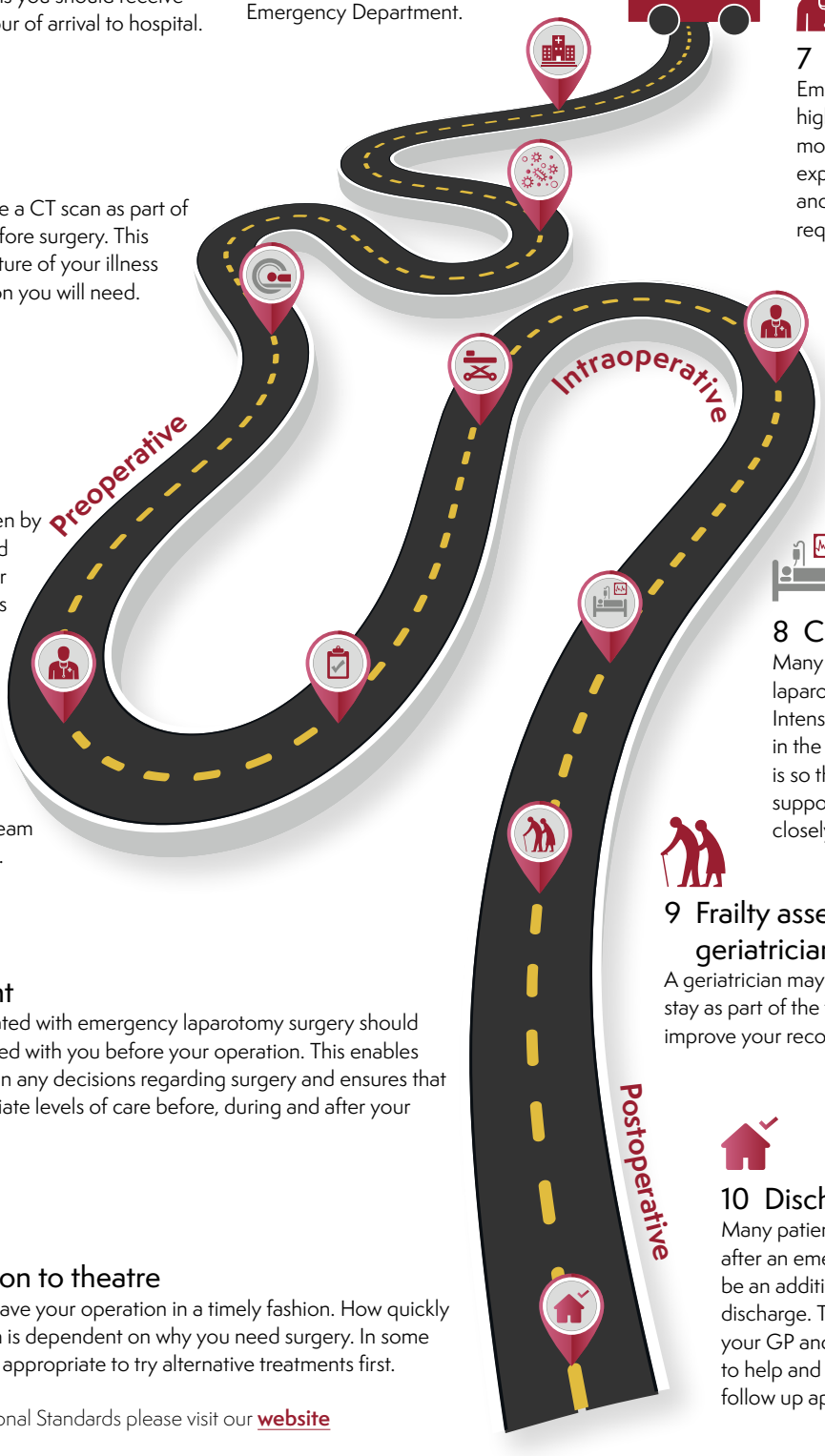
3 Radiology
Most patients will receive a CT scan as part of the initial assessment before surgery. This helps to establish the nature of your illness and guide what operation you will need.

4 Consultant review
Most patients will be seen by a consultant surgeon and anaesthetist prior to their operation. Any questions or concerns can be discussed. In the most unwell patients who need immediate surgery this discussion may take place with another member of the surgical or anaesthetic team in order to avoid a delay.

5 Risk assessment
The risk of death associated with emergency laparotomy surgery should be assessed and discussed with you before your operation. This enables you to be fully involved in any decisions regarding surgery and ensures that you receive the appropriate levels of care before, during and after your operation.

6 Timely admission to theatre
It is important that you have your operation in a timely fashion. How quickly you have your operation is dependent on why you need surgery. In some circumstances it may be appropriate to try alternative treatments first.

For more details on National Standards please visit our **website**



7 Consultant presence
Emergency laparotomy is often high-risk surgery. This means, that in most cases you will benefit from the expertise of a consultant anaesthetist and a consultant surgeon will be required during your operation.

8 Critical care
Many patients who have an emergency laparotomy will be cared for in the Intensive Care or High Dependency Unit in the initial period after their surgery. This is so they can receive specialist organ support if necessary and be monitored closely for any possible complications.

9 Frailty assessment + geriatrician review
A geriatrician may review you during your hospital stay as part of the team looking after you to help improve your recovery after surgery.

10 Discharge and future recovery
Many patients will have had a long stay in hospital after an emergency laparotomy. There will often be an additional period of recovery required after discharge. The hospital medical and nursing teams, your GP and community nursing teams will be able to help and provide support. You should receive a follow up appointment with the surgical team.

Acknowledgements

This Report was prepared by:

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Ms Cristel Santos

on behalf of members of the National Emergency Laparotomy Audit Project Team on behalf of the Royal College of Anaesthetists. The members of the project team at the time of writing were:

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The NELA Project Team and Board would like to express their thanks to all clinical and non-clinical staff at all NHS trusts and Welsh health boards who collected and submitted data. We recognise that many staff are collecting and entering data in their own time and without additional resources. We commend their dedication to improving patient care. In particular we would like to thank the NELA Leads for their hard work, leadership and continued enthusiasm; without this engagement, patients would not have benefited from improved care and NELA would not be the success it has become over the last six years.

The NELA Project Team and Board would also like to thank the members of the NELA Clinical Reference Group for helping to shape the dataset and report.

1 The NELA key messages and recommendations; improving outcomes and reducing complications

Local clinical teams should use the data from quarterly reports, and the contemporaneous webtool, to monitor their performance and patient outcomes. They can also use their benchmarked data to raise concerns or challenge apparent gaps in care pathways.

Commissioners of care, executive teams and senior leadership teams are responsible for providing adequate resources, financial investment and infrastructure targeted to enable the following NELA recommendations to be implemented.

KEY MESSAGE 1

High-risk patients undergoing emergency laparotomy do not consistently benefit from perioperative consultant delivered care. Patient groups at risk of missing out on this include those needing surgery out of hours, and older patients (Chapter 4.4, 4.6 and 5.5).

Recommendation 1.1: Clinical teams must assess all patients' risk of death and morbidity, using validated tools, ensuring other factors such as frailty, nutritional status, are recognised.

Recommendation 1.2: Clinical Directors and Medical Directors should ensure local workforce planning facilitates the consultant presence throughout the perioperative journey 24/7. This should include the wider multidisciplinary team such as geriatricians, radiologists, physicians and emergency department doctors.

KEY MESSAGE 2

Since the introduction of the Best Practice Tariff (BPT) there has been an increase in the number of Trusts achieving the thresholds needed to be eligible for the enhanced tariff. The BPT metrics are consultant delivered care and admission to critical care after surgery for high-risk patients (Chapter 3).

Recommendation 2.1: All Trusts should use their local data to effect change; accessing and presenting it regularly to inform improvements in care pathways for many patients.

Recommendation 2.2: Clinical teams, audit teams, should use performance against the key NELA standards of care (via BPT report, excellence and exception reporting toolkit) as part of the structured review of processes of care. Use these and local outcome data to inform mortality reviews for patients who have undergone emergency laparotomy.

KEY MESSAGE 3

Patients referred from a non-surgical specialty who need emergency laparotomy should be considered to be high-risk as a matter of course (Chapter 4.1 and Chapter 7).

Recommendation 3.1: Local NELA leads should include the wider multidisciplinary team such as geriatricians, radiologists, physicians and emergency department doctors in the design and delivery of the emergency laparotomy care pathway.

KEY MESSAGE 4

Most patients who require emergency laparotomy are admitted via the emergency department (ED). Admission to ED is the start point of the care pathway for many patients (Chapter 4).

Recommendation 4.1: Medical Directors, Clinical Directors and Leads should design and implement NELA pathways of care and improvement work that includes ED teams to ensure the most rapid, seamless management of these high-risk patients.

Recommendation 4.2: Medical Directors should direct Clinical Directors to broaden the local NELA team by appointing ED physicians as NELA clinical leads.

KEY MESSAGE 5

Increased frailty is an independent marker of poor outcomes, and frail patients should be considered high-risk regardless of risk score. It is possible assessment of frailty may influence clinical decision making and processes of care. Despite this, consistent geriatrician input at hospital level remains variable with many older frail patients missing out on the care and expertise of geriatric and frailty teams (Chapter 7).

Recommendation 5.1: All clinicians who assess patients over the age of 65 must formally assess and document Frailty. Frailty scoring must be considered an integral part of a formal risk assessment.

2 Introduction

This report is the sixth report of NELA and covers the care received by NHS patients in England and Wales who underwent an emergency laparotomy between 1 December 2018 and 30 November 2019. This reporting period did not include the COVID-19 pandemic: this data will appear in a subsequent report. This data is for clinicians, hospital teams, trust and hospital executive boards, and commissioners to use in order to understand their own processes of care and outcomes, whilst supporting quality improvement work. Patients are also encouraged to review their local hospital performance data.

Emergency laparotomy has one of the highest associated rates of death of all types of surgery performed, almost ten times greater than that of major elective gastrointestinal surgery.[1] Despite this, emergency perioperative care pathways often fall short of the clinical standards, organisational structures and care processes that benefit most elective patients.[2] NELA investigates processes of care and outcomes, and aims to highlight if there is variation in these for any specific patient group or for different operations performed. For patients, this means that they can be assured that hospitals and teams who actively participate in NELA activities are continually assessing whether they are providing the best quality care possible, and that there is continuous assurance that care is safe, effective, and timely.

In the post-COVID-19 era, as many hospital teams utilise the unique opportunity to re-configure historical estates layouts, care pathways and critical care areas this report is important in highlighting care processes that need improvement and that could be focussed upon. It is important to consider that the mortality and morbidity from emergency general surgery still presents a higher risk to most patients than infection with SARS-COVID 2 and that even during a global pandemic, this group of patients remain a priority for the Multidisciplinary Team.

The RAG tables provide a summary of hospital performance indicators and are available here.[†]

	Number of patients (%)	Case ascertainment rate[‡]
England	23,041 (92.8%)	83.6%
Wales	1,782 (7.2%)	95.9%
Overall	**24,823**	**84.5%**

Total number of hospitals included in year 6 report across England and Wales = 176

[†]Some figures may differ from last year's published RAG tables. This takes into account any updated data subsequently provided by local teams.
[‡]Based on HES and PEDW estimated caseloads between December 2018 and November 2019.

3 Key findings of the sixth National Emergency Laparotomy Audit

Key process measure[§]

Final case ascertainment[¶]

- 179 hospitals were included in this metric. Overall case ascertainment was 84.5%. Overall 121 hospitals were rated green and 20 were rated red.

Data from Hospital Episode Statistics (HES) and Patient Episode Database for Wales (PEDW) for England and Wales are used to calculate the expected annual number of emergency laparotomies that take place in each hospital. This allows calculation of case ascertainment rates.

Case ascertainment for each hospital are shown in the RAG table. Hospitals with a low case ascertainment may not have provided enough information on enough patients for audit results to accurately reflect the quality of their patient care.

This year NELA has included 'data completeness' indicator in the hospital level reports to help local teams assess the quality of their own data. Clinical teams need to have confidence in the quality of their audit data; it needs to be accurate, complete, reliable, timely and ultimately fit for purpose if they are to be able to use it to support changing practice or processes of care.

How to improve data completeness:

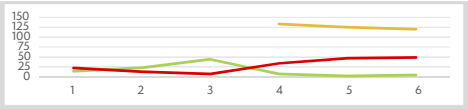
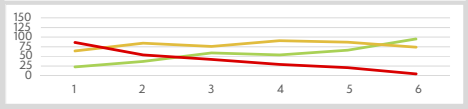
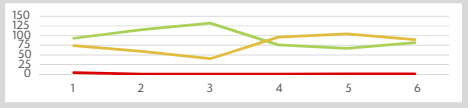
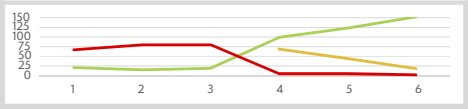
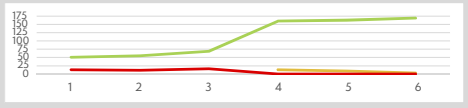
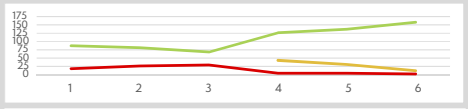
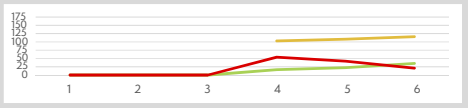
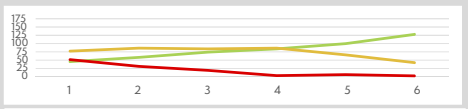
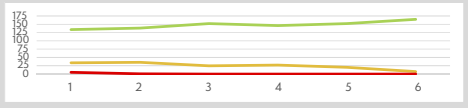
- teams can regularly check the real time data on the NELA webtool for how many, and which cases are 'locked' and submitted
- using the webtool, teams should perform regular benchmarking exercise against local, AHSN and national level data
- teams can find further details in the NELA quarterly and BPT reports for case ascertainment.

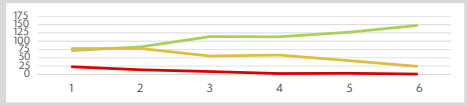
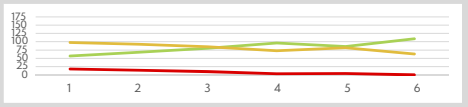
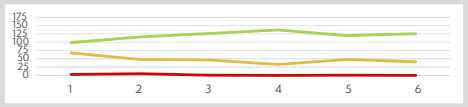
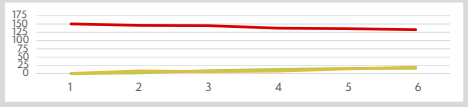
This year we have included Quality Improvement Activity Boxes (TASKS FOR TRUSTS) to help guide future quality improvement work in the key areas that have failed to show significant improvement over the last six years. There are several regional opportunities, such as collaborative improvement events, that focus upon emergency laparotomy for Trusts and Health Boards to report back on completing these tasks and to share their learning.

[§]Full comparative details and individualised hospital level reports are provided online.
[¶]Based on HES and PEDW estimated caseloads between December 2018 and November 2019.

Table 3.1 Trends in proportions of patients meeting standards nationally, and trends in proportions of hospitals RAG rated green in NELA patient reports for the key standards and supporting process measures (excluded hospitals with less than ten eligible cases)**

Key process measures since Year 4 NELA Audit

National figures								
Key standard	Process measure	Trend over time Year 4 (Dec 16 - Nov 17) n = 24383	Year 5 (Dec 17 - Nov 18) n = 24718	Year 6 (Dec 18 - Nov 19) n = 24823	Number of Hospitals Green RAG rated Yr4	Yr5	Yr6	Percentage of Hospitals achieving RAG standards by NELA audit year
Hospitals which admit patients as emergencies must have access to both conventional radiology and CT scanning 24 hours per day, with immediate reporting	Proportion of all emergency laparotomy patients who received a preoperative CT report by an in-house consultant radiologist	64.2% n = 24383	62.4% n = 24718	62.3% n = 24823	7	2	5	
An assessment of mortality risk should be made explicit to the patient and recorded clearly on the consent form and in the medical record	Proportion of patients in whom a risk assessment was documented preoperatively	74.5% n = 24383	77.2% n = 24718	84.0% n = 24823	54	66	95	
Trusts should ensure theatre access matches need and ensure prioritization of access is given to emergency surgical patients ahead of elective patients whenever necessary	Proportion of patients arriving in theatre within a time appropriate for the urgency of surgery	82.5% n = 17471	82.5% n = 17932	82.8% n = 18324	76	67	82	
Each high-risk case should be reviewed by a consultant surgeon, anaesthetist, intensivist	Proportion of patients with a preoperative risk of death ≥5% who had input from a consultant surgeon and consultant anaesthetist prior to surgery	85.0% n = 12261	87.7% n = 12033	91.4% n = 11894	99	123	152	
	Proportion of patients with a preoperative risk of death ≥5% who had input from a consultant surgeon prior to surgery	95.0% n = 12261	95.5% n = 12033	96.9% n = 11894	160	163	169	
	Proportion of patients with a preoperative risk of death ≥5% who had input from a consultant anaesthetist prior to surgery	88.4% n = 12261	90.7% n = 12033	93.9% n = 11894	126	137	158	
	Proportion of patients with a preoperative risk of death >5% who had input from a consultant intensivist prior to surgery	62.4% n = 12009	65.8% n = 12031	71.4% n = 11893	16	22	35	
Each high-risk case should have a consultant surgeon, anaesthetist present in theatre during surgery.	Proportion of patients with a preoperative risk of death ≥5% for whom a consultant surgeon and consultant anaesthetist were present in theatre	82.3% n = 12262	83.7% n = 12034	88.5% n = 11894	84	100	128	
	Proportion of patients with a calculated preoperative risk of death ≥5% for whom a consultant surgeon was present in theatre	91.7% n = 12262	92.6% n = 12034	94.8% n = 11894	146	152	165	

National figures								
Key standard	Process measure	Trend over time Year 4 (Dec 16 - Nov 17) n = 24383	Year 5 (Dec 17 - Nov 18) n = 24718	Year 6 (Dec 18 - Nov 19) n = 24823	Number of Hospitals Green RAG rated Yr4	Yr5	Yr6	Percentage of Hospitals achieving RAG standards by NELA audit year
All high-risk patients should be admitted to critical care	Proportion of patients with a preoperative risk of death ≥5% for whom a consultant anaesthetist was present in theatre	88.2% n = 12262	89.0% n = 12034	92.3% n = 11894	113	127	147	
	Proportion of patients with a postoperative risk of death >= 5% who were directly admitted to critical care postoperatively.	80.0% n = 12163	81.9% n = 12017	85.2% n = 11970	96	86	109	
	Proportion of patients with a postoperative risk of death > 10% who were directly admitted to critical care postoperatively.	87.1% n = 7314	88.0% n = 7331	90.0% n = 7144	137	120	126	
Each patient aged over the age of 65 or over and frail or 80 or over should have multidisciplinary input that includes early involvement of Geriatrician teams	Proportion of patients aged 65 years or over and frail or 80 or over who were assessed by a care of the older person specialist	25.6% n = 4685	27.4% n = 5326	28.4% n = 8268	13	16	16	

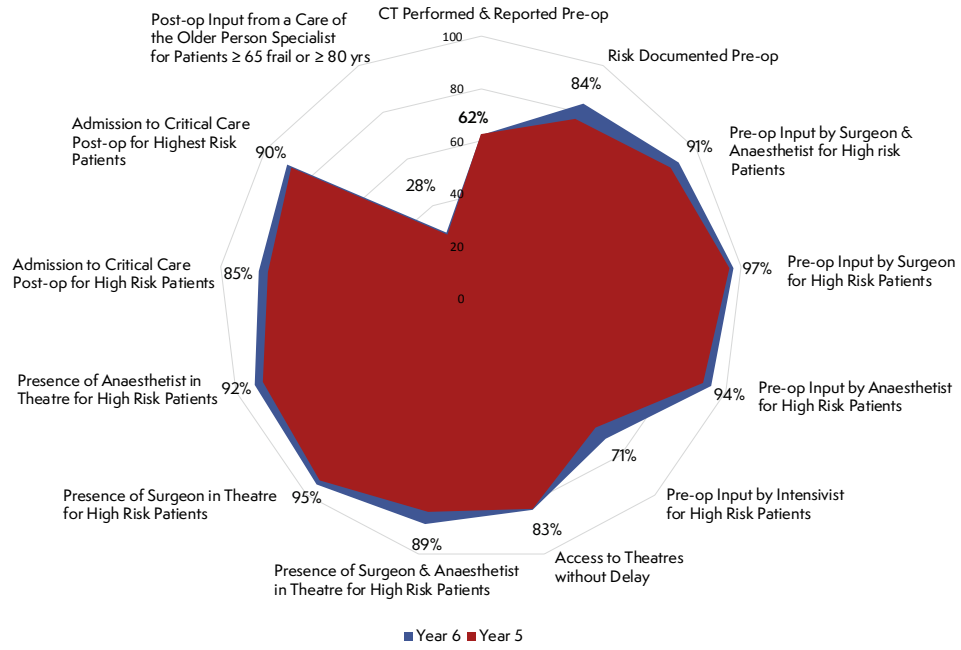
Green: standard met for at least 85% of patients

Amber: standard met for 55–84% of patients

Red: standard met for under 55% of patients

**New data from Year 4 therefore previous years not shown in Trend line charts.

Figure 3.1.1 Proportion of all emergency laparotomy patients in Year 6 who had surgery between December 2018 and November 2019, who received key standards of care



Impact of Best Practice Tariff

This is the first year of reporting NELA data since the introduction of an emergency laparotomy BPT in England. The BPT focussed on two key standards of care: consultant anaesthetist and surgeon presence intraoperatively and direct admission to critical care for high-risk patients after their operation. As the tariff applies to only high-risk patients, assessment of risk was a key process for most sites working to improve their eligibility for the tariff. All Trusts were required to introduce an emergency laparotomy pathway as a precursor to access the BPT.

Improvements in care were also supported by the work undertaken by the Academic Health Science Network (AHSN) national spread programme for the Emergency Laparotomy Collaborative. This brought together regional collaboratives facilitated by each of England's 15 AHSNs. As the introduction of the BPT was a key change for many providers in England, the AHSN networks undertook much of their collaborative work focusing on the BPT metrics. The impact of this work will be published in a full evaluation of the national spread programme in due course.

Figure 3.1.2 Proportion of eligible Trusts who have achieved the BPT target (80%) (BPT introduced in April 2019)

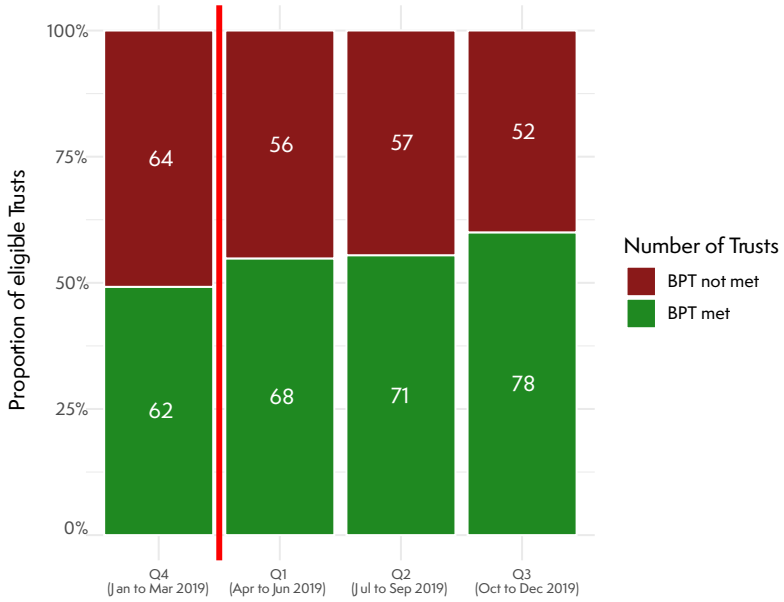
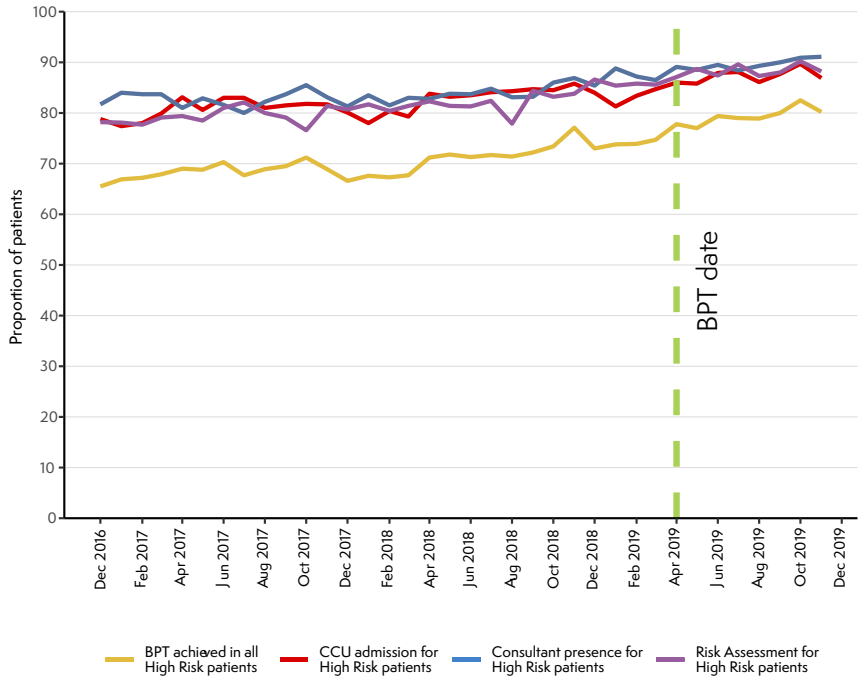


Figure 3.1.3 Proportion of all emergency laparotomy patients who meet the standards for BPT, both before and after its introduction



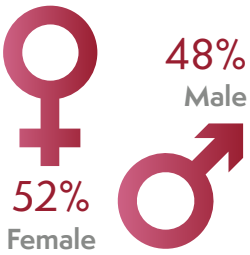
4 Preoperative care

4.1 Who has emergency laparotomy surgery?

Patients needing emergency bowel surgery are heterogeneous in their demographics and pathology, but they all need access to the same processes of care to achieve the best possible outcomes.

24,823 patients
were entered into the audit, from
176 hospitals
in England and Wales

45.8%
assessed as high-risk
with a NELA predicted **mortality risk of ≥5%**

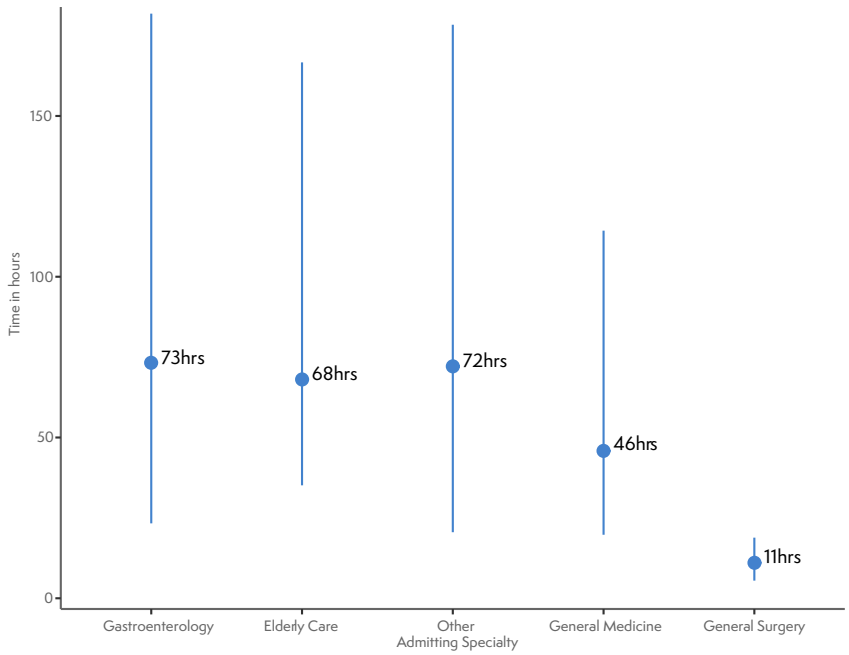


50%
required surgery **within six hours**

94%
have **emergency laparotomy** after an emergency admission to hospital

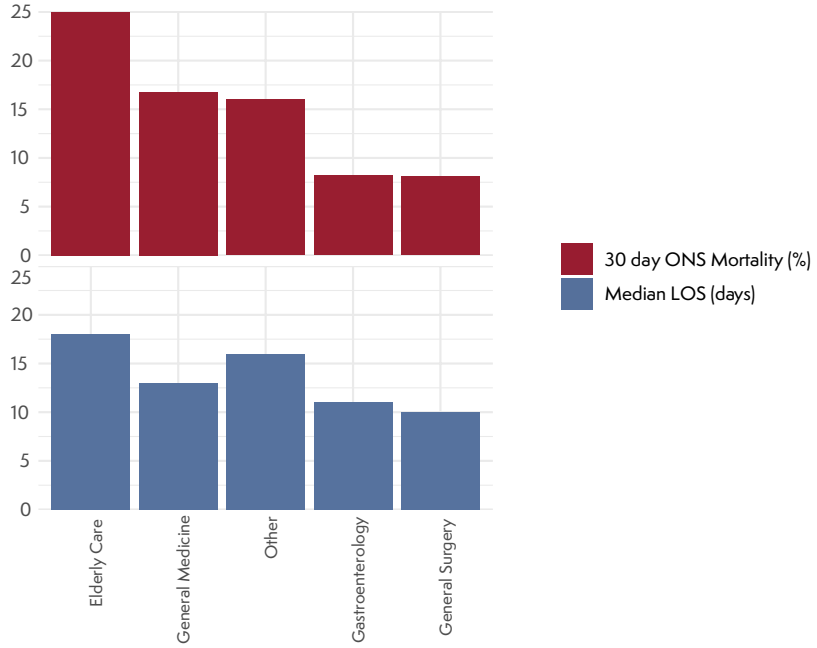
Almost ¾ of patients
undergoing **emergency laparotomy** are admitted via the Emergency Department

Figure 4.1.1 Number of hours to consultant surgeon review, from admission, by admitting specialty



NOTE: Median time (in hours) and interquartile range (IQR)

Figure 4.1.2 Association between admitting specialty and outcomes for patients undergoing emergency laparotomy



ALERT! Patients admitted under non-surgical specialties have a higher predicted risk profile, higher mortality and longer length of stay after their emergency laparotomy than those who are admitted initially under the surgeons. Patients undergoing an emergency laparotomy after admission to a non-surgical speciality should be considered high-risk. NELA does not report the reasons for their initial admission, which may be for a non-surgical reason. However the impact of possible co-existant medical co-morbidities must be recognised by anaesthetic and surgical teams.

Improvement opportunity: Examine the care of patients admitted to non-surgical specialties ensuring they access emergency laparotomy surgery in the same timescale as those admitted to hospital under general surgical teams.

Actions: Use your NELA data to understand the average and spread of time periods between admission and arrival in the operating theatre in your hospital. How do these differ for those admitted under surgical and non-surgical teams?

Map out the steps between admission and arrival in the operating theatre for those under surgical and non-surgical teams. Key areas to examine include any delays in detecting an acutely unwell or deteriorating surgical patient on a medical ward, delays in referral and initial surgical assessment, delay in making a decision to operate, due to delays in accessing a senior surgical decision maker and delays in transfer to the operating theatre these cases in detail. Improvements may include training on measurement of early warning scores, making speciality referral pathways clearer and more reliable, changing working patterns or policies to ensure the initial assessment is by a senior surgical decision maker.

Are there any delays in surgical assessment, investigations, treatment or accessing theatres that teams can work on to improve outcomes?

Do you have a forum to discuss these issues across your teams – nominated a NELA lead/liaison or a scheduled meeting/reporting structure where you can disseminate your data and discuss pathway improvements?

4.2 Timeliness of arrival in theatre

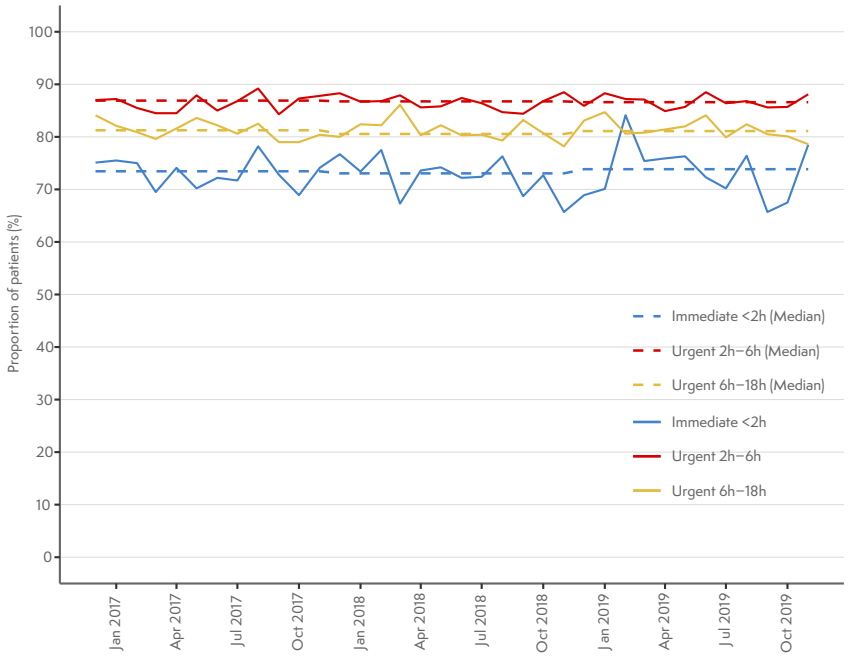
Key process measured[††]

The proportion of patients arriving in theatre in a timescale appropriate for the urgency of surgery (minimum standard 85%).

Key findings

- 83% patients arrived within the appropriate time frame to have their operation in accordance with their recorded category of NCEPOD urgency. This is unchanged from last year.

Figure 4.2.1 Trend in the overall proportion of patients arriving in theatre within an appropriate timeframe for their level of urgency (surgery within 2 hours, 2–6 hours and 6–18 hours)



The group of patients requiring the most immediate of surgery (within two hours) are still the least likely to arrive in theatre within the stated time with only 73% of patients achieving this. This has not changed from previous years.

For the most urgent of patients who require immediate surgery, an 'in person' review before surgery by a consultant surgeon must be balanced against ensuring this does not delay the patient in reaching the operating theatre. Remote discussion with the clinical team, by the consultant in this setting may be more effective.

Delays to surgery may be appropriate in order to allow informed discussion with the Multidisciplinary Team, patient and relatives, and/or if preoperative optimisation is required.

Improvement opportunity: Timely access to the emergency theatre is covered in the RCoA Quality Improvement compendium, in recipe 4.2: Theatre Provision for Emergency Surgery and in recipe 4.3: Emergency Laparotomy.

ALERT! Patients who are more likely to experience delays in getting their emergency laparotomy include those who require immediate surgery, particularly if surgery is required in the morning session.

- 34% of patients experience delay if a decision is made for immediate surgery in the morning 0800–1200 compared to only 19.3% between midnight–0800.

(see supplementary data tables 4.2.5 to 4.2.10)

[††]In the data collected on date and time the patient was booked for surgery, timing was missing in 3% of cases. In the decision to operate data, date or time were missing for 9.8% of patients. 11.7% patients did not have a complete date in either surgery or decision to operate.

4.3 Radiology

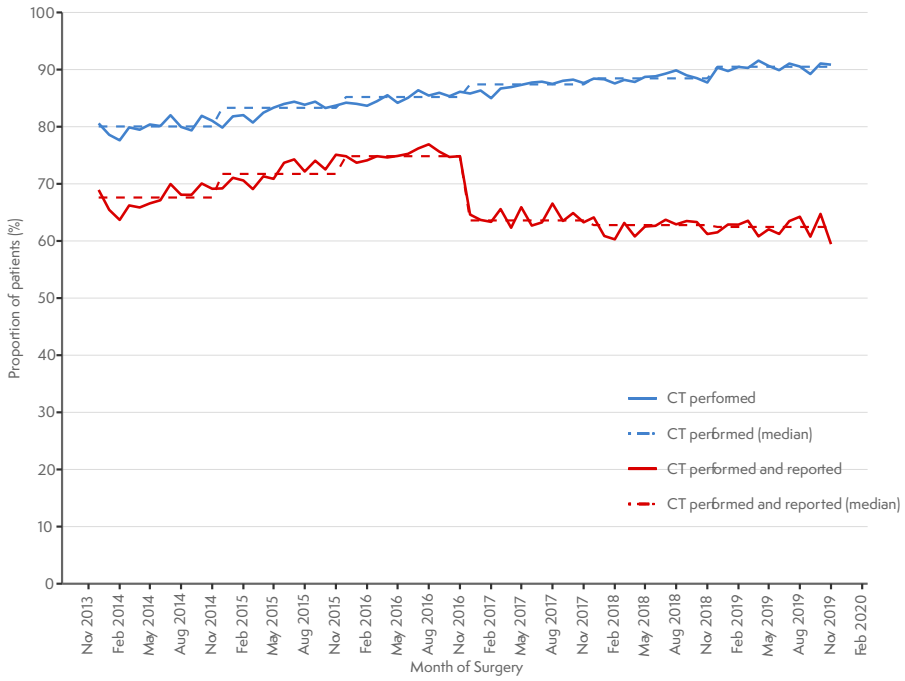
Accurately reported CT scanning is an important diagnostic tool to support timely decision making, appropriate resuscitation and prioritisation of patients during the initial management phase.[3] It is now accepted that enhanced access to cross sectional imaging should be considered a minimum standard within an emergency laparotomy pathway.[4]

Key Process Measure‡‡

The proportion of patients who received a CT scan which was reported by an in-house consultant radiologist before surgery (minimum standard 85%).

- Key Finding 1: 62% of patients had a CT scan which was reported by an in-house consultant radiologist before surgery (Figure 4.3.1).
- Key Finding 2: 90.5% of patients had a preoperative CT scan performed, compared with 80% in Year 1.

Figure 4.3.1 Trend in the overall proportion of patients receiving a CT scan preoperatively and CT scans being reported by a consultant radiologist preoperatively (note, this metric only includes in-house consultant for Year 5 and 6, whereas Year 1–3 also included outsourced reports



Who reports CT scans?

Patients are less likely to have a CT scan performed and reported preoperatively by an in-house consultant radiologist if they require immediate surgery (<2hours). NELA data demonstrates that the use of outsourced radiology reporting services has increased to 17.8% (14.8% in year 5 NELA) despite there being a reported increased reporting discrepancy rate in out-sourced reported scans. The accepted discrepancy rate[3] is 5% regardless of who reports the CT scan.§§

ALERT! Discrepancy rates between the CT and the surgical findings are higher for those in whom the scan was reported by an outsourced radiology service. This remains unchanged from last year.[5]

‡‡Data on CT performed was missing in 0.5% of cases ('unknown' selected). This decreased from 1.3% in year 1. The method of CT reporting was unknown in 3.3% of cases.

§§The definition of discrepancy was developed in conjunction with the Royal College of Radiologists and refers to a discrepancy between the reported CT and surgical findings. We are unable to state if discrepancies are related to the initial report or regarding any addendums. Similarly, despite out-sourced reports mainly being done by consultants, in-house consultant reports are defined as the gold standard as per the Royal College of Radiologists recommendations.

What clinical factors affect CT reporting discrepancy rates?

Overall discrepancy rates according to person reporting the scans are:

- In-house consultant discrepancy rate 5.3%
- In-house registrar discrepancy rate 4.6%
- Outsourced radiology service discrepancy rate 6.2%
- The highest discrepancy rate (8%) is seen in patients who are found to have either ischaemia or bleeding at emergency laparotomy.
- The more urgent the need for surgery, the higher the discrepancy rate between the CT report and surgical findings. A discrepancy rate of 6.9% is seen in patients requiring immediate surgery (<2 hours) compared with 4.1% for those who require expedited surgery (>18 hours).
- The discrepancy rate is higher (7.4%) where there has been a preoperative discussion between consultant surgeon and radiology team compared to a rate of 3.9% where there has been no discussion. This may represent that multi-disciplinary discussions are more likely in complex patients where the diagnosis is unclear.
- CT discrepancy rate does not appear to be influenced by volume of emergency laparotomies performed.
- Discrepancy rate ranged between hospitals from 0 and 16.7%.

4.4 Consultant input before surgery

The advantages of consultant led care throughout the perioperative journey include not only clinical expertise, but also rapid decision making, management and leadership in time critical situations, efficient use of resources, support of junior doctors and improved outcomes.[6]

Key Process Measures¶¶

The proportion of patients who had preoperative input by a consultant anaesthetist before surgery when the calculated risk of death ≥ 5%

- Key finding: 94% patients who are high-risk have consultant anaesthetist input before their surgery.

Key Process Measures¶¶

The proportion of patients who had preoperative input by a consultant surgeon before surgery when the calculated risk of death ≥ 5%

- Key finding: 97% patients who are high-risk have consultant surgeon input before their surgery.

Key Process Measures¶¶

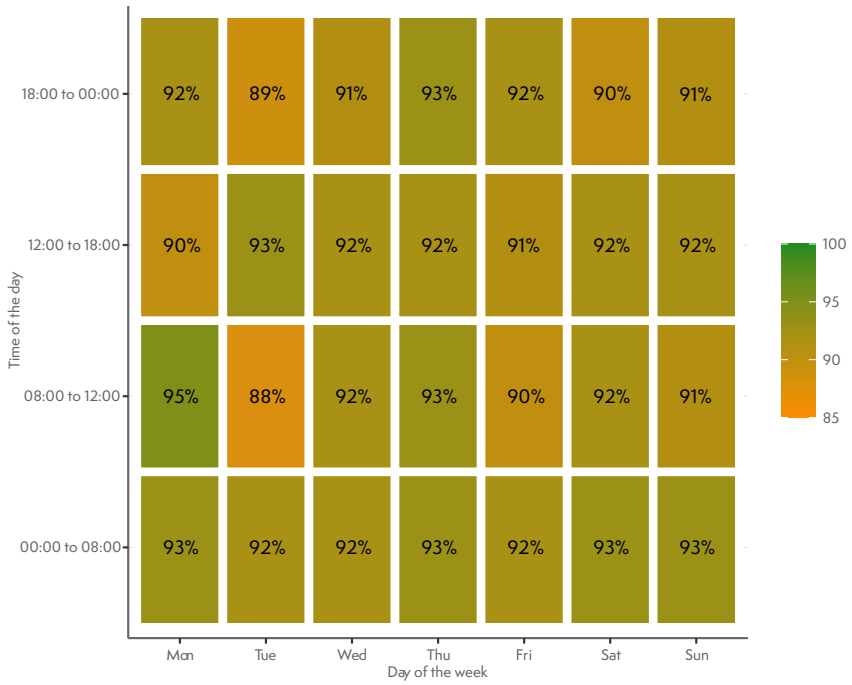
The proportion of patients who had preoperative input by a consultant intensivist before surgery when the calculated risk of death ≥ 5%

- Key finding: 71% patients who are high-risk have consultant intensivist input before their surgery.

There is no variation according to the time of day, or day of the week (see supplementary data tables 4.4.11 to 4.4.16)

¶¶In 2.6% of cases, data on consultant surgeon input was missing ('unknown' selected). Consultant anaesthetist input was unknown in 4.2% of cases. Intensivist preoperative involvement was not known in 6.9% of cases.

Figure 4.4.1 Proportion of high-risk patients reviewed by both a consultant surgeon and consultant anaesthetist in person or by discussion, by time of day and day of the week of admission



4.5 Management of patients with peritonitis and sepsis

Sepsis is one of the most significant causes of deterioration and critical illness.[7] Around 25–35,000 patients each year in the UK will have an intra-abdominal source of infection. Whilst not all require emergency laparotomy surgery, it is clear that the rapid administration of antibiotics and definitive source control is crucial in improving outcomes for this cohort of patients.

ALERT! Comparisons with previous NELA reports demonstrated that there was little improvement in the time taken to give antibiotics, or the time to take these patients to theatre for surgery.

Key findings

25% have signs of sepsis

20.5% have signs of peritonitis

92.7% require urgent surgery

85% arrive within timeframe

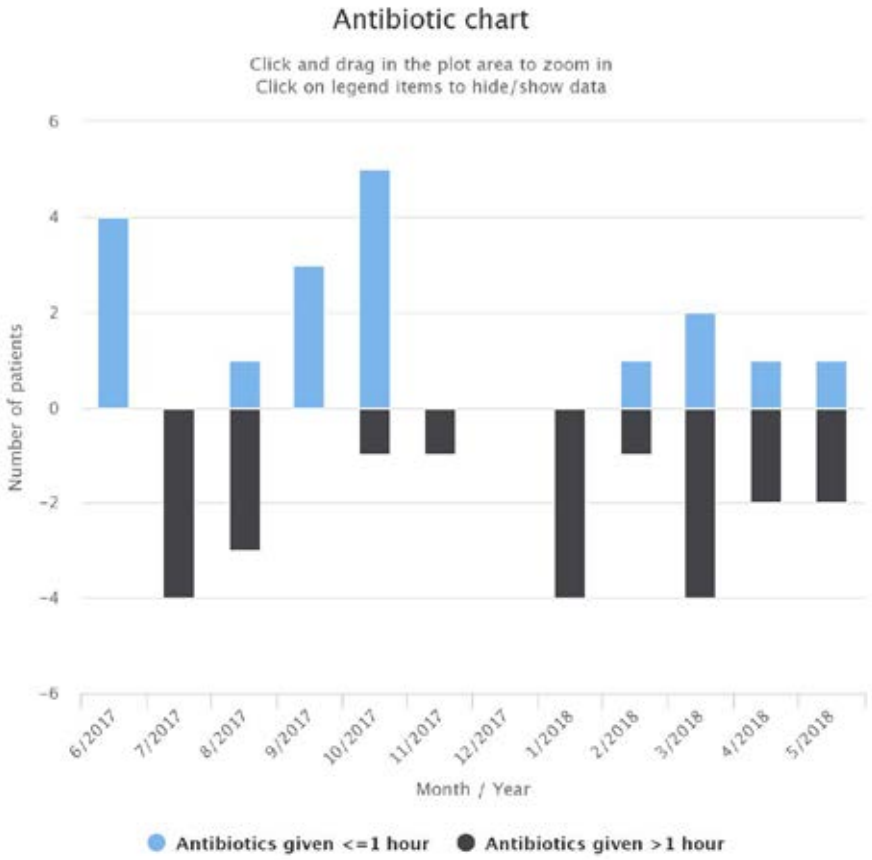
71% cared for in critical care

15.1% sepsis 30-day mortality

(see supplementary data tables 4.5.1, to 4.5.3 and tables 4.5.6 to 4.5.8).

Improvement opportunity: To ensure reliable and timely antibiotic administration to patients who need an emergency laparotomy with signs of sepsis.

Actions: Use the NELA sepsis dashboards to describe key standards of care in patients with sepsis (prompt administration of antibiotics, measurement of lactate and timely access to operating theatres, shown below). Examine the care of patients who fail to meet the above standards, who are listed within the sepsis dashboard. The care can be examined as case reviews in multidisciplinary morbidity and mortality meetings or linking to your hospital's surviving sepsis work. Action plans to improve the care for patients **with sepsis** will cross many departments and include improved cross specialty working, better use of data and improving the reliability of sepsis care bundles.



This is an example of a hospital's antibiotic administration chart, visible in each hospital's real time NELA QI dashboard. In this example, in June 2017, all patients with sepsis received antibiotics within 1 hour, however in January 2018, no patients achieved the target time for antibiotic administration.

On the NELA dashboard, the chart is accompanied by a table that links to the patient records of those who didn't meet the standard of care, to facilitate local case based discussions and work to improve the reliability of patient pathways

4.6 Risk assessment

All patients should have an assessment of their individual risk of death to allow clinicians to tailor their care and meet their individual needs. This should be clearly documented as having been discussed with the patient in their notes, and also recorded on the consent form. Failure to formally assess risk may result in them not receiving the care that they should. Accurate data not only supports objective decision making but also is used to calculate a hospital's risk-adjusted mortality.

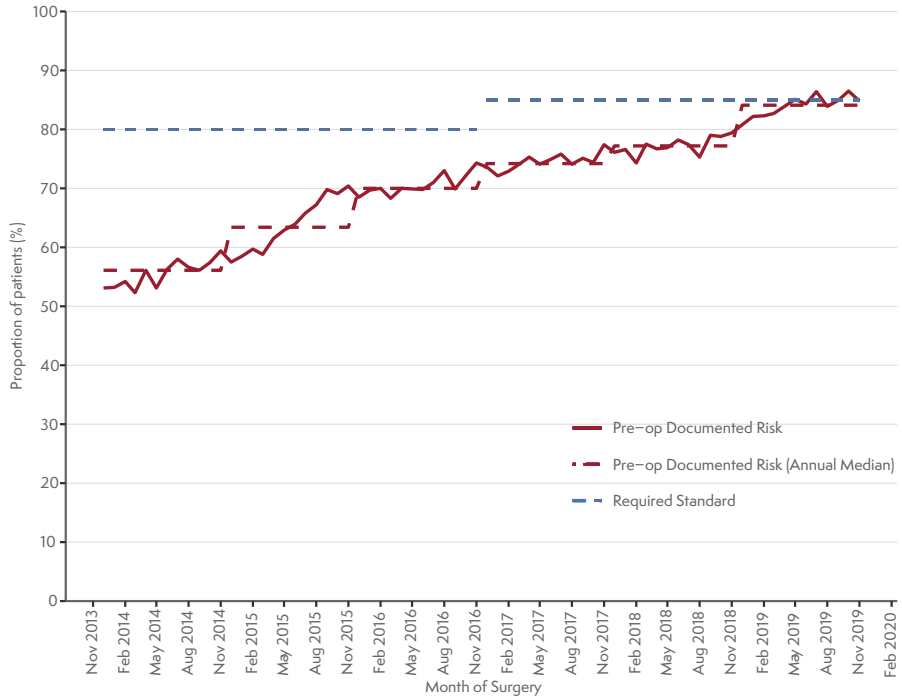
High-risk is defined as a predicted risk of death within 30 days greater than or equal to 5% when assessed by any means (including clinical judgement and/or risk prediction tools). Any patient within the NELA dataset who has a 'missing' value for their preoperative risk score is assumed to be high-risk in view of the findings of previous reports. This definition allows ready identification of a group of patients more liable to experience adverse outcomes however patients undergoing emergency laparotomy who have a predicted mortality <5% should not be viewed as 'low risk' and many of this group will benefit from the same recommended interventions. Categorisation of major surgical patients as low risk should be an active decision made by senior clinicians.

Key process measure

The proportion of patients for whom a risk assessment was documented before surgery.

- Key finding: 84% patients had a documented risk assessment before surgery.

Figure 4.6.1 Trend in the overall proportion of patients whose risk was documented preoperatively



44%

assessed as high-risk of death ≥5% before surgery

40%

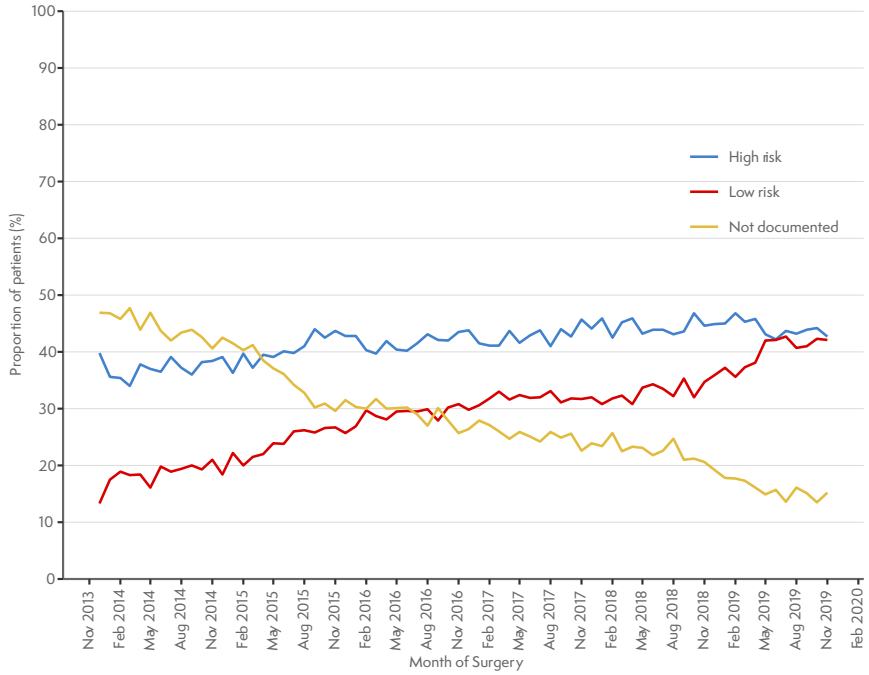
assessed as risk of death <5% before surgery

70%

assessed by utilising a formal calculation tool

(see table 4.6.4 below and supplementary data table 4.6.5)

Figure 4.6.2 Trend in the overall proportion of patients who have their risk assessed according to their predicted risk category prior to surgery



Documented risk assessment is becoming routine regardless of which risk group (high or low) patients fall into.

(see supplementary data tables 4.6.6 to 4.6.8)

Which patients are more likely to have their risk formally documented?

Patients are more likely to have their risk formally documented if:

- over 65 years old
- higher ASA
- have had a frailty assessment of any kind
- need immediate surgery.

(see supplementary data tables 4.6.10 to 4.6.16)

What are the differences in processes of care, according to if a patient has not had an accurate documented risk calculated before surgery?

Previous reports have highlighted that patients who do not have a preoperative assessment of risk should be treated as if they are high-risk, or they may miss out on key processes of care. The proportion of patients not having their risk assessed has steadily decreased. This year, we report in more detail on the small group of patients who did not have risk assessment documented before surgery, or who had a risk assessment documented that was different to the calculated NELA risk score.

3,974 (16%) patients did not have their risk documented before their surgery (see table 4.6.1 below).

Patients who are least likely to have an accurate risk assessment documented before surgery are:

- young, under the age 65 (19% under 65 do not have documented risk assessment)
- ASA 1 or 2
- patients who have been in hospital longer and need the least emergent surgery
- patients who are older and not frail
- patients who are older and do not have their frailty assessed.

(see supplementary data tables 4.6.11 to 4.6.14)

ALERT! Patients admitted under a non-surgical specialty are amongst some of the most complex, high-risk patients. They must have careful, accurate assessment of their perioperative risk, and their risk of death and other specialties should be encouraged to use formal risk assessment tools in their assessments even before patients are referred to the surgeons.

1,373 (35%) patients who did not have risk documented, in fact had a calculated NELA risk that was high (see table 4.6.1 below).

Of this group:

- consultant presence in theatre was 84%
- 76% were admitted to critical care
- 30 day ONS mortality was 14.7%
- length of stay was 13 days.

(see supplementary data tables 4.6.7 to 4.6.10)

2,539 patients who did not have a preoperative documented risk assessment had an actual calculated NELA risk that was low. Their actual 30 day mortality was 1.1%.

Overall, all patients who do not have their risk of death documented before surgery have a 30 day mortality of 6%. This categorises them as a high-risk group (see table 4.6.2 below).

Accuracy of risk assessment

9,869 patients are recorded as being 'low risk' before their surgery, of whom 1,231 (13%) had a 'high' calculated NELA risk (see table 4.6.2). Of this group of patients:

- consultant presence in theatre was 84%
- 66% were admitted to critical care
- 30 day ONS mortality was 5.8%.

ALERT! Accurate risk assessment is crucial for all patients, especially those who may be perceived as being 'low risk'. These patients may still have a high 30 day mortality. No risk score methodology is perfect, and so a combination of both clinical judgement, and formal risk assessment is required. This may need to utilise assessments of frailty, nutritional status and cognitive function as well as physiological risk assessments such as the NELA risk calculator.

Table 4.6.1 Relative proportions of patients in all risk category when preoperative documented risk is compared to preoperative calculated NELA risk of death

Document risk prior to surgery	Preoperative calculated High NELA Risk n (%)	Preoperative calculated Low NELA Risk n (%)	Preoperative calculated NELA Risk Missing n (%)	Number of patients in each risk category (n = 24,823)
High	8,773 (79.9%)	2,122 (19.3%)	85 (0.8%)	10,980
Low	1,231 (12.5%)	8,554 (86.7%)	84 (0.8%)	9,869
Not documented	1,373 (34.5%)	2,539 (63.9%)	62 (1.6%)	3,974

Table 4.6.2 30-day and 90-day ONS mortality according to preoperative documented risk

Calculated preoperative risk of death	30-day ONS mortality	90-day ONS mortality
High	17.4%	23%
Low	1.7%	3.3%
Not documented	6%	9.3%

Nearly 3000 patients had only a clinical assessment of risk, without the utilisation of a formal risk scoring tool. Generally these assessments appear to be accurate in the context of 30 day mortality.

Table 4.6.3 30-day ONS mortality in patients who had a clinical assessment of risk according to preoperative calculated NELA risk of death

Patients who had clinical assessment of risk only (n= 2,914)	NELA calculated risk HIGH		NELA calculated risk LOW		NELA calculated risk Missing		30-day ONS mortality
	n (%)	30-day Mortality	n (%)	30-day Mortality	n (%)	30-day Mortality	
Clinically assessed as HIGH n= 1,185	878 (74.1%)	22.9%	286 (24.1%)	4.2%	21 (1.8)%	19%	18.3%
Clinically assessed as LOW n= 1,729	207 (12%)	4.3%	1488 (86.1%)	0.4%	34 (1.9%)	0%	0.9%

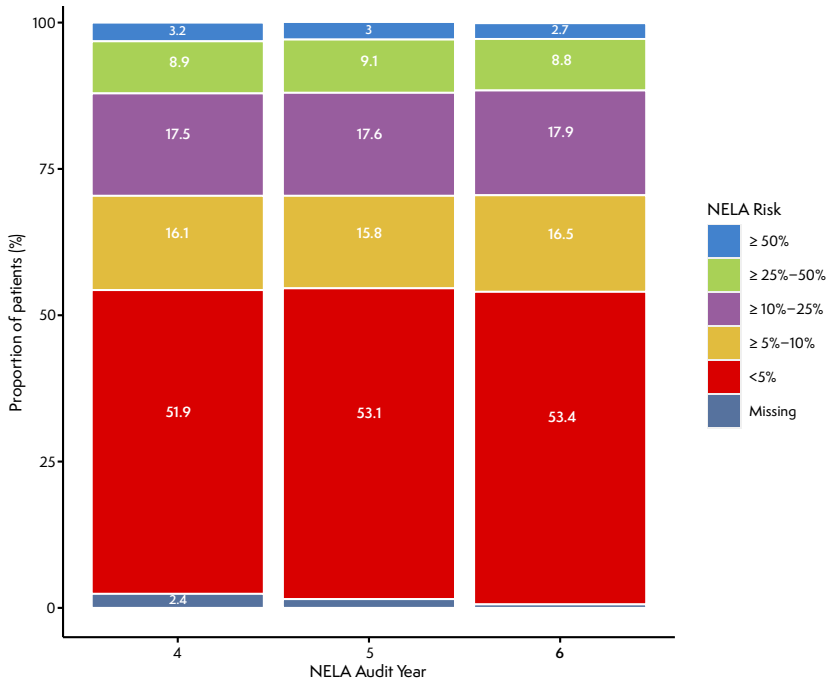
Table 4.6.4 Proportion of patients in each risk category who had their risk assessed using clinical judgement and/or a risk prediction tool

Documented risk before surgery	Clinical judgement only	Risk prediction tool only	Both clinical and formal assessment
High	1,185 (10.8%)	6,517 (59.4%)	2,923 (26.6%)
Low	1,729 (17.5%)	5,894 (59.7%)	1,938 (19.6%)

What is the distribution of risk each reporting year? Who are we operating on?

The number of patients falling into each risk category has not changed.

Figure 4.6.3 Population risk profiles according to preoperative NELA predicted 30 day mortality, by NELA year of reporting



(see supplementary data tables 4.6.20; 4.6.21; 4.6.22; 4.6.23; 4.6.24)

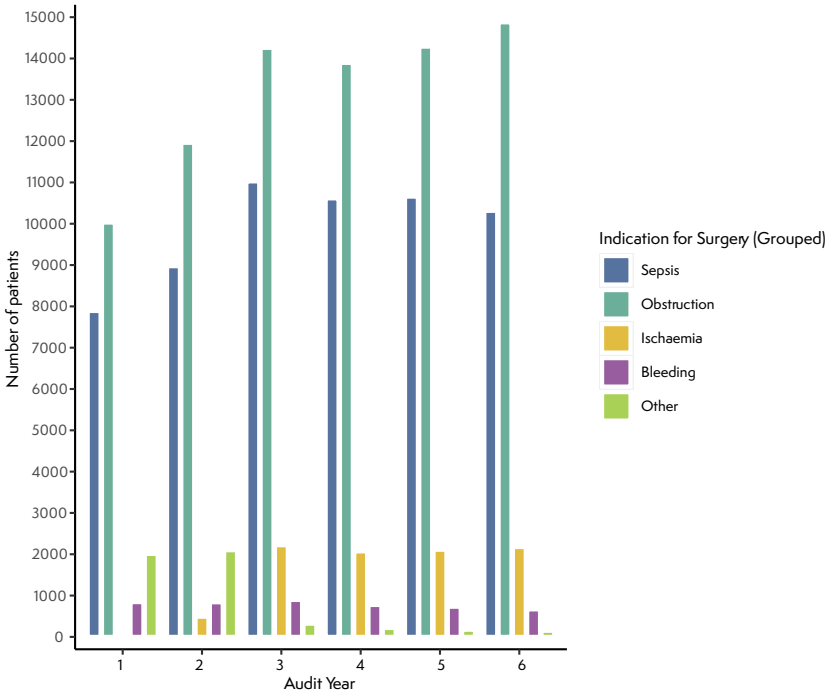
Improvement opportunity: Risk assessment is covered in the RCoA Quality Improvement compendium, in recipe 4.1: Risk assessment and preparation for emergency surgery and in recipe 4.3: Emergency Laparotomy.

5 Intraoperative care

5.1 What are the indications for emergency laparotomy?

The indications for emergency laparotomy are numerous but can be broadly divided into intestinal obstruction, sepsis, ischaemia, or haemorrhage.

Figure 5.1.1 Indications for emergency laparotomy, by NELA year



(see supplementary data tables 5.1.3; 5.1.4; 5.1.5)

- Patients with bleeding are more likely to have both consultant anaesthetist and surgeon present intraoperatively than patients presenting with obstruction.
- There is wide variation in pathology for patients presenting for emergency laparotomy. Whilst the indication for surgery does not affect the likelihood of the patient receiving consultant surgeon and anaesthetic preoperative review, it does impact on whether the patient gets to theatre in the appropriate time frame.
- Patients with bleeding require the most urgent intervention, and are most likely to access theatres within the appropriate time frame if immediate surgery is required (88% of patients with bleeding access theatre within two hours compared with 68% of patients with obstruction reaching this standard for the most urgent group).

Table 5.1.1 Indication for surgery according to time of arrival to theatre appropriateness to urgency of surgery

Urgency of Surgery	Sepsis	Obstruction	Ischaemia	Bleeding	Other
<2 hours	1,114 (73.5%)	762 (68.1%)	417 (76%)	267 (88.7%)	27 (84.4%)
2–6 hours	3,911 (89%)	3,834 (84.2%)	973 (92%)	144 (87.8%)	45 (84.9%)
6–18 hours	1,757 (80.9%)	4,262 (81.8%)	260 (94.2%)	39 (76.5%)	19 (95%)

- QI activity: Process map the multifactorial reasons for delay to theatre and include patient, anaesthetic, surgical and organisational factors.

5.2 What are the surgical findings at emergency laparotomy?

NELA has categorised the findings at laparotomy into the categories of bowel obstruction, intra-abdominal infection, cancer, ischaemia, post-operative complications, and haemorrhage. Data has been analysed in these groups. It is possible that a patient may have more than one surgical finding at surgery.

47.4% of patients have **bowel obstruction**

12.1% of patients have **ischaemic bowel**

38.9% of patients have evidence of **infection/inflammation** at emergency laparotomy

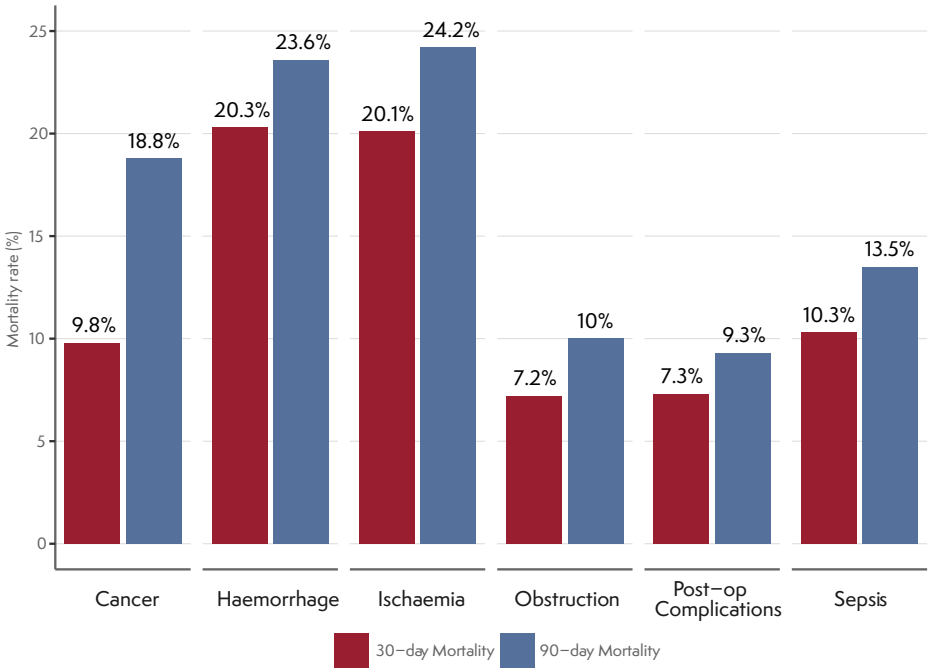
4.9% of patients had evidence of a **postoperative complication**

18.6% of patients have **cancer**

1.5% of patients are found to have **bleeding**

1.4% of patients had a **negative laparotomy** with normal intra-abdominal findings. This is unchanged since Year 1 meaning that **very few patients have unnecessary surgery**

Figure 5.2.1 30-day ONS mortality for grouped intra-abdominal surgical findings



5.3 What are the procedures performed at emergency laparotomy?

Figure 5.3.1 Top ten most commonly performed surgical procedures and associated 30 day ONS mortality (NB hospital teams can see this data contemporaneously on their own database and the NELA webtool). Figures in brackets are the 30-day ONS mortality for the procedure performed

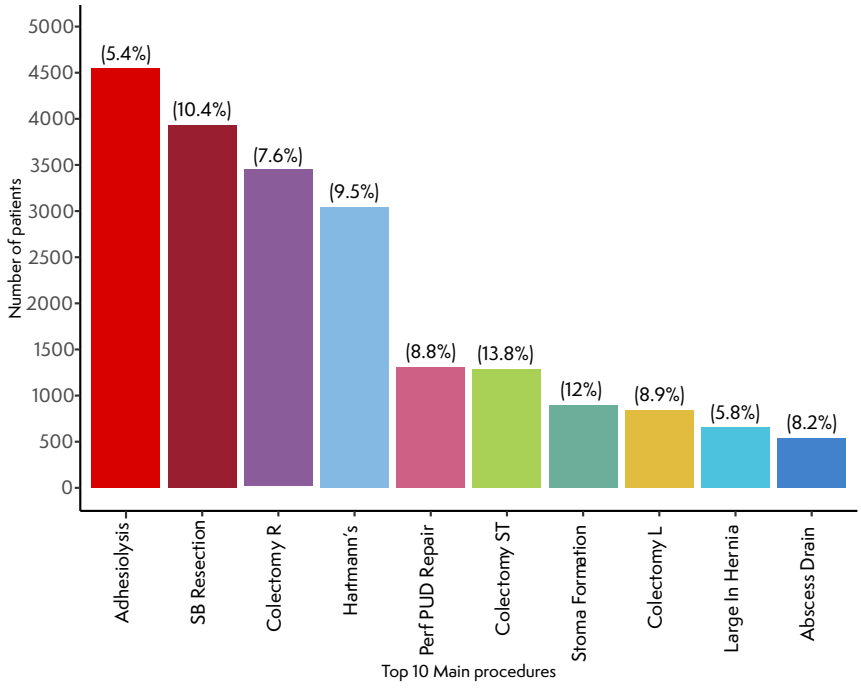
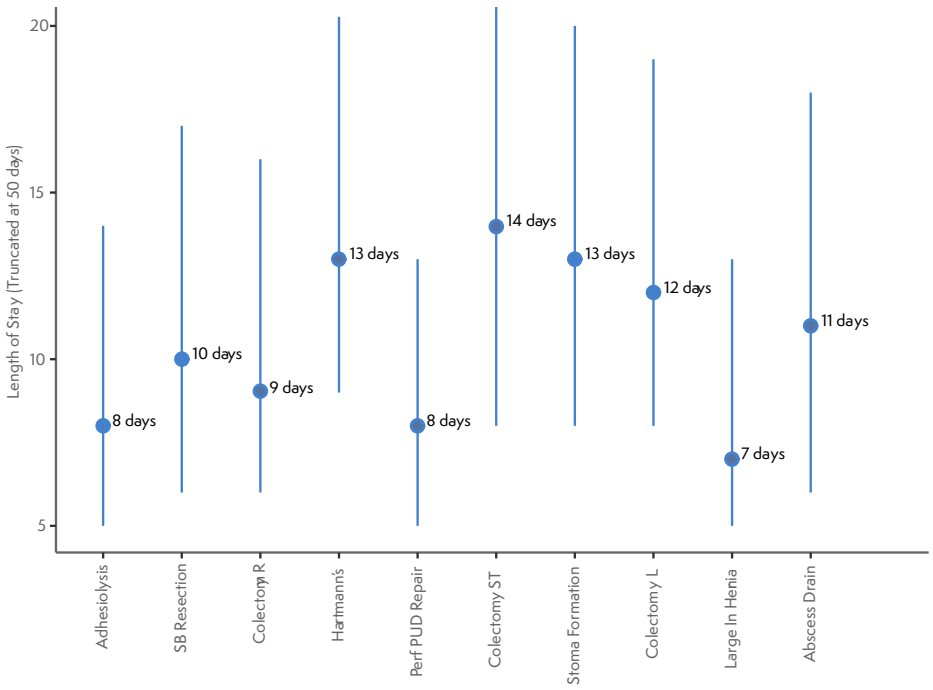


Figure 5.3.2 Top ten most commonly performed surgical procedures and associated length of stay in days



NOTE: Median time (in days) and interquartile range (IQR)

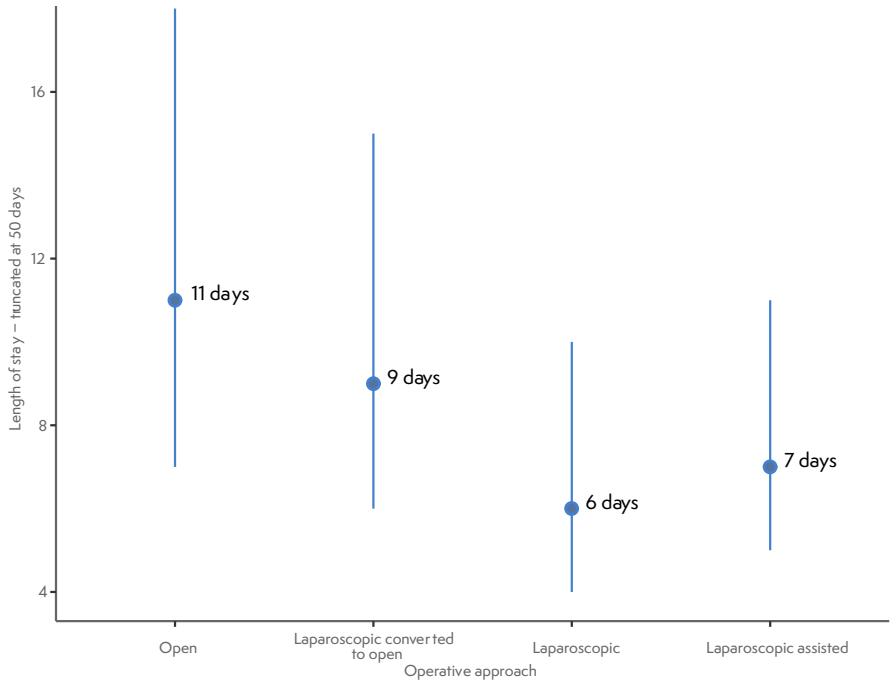
5.4 Laparoscopic emergency bowel surgery

Emergency laparotomy remains predominantly an open procedure.

- There is no increase in the laparoscopic rate in Year 6 with 10% of emergency laparotomies being completed laparoscopically.
- For patients undergoing laparoscopic surgery the 30-day ONS mortality is 3.6% compared to 10.4% if surgery is via an open approach. This likely represents the fact that these patients are less unwell as they have lower preoperatively predicted mortality. (see supplementary data table 5.4.5).
- Only 24.7% of laparoscopic cases are performed out of hours. 72.1% are performed during the day.
- The day of the week that the operation takes place does not influence the mode of surgery, patients are almost as likely to have a laparoscopic approach on weekend compared with a weekday.
- Patients undergoing laparoscopic surgery are less unwell than those who have an open procedure.
- Patients are more likely to have a laparoscopic approach the less urgent the surgery.

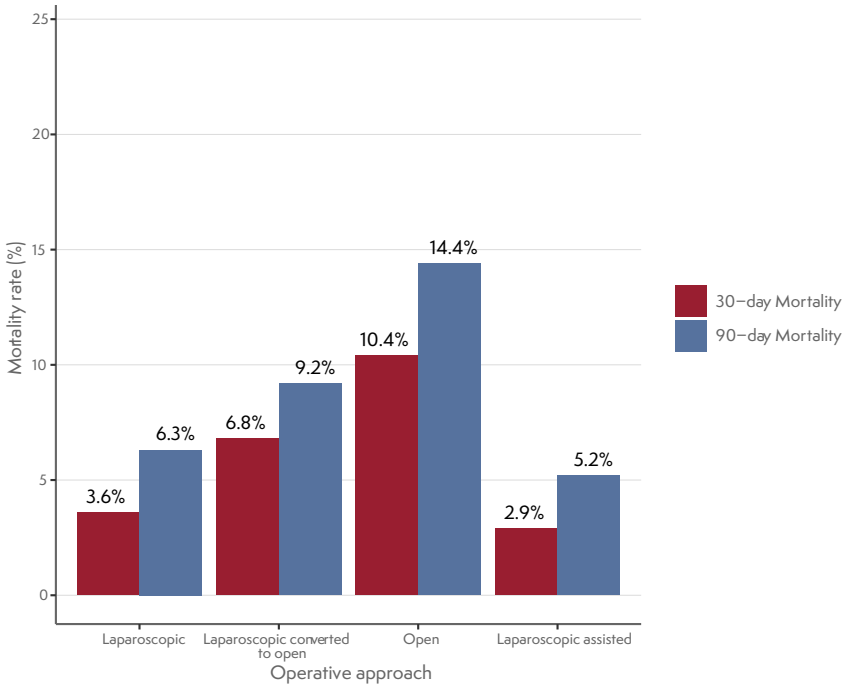
(see supplementary data tables 5.4.1 to 5.4.7)

Figure 5.4.1 Length of stay in days, by operative approach



NOTE: Median time (in days) and interquartile range (IQR)

Figure 5.4.2 30-day and 90-day ONS mortality by operative approach



The mode of surgery is unaffected by the presence of a consultant surgeon. Patients undergoing open surgery are just as likely to have a consultant surgeon present as those patients who have a laparoscopic approach. However, a consultant anaesthetist is less likely to be present in theatre if laparoscopic surgery is performed (see supplementary table 5.4.8).

5.5 Consultant presence in theatre

The intraoperative management of patients undergoing emergency laparotomy surgery can be challenging reflecting both the often-complex underlying pathology and physiological derangement of the patient. Clinical situations may change rapidly and safe, effective team work, led by consultants, is crucial.

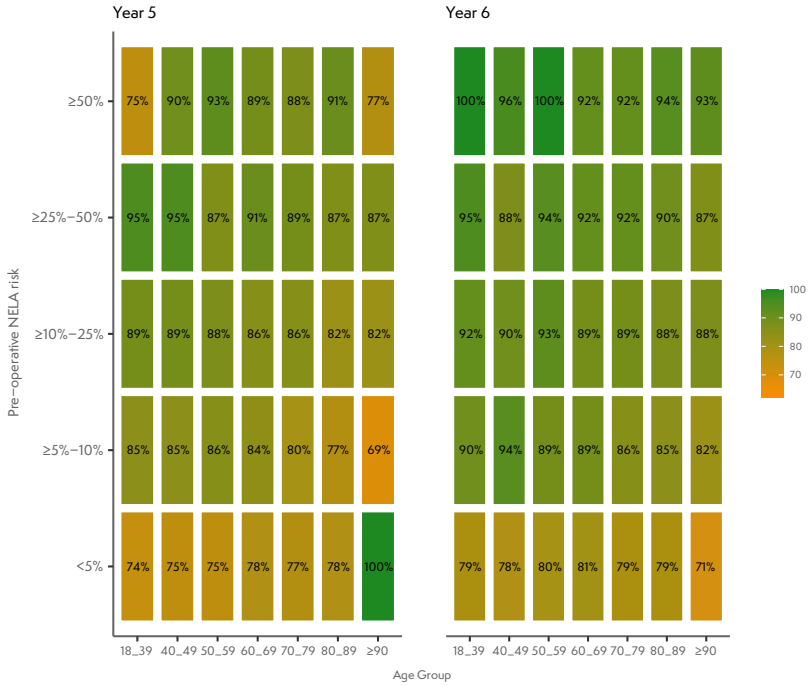
Key process measures

The proportion of patients who had BOTH a consultant surgeon and anaesthetist present in theatre when risk of death ≥5%.

- Key findings: 88.5% of patients had BOTH a consultant surgeon and anaesthetist present in theatre when risk of death ≥5%.
- 79.3% of patients had BOTH a consultant surgeon and anaesthetist present in theatre when risk of death <5%

If **risk is not documented** patients are **significantly less likely** to have both a **consultant surgeon** and **anaesthetist** present in theatre

Figure 5.5.1 Proportion of patients who had both a consultant surgeon and anaesthetist present in theatre, by age group and calculated NELA risk score



ALERT! The heatmap above shows that high-risk older patients are less likely to get consultant delivered care, even if they are very high-risk (Figure 5.5.1)

Figure 5.5.2 Proportion of high-risk patients who had a consultant surgeon and anaesthetist present in theatre, by time of day and day of the week

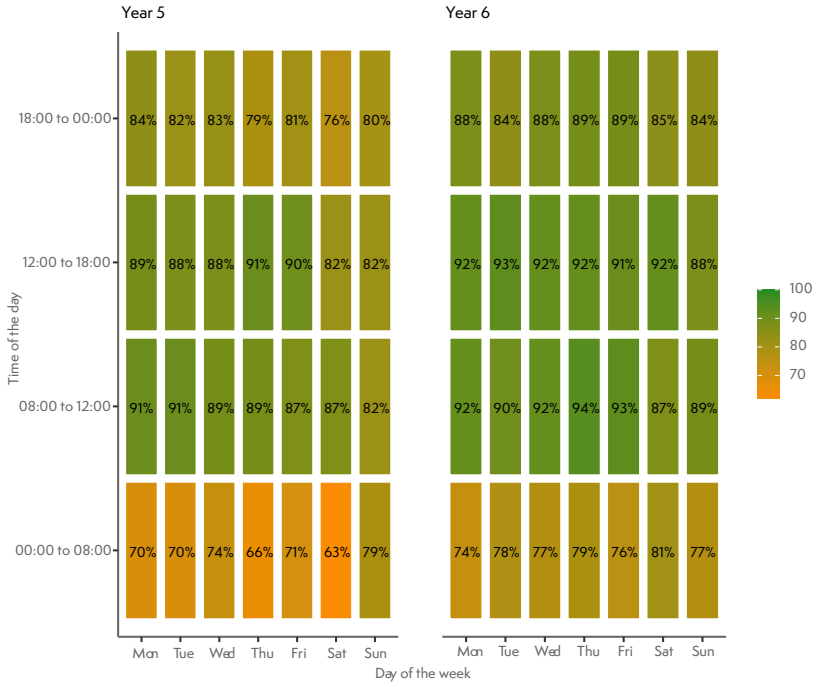
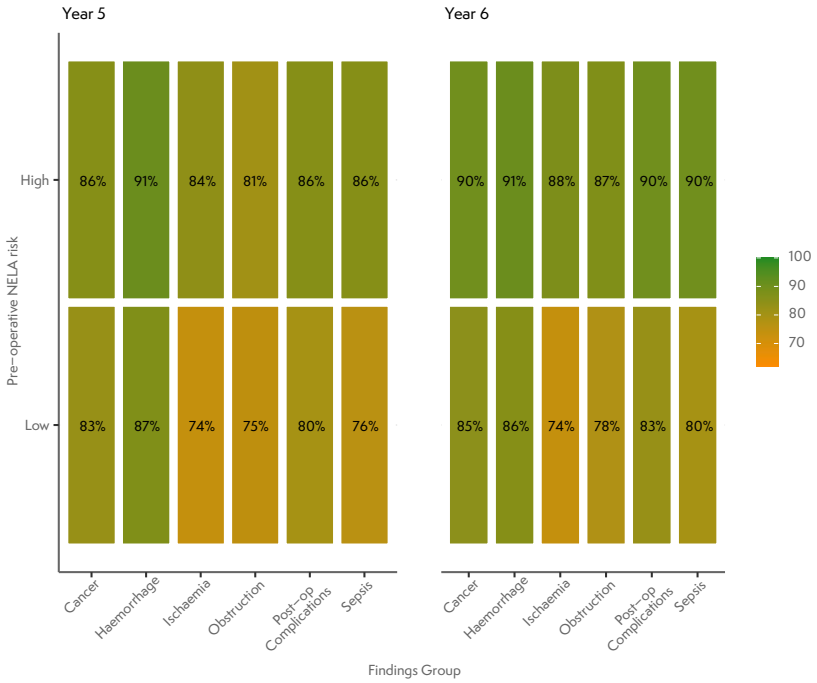


Figure 5.5.3 Proportion of patients who had a consultant surgeon and anaesthetist present by intraoperative findings and NELA calculated risk score



6 Postoperative care

6.1 Postoperative admission to critical care

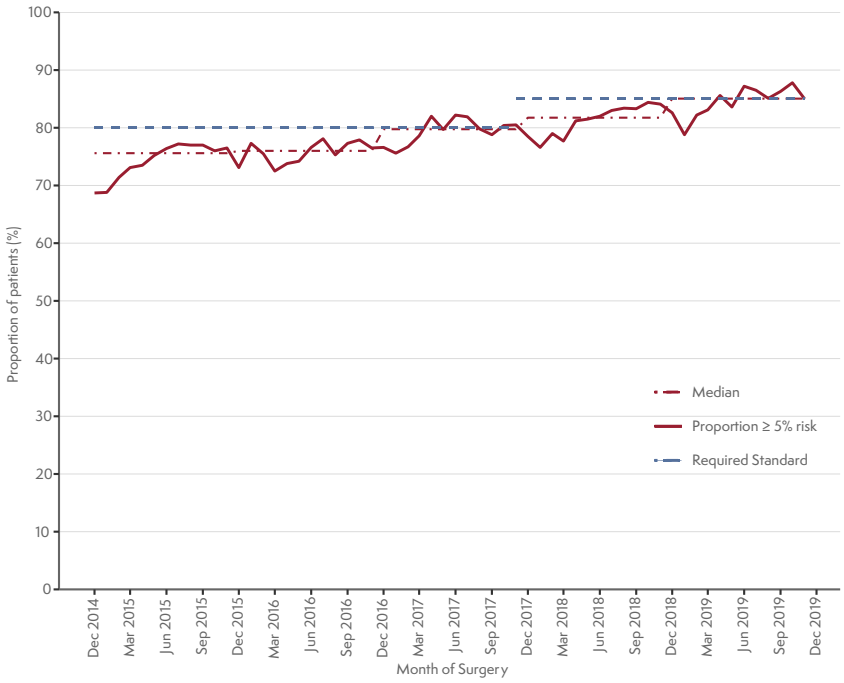
Critical care provides patients with advanced treatments and organ support not available on general surgical wards, alongside a higher staff to patient ratio. Patients are more likely to die if they are admitted to a general ward, deteriorate and require subsequent admission to critical care, than if they are admitted directly to critical care.[8,1] NELA is currently undertaking additional analysis with linked Intensive Care National Audit and Research Centre (ICNARC) data to better understand the types of treatment that patients require when admitted to critical care. This may allow us to issue guidance on the role for enhanced level care units (level 1.5 care).

Key process measure

The proportion of patients who were admitted directly to critical care when risk of death ≥5%.

- Key findings – 85% of patients were admitted directly to critical care when risk of death ≥5%.

Figure 6.1.1 Trends in the proportion of patients with a risk of death ≥5% admitted directly to critical care after surgery



Where were patients admitted to after their surgery?

- 63% of all patients undergoing emergency laparotomy were admitted directly to critical care unit (CCU).
- 34% of the 15,630 patients admitted to critical care had a risk <5%
- 5.5% were admitted to another 'enhanced care area.'
- 31% were admitted onto the general surgical ward.
- Patients were more likely to be admitted to a critical care unit directly if older, frail, high ASA, or documented as high-risk preoperatively.
- 79% of patients assessed to be frail were admitted to critical care.
- 51.7% of patients who did not have their risk documented went to critical care.
- 72% of patients aged ≥ 65 years were admitted directly to critical care compared with 51% of patients <65 years old.

63%
admitted to critical care

34%
had a risk of <5%

5.5%
admitted to enhanced care

31%
admitted to general surgical ward

79%
of frail patients admitted to critical care

51.7%
of undocumented risk patients went to critical care

72% / **≥65** Vs **51%** / **<65**
admitted directly to critical care

(see supplementary data tables 6.1.1 to 6.1.6)

All high-risk patients who are not admitted to critical care are listed on a NELA BPT (England only) report.

Improvement opportunity: Admission to critical care after emergency laparotomy is covered in the RCoA Quality Improvement compendium, in recipe 4.11: Admission to high dependency and intensive care after emergency surgery.

7 Care of the older patient

7.1 Frailty,*** age and patients having emergency laparotomy

13,919 (56%)
of patients were aged over 65

6,689 (27%)
of patients were aged 65 and frail (CFS ≥ 4)

4,695 (19%)
of patients were aged over 80

Key process measure

The proportion of patients aged 80 and over OR aged 65 or over and frail (CFS ≥ 4) who were assessed by a geriatrician.

- Key finding: 30% of patients aged 80 were assessed by a geriatrician.
- 28.8% aged 65 or over and frail (CFS ≥ 4) who were assessed by a geriatrician.

Key Process measure

The proportion of patients aged over 65 who had frailty assessed

- Key finding: 87% patients over 65 had frailty assessed (NB this can not be compared with previous years data as the question was changed).
- Length of stay aged over 80 was 14 days.
- Length of stay aged over 65 and frail (CFS ≥ 4) was 15 days.
- 30 day mortality aged over 80 was 16%.
- 30 day mortality over 65 and frail (CFS ≥ 4) was 18%.

Older patients may suffer from multi-morbidity and may be frail. Frailty is defined as being a syndrome of physiological decline in older people which makes them particularly vulnerable to adverse outcomes and deterioration in physical health after major stressors (such as emergency laparotomy). Frailty is a known risk factor for postoperative morbidity and mortality, and is independent of age. It is important to note however that while frailty incidence increases with age, it is not an inevitable part of the ageing process and can also occur in younger cohorts.[9] NELA has previously reported on the risk of increased adverse outcomes and complications after surgery for older patients. The use of comprehensive geriatric assessment methodology facilitates targeted patient-centred interventions that has shown to result in improved patient outcomes.[10] *The High-Risk General Surgical Patient*[4] states that all patients over the age of 65 should have frailty assessed, and if found to be frail the patient should be considered to be high-risk. The findings of the ELF study demonstrate that those patients with a CFS ≥ 4 are vulnerable to complications and adverse outcomes and they should be reviewed by geriatricians.

***Frailty scoring is defined according to the Clinical Frailty Scale (CFS). CFS considers patients with CFS =4 as 'vulnerable' and CFS ≥5 as frail. NELA classified patients with a score between 1 and 3 as not frail and frail where the CFS ≥ 4.

ALERT! There has been minimal improvement in the proportion of older patients benefiting from geriatric specialist input (22.5% in year 5 compared to 25% year 6)

(see supplementary data tables 7.1.3 and 7.1.4)

Figure 7.1.1 Comparison of 30-day mortality in two groups of patients over time; patients over the age of 65 years and patients under the age of 65 years

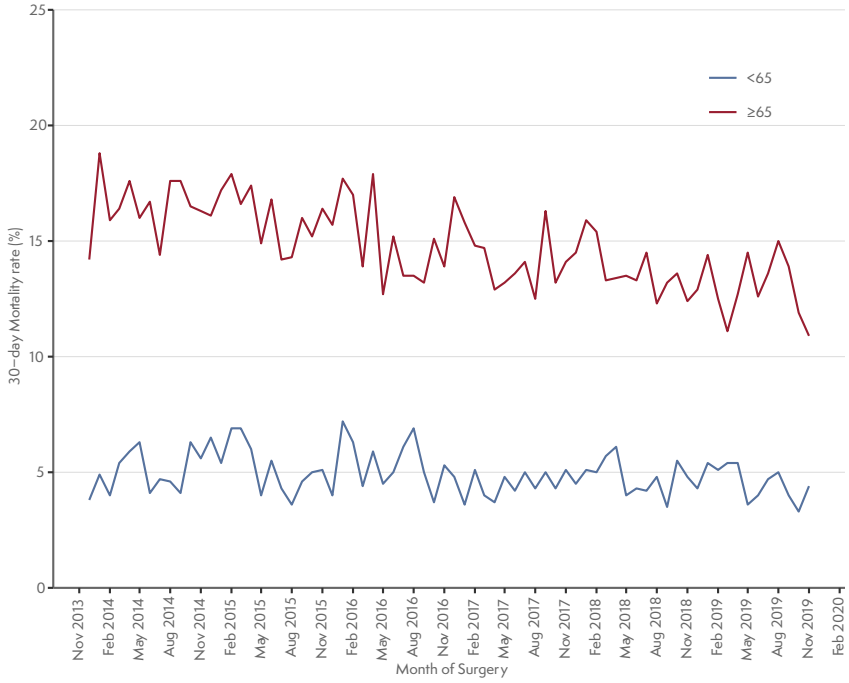
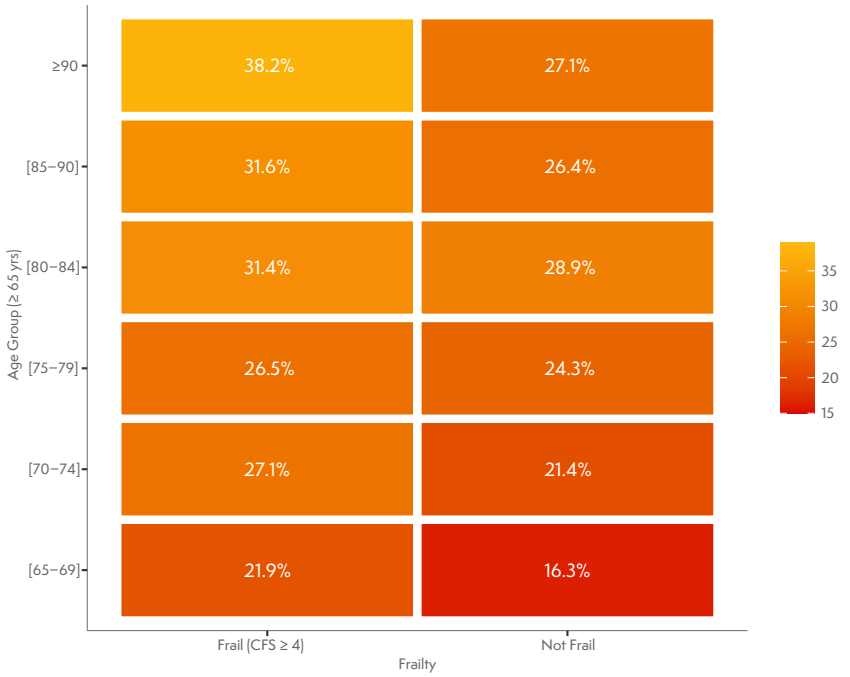


Table 7.1.1 Proportion of patients by age assessed by a geriatrician

Age (years)	Total number of patients in age group (n)	Proportion of patients assessed by a geriatrician
65–69	2,701	17.5%
70–74	3,417	22.7%
75–79	3,106	24.7%
80–84	2,691	29.4%
85–90	1,479	30.2%
≥ 90	525	35.2%
Overall	13,919	24.7%

Figure 7.1.2 Proportion of patients aged over 65 who were assessed by a geriatrician according to frailty score



Outcomes of the frail patient after emergency laparotomy surgery

Figure 7.1.3 30-day and 90-day ONS mortality, by age and frailty assessment

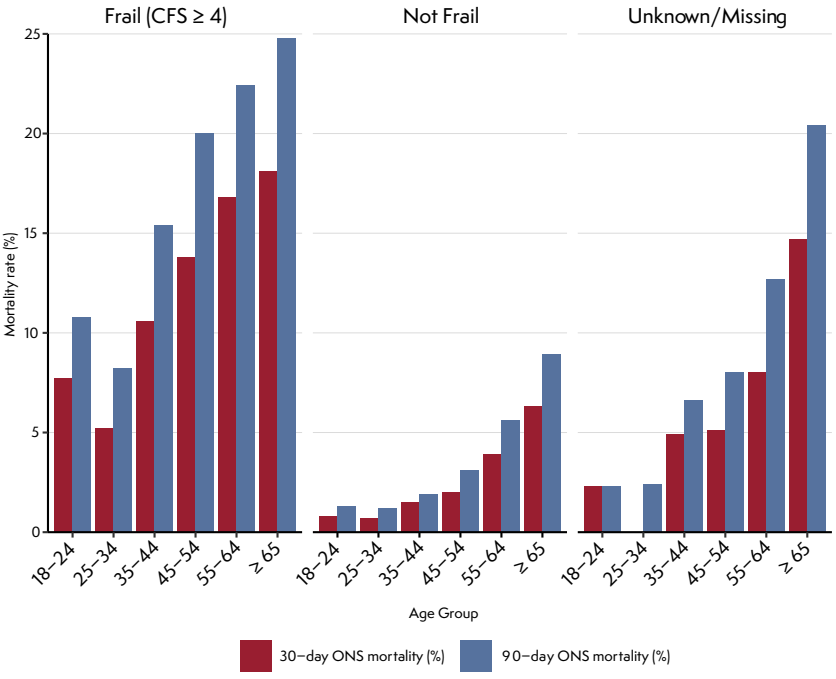
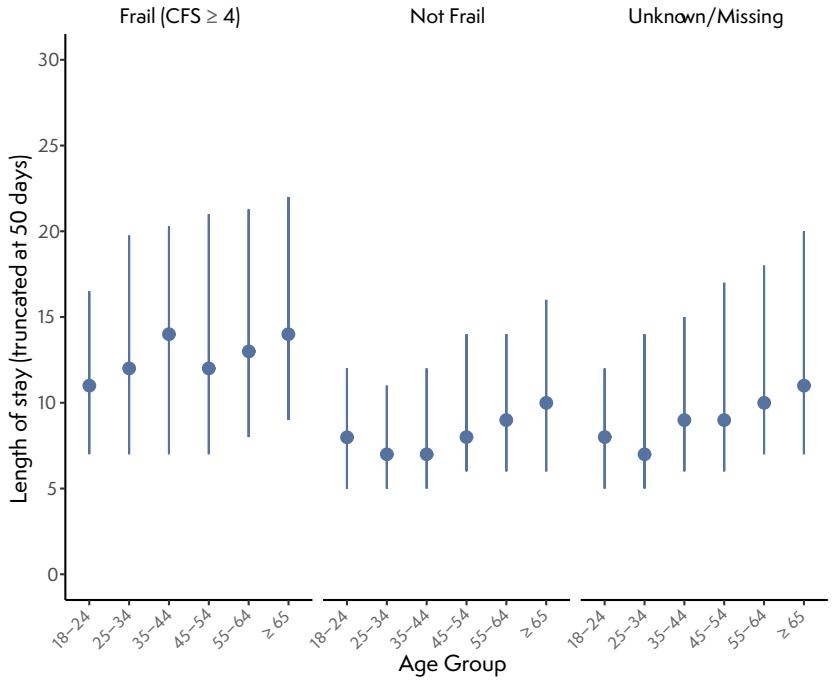


Figure 7.1.4 Postoperative length of stay in patients surviving to hospital discharge, by patient age and frailty assessment



NOTE: Median time (in days) and interquartile range (IQR)

ALERT! Frailty was associated with increased mortality, and a longer length of stay, regardless of patients age. The data shows that any patient who is frail should be regarded as high-risk, regardless of age or formal risk calculation.

Frailty and risk assessment

Of the patients who had their frailty assessed, the majority (68.8%) were also documented as being in the high-risk group. However, 20% of frail patients were documented pre-operatively as being low-risk, however published data would suggest this to be unlikely because increasing frailty scores are independently associated with a higher mortality.[9] The NELA risk score only accounts for physiological and biochemical markers and population level data. It does not account for individual risk factors or co-morbidity.

A combination of being high-risk AND frail results in a twofold increase above the average mortality for patients undergoing emergency laparotomy.

Improvement opportunity: Care of frail and older patients is covered in the RCoA Quality Improvement compendium, in recipe 4.4: Emergency anaesthesia in the older patient, recipe 1.8 Managing frailty in the perioperative period, 1.11 Perioperative neurocognitive disorders.

7.2 Patients with learning disabilities (LD) or autism spectrum disorder (ASD)[†††]

Patients with learning disabilities or autism, who present for major emergency surgery are a vulnerable group,[11] and almost all will have one or more long term health condition.[12] This group of patients when presenting for emergency laparotomy surgery need to be recognised and appropriate care and support provided throughout their hospital admission; including liaison with hospital learning disability specialist nurses and an understanding of the Mental Capacity Act.

[†††]NELA acknowledges that people with LD and ASD are distinct groups of individuals with multiple individual diagnoses. However, NELA data is not granular enough to be able to analyse in more detail at present.

307 patients having emergency laparotomy surgery were identified as having either learning disabilities, or autism. (502 cases were marked as unknown).

There was no difference in the preoperative documentation of risk, timeliness in access to theatre or in consultant presence in theatres for these patients. 87% (regardless of risk category) having consultant delivered intraoperative care, and 90% of high-risk.

(see supplementary data tables 7.2.4 and 7.2.6)

Patients with learning disabilities were more likely to be admitted to critical care postoperatively.

- 68% of all patients with LD/ASD were admitted to critical care (compared to 62.9% admission rate overall for all patients).
- Length of stay was longer for patients in this group with a mean duration of admission of 20 days (compared to 15 days).
- 30-day mortality was 11.7%.

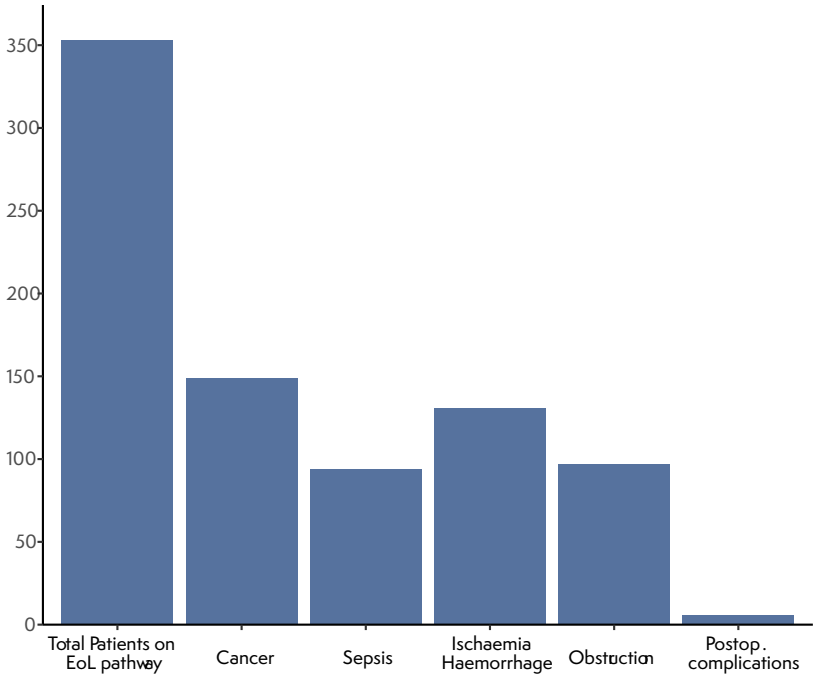
(see supplementary data tables 7.2.7; 7.2.8 and 7.2.9)

7.3 Intraoperative deaths and end of life care pathways

- 46 patients (0.19%) died in theatre, nearly half of whom had sepsis and 80% of whom were aged over 65 years old.
- Of those patients who died in theatre, 93.5% had both a consultant anaesthetist and surgeon present.
- Patients undergoing emergency laparotomy out of hours are no more likely to die in the operating theatre.
- 353 patients were placed on an end of life pathway after their surgery, which was more likely in older patients. Patients with cancer or ischaemia found at laparotomy were more likely to be placed on an end of life pathway.

(see supplementary data tables 7.3.2 to 7.3.7)

Figure 7.3.1 Number of patients placed on End of Life Pathway (EoL) by findings



8 Outcomes

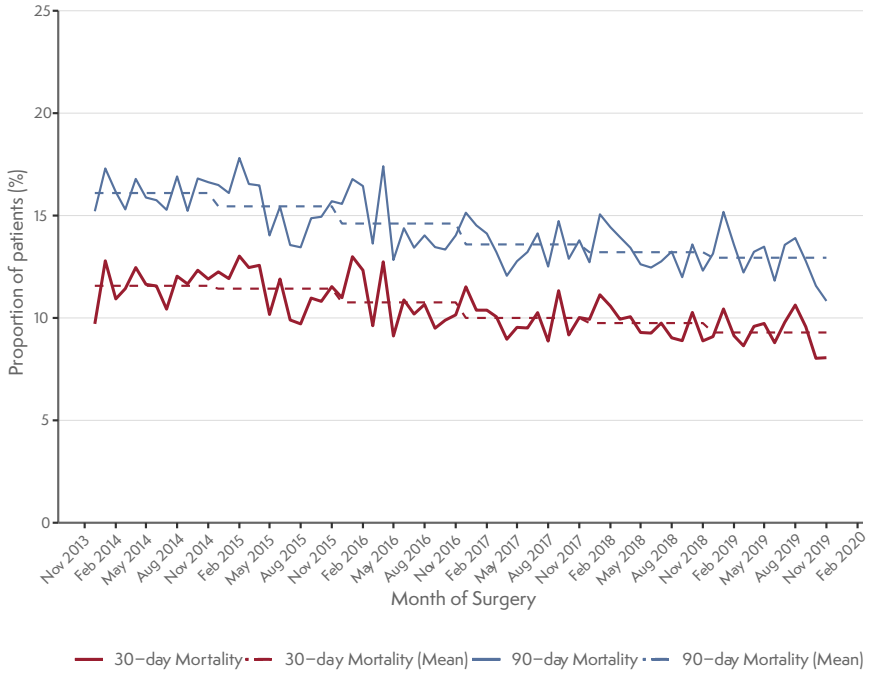
As the world's largest database of prospectively identified patients undergoing emergency laparotomy we are able to reliably report upon risk adjusted death within 30 days, length of stay, and longer term outcomes. Understanding these outcomes, for example, the frequency of prolonged durations of hospital stay after emergency laparotomy, is important not only from a health economics perspective but as an indicator of care quality.

This knowledge, including the likelihood of needing to return to theatre for further surgery helps patients and their clinical teams to have informed discussions about the risks and benefits of surgery.

8.1 Risk adjusted mortality

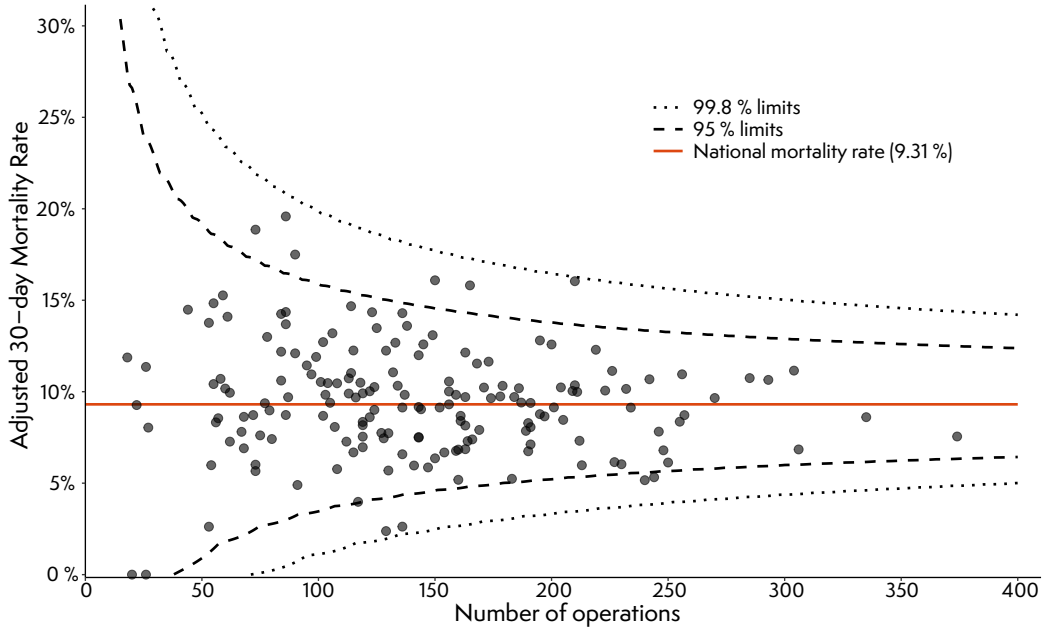
Previously published figures demonstrate that all cause 30-day mortality[‡‡‡] after surgery fell for the first four years of reporting, but did not improve in year 5. However, in year 6 30-day mortality has fallen to 9.3%, and 90-day mortality to 13%.

Figure 8.1.1 Trend in the overall unadjusted 30-day and 90-day ONS mortality rates by NELA dataset year



[‡‡‡]NELA receives quarterly updates to ONS mortality data which has a small impact on previously published figures. An analysis is underway to assess how this impacts on previously published mortality data.

Figure 8.1.2 Funnel plot of risk-adjusted ONS 30-day mortality rates



Notes: This plot shows data from 174 hospitals. Two hospitals with fewer than ten operations in Year 6 were excluded.

Hospital level mortality

Following adjustment for casemix differences, of the 176 hospitals contributing data to this year's report, six hospitals triggered alert status (between 95% and 99.8% upper control limits). Five of these triggered alert status for this year only, and one was flagged as a double-alert level outlier based on exceeding the 95% control limit for two out of three consecutive reporting cycles. All these hospitals have been notified in advance of publication of this report and in accordance with NELA's outlier policy. Individual hospital outcomes are shown via the NELA website here.

Double alert outlier

- Luton & Dunstable Hospital (Alert status in Year 5 and Year 6 report).

Single alert outliers

- Birmingham Heartlands Hospital
- George Eliot Hospital
- Hereford County Hospital
- Peterborough City Hospital
- Royal Albert Edward Infirmary.

Hospitals with the best outcomes

Four hospitals (shown in the table below) had a risk-adjusted mortality below the lower 95% control limit, meaning that these hospitals have some of the best outcomes in England and Wales. The hope is that collaborative learning events will provide opportunities for hospital teams to learn from one another and share how improved outcomes for patients can be sustained.

Hospital	Caseload	Risk adjusted 30-day mortality
Addenbrookes Hospital	244	5.32
Gloucestershire Royal Hospital	240	5.16
Salford Royal Hospital	136	2.62
Stepping Hill Hospital	129	2.38

Table 8.1.1 Mortality rate by operative finding

Operative findings	Total patients	ONS 30-day mortality	ONS 90-day mortality
Adhesions	7,211	7	9.8
Perforation Small Bowel Colonic	5,021	13.8	17.4
Intestinal Ischaemia	3,006	20.1	24.2
Abscess	2,618	7.6	10.8
Colorectal Cancer	2,246	9.5	15.3
Malignancy Localised	2,058	6.9	12.2
Incarcerated Hernia	1,857	8.6	11.3
Diverticulitis	1,527	8	10.3
Perforation Peptic Ulcer	1,516	10	13.4
Internal Hernia	1,469	7.3	9.8
Malignancy Disseminated	1,409	15.7	34.1
Stricture	1,223	5.8	8.3
Volvulus	1,101	7.5	10.3
Crohns Disease	746	2	2.9
AnastomoticLeak	602	7	8.5
Intestinal Fistula	425	7.3	12.2
Ulcerative Colitis	418	4.5	5.5
Normal Findings	351	13.7	15.7
Stoma Complications	290	6.2	9
Colitis	279	11.8	13.3
Gallstone Ileus	278	5.4	9
Haemorrhage Post-Op	246	10.2	11.8
Meckels Diverticulum	233	1.7	2.1
Haemorrhage Intestinal	224	18.3	20.1
Intussusception	217	3.2	5.5
Foreign Body	204	3.4	5.4
PseudoObstruction	203	11.8	16.3
Haemorrhage Peptic Ulcer	144	25	30.6
Wound Dehiscence	96	2.1	3.1
Gastric Cancer	68	5.9	20.6
Necrotising Fasciitis	39	15.4	28.2
AbdoCompartment Synd	39	25.6	30.8

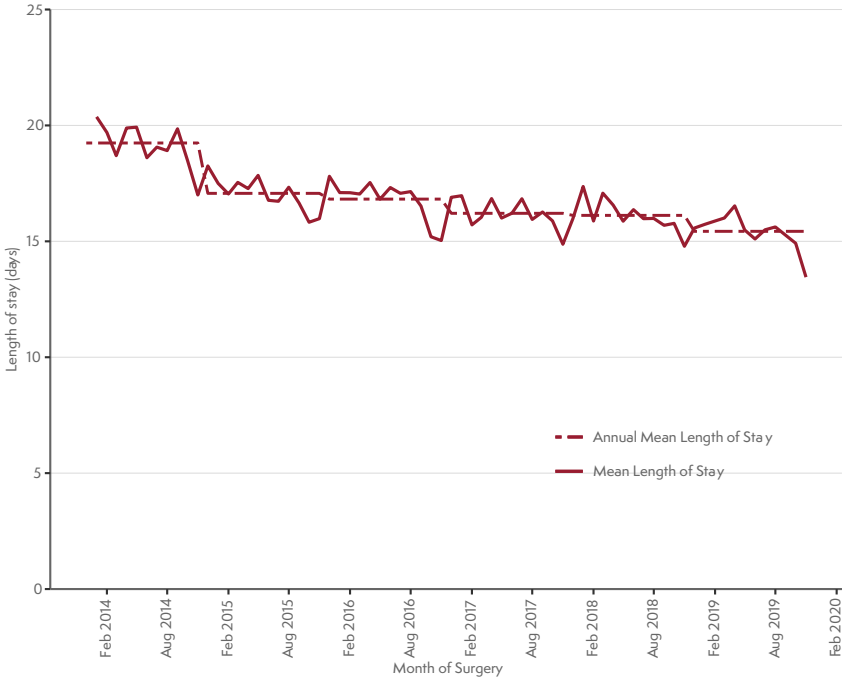
Improvement opportunity: Guidance to help teams review perioperative mortality is available in the RCoA Quality Improvement Compendium, as recipe 4.12: Structured morbidity and mortality reviews and recipe 11.5 Sharing, improving and learning from critical incidents.

8.2 Length of stay (LOS)

Prolonged hospital stays are a significant burden for both patients and their families. A shorter length of stay may not only indicate good care processes and an uncomplicated recovery, but is also more desirable for patients who wish to return to their own home. National work streams highlight the detrimental impact of a long length of stay on patients and their families.

Mean length of stay in 2019 was 15.4. This has fallen from 19.2 since NELA's inception in 2013. This represents a cost saving to acute Trusts of £38.4 million.§§§

Figure 8.2.1 Trend in the mean length of stay over time in patients surviving to hospital discharge



Length of stay¶¶¶ increases with:

Increasing age: <40 years LOS = **8 days** (IQR 5–13), ≥90 median LOS = **15 days** (9–23)

Higher risk profiles: high preoperative documented risk LOS = **15 days** (9–25), low-risk = **8 days** (6–13).

More co-morbidities: ASA 1 = **7 days**, ASA 4 = **18 days**.

An unplanned return to theatre which more than doubles the median LOS **from 10 up to 27 days**.

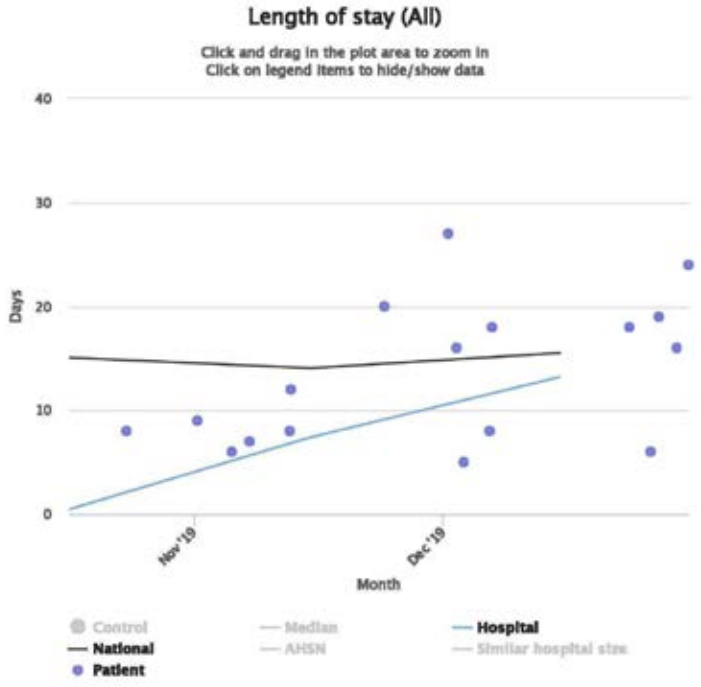
An unplanned admission to critical care which is associated with a significantly prolonged LOS with around an extra **14 days** in hospital (unplanned admission median LOS = **24 days** (15–38) *v* no unplanned admission LOS = **10 days** (6–18).

(see supplementary data tables 8.2.1 to 8.2.8)

§§§Based on 30,000 emergency laparotomy cases per year which represents a saving of 114,000 bed-days. The cost saving was estimated based on the excess non-elective bed day cost for 2017/18 of £337[13] per day.

¶¶¶We only report on patients who survive to discharge in this section and all are median LOS reported alongside the interquartile range. LOS calculations for survivors do not include patients who were still in hospital at 60 days as their outcome is not yet known.

Improvement opportunity



The NELA length of stay QI dashboard indicates monthly average figures, as well as individual patient's length of stay.

Local leads can easily find cases with a long length of stay, allowing for case based discussions looking for opportunities to reduce length of stay.

8.3 Unplanned returns to theatre

2,149 patients (8.7%)
needed to return to theatre for further operative intervention

783 patients (3.2%)
are as a planned return, usually following initial 'damage control' surgery

1,246 patients (5%)
had an unplanned return to theatre

(see supplementary data tables 8.3.2 and 8.3.3)

It is important to try and identify which patients are at risk of an unplanned return to theatre and to have appropriate pathways in place to ensure these patients are managed promptly with appropriate consultant level input.

- Unplanned return to theatre is:
  - more likely if the patient is predicted high-risk (≥ 5%) (6.4% v 3.6%)
  - 1.7 times more likely if the patient required immediate (most urgent) surgery.
- Patients requiring an unplanned return to theatre are just as likely to have a consultant surgeon present and anaesthetist present at their initial laparotomy as those who do not require a return to theatre.
- Outcomes are worse for patients who have an unplanned return to theatre:
  - average length of stay increases from 10 days to 27 days
  - ONS 30 day mortality is 16.2%.

(see supplementary data tables 8.3.4 to 8.3.10)

8.4 Unplanned admission to critical care

Unplanned admission to critical care is associated with significantly higher 30 day mortality and a longer length of stay. Importantly, three-quarters of this group of patients were admitted to critical care directly after their emergency laparotomy, and, once discharged, subsequently required re-admission to critical care.

730 (2.9%) patients had an unplanned admission to critical care

The rate of unplanned admission **varied between 0% and 14.7%** between hospitals

Unplanned admission to critical care resulted in a **longer median duration of stay of 24 days** (IQR 15–38) compared with 10 days if there was no unplanned admission

Mortality was 20.8% if an unplanned admission to critical care occurred

The **preoperative predicted mortality** of the patients who went to the ward postoperatively and then were **admitted to critical care was 4.1%**

Table 8.4.1 Original postoperative discharge destination of patients after emergency laparotomy who required a subsequent unplanned admission to critical care

Postoperative destination following original laparotomy for patients with an unplanned admission to critical care	Total number of patients [n (%)]
Critical care	558 (76.4%)
Enhanced care area	30 (4.1%)
Ward	142 (19.5%)

Table 8.4.2 Number of patients who had an unplanned admission to critical care and 30 day mortality (excluding patients who died in theatre or where there was a decision for palliative care)

	Number of cases (% of total)	ONS 30-day mortality
No unplanned admission to critical care	23,939 (96.6%)	8.8%
Unplanned admission to critical care	730 (2.9%)	20.8%
Unknown	108 (0.4%)	11.1%
Missing	15 (0.1%)	

ALERT! NELA data cannot define the reasons behind why unplanned re-admissions to critical care may occur, however patients who suffer a 'failed discharge' from critical care after emergency laparotomy have a significantly higher mortality overall.

Using NELA; impact beyond quality improvement and audit

NELA is more than 'just an audit'. As the world's largest data set, holding information on over 140,000 patients who have emergency laparotomy surgery, it is a powerful and important resource that can be used to support improvement work, assurance work and research that enhances the care of patients undergoing emergency laparotomy.

NELA was one of the national audit projects recommended to continue collecting data during the COVID-19 global pandemic. Teams across the UK have continued to enter data into the NELA dataset therefore capturing the impact of COVID-19 on patients needing emergency laparotomy throughout this period.

Nine peer reviewed publications based upon detailed analysis of NELA data

There are 13 ongoing research projects using the NELA dataset

NELA data has been presented at over 59 conferences and meetings across the world

NELA is cited in over 48 papers

References

1 Pearse RM *et al*. Mortality after surgery in Europe: a 7-day cohort study. *Lancet* 2012;**380**:1059–1065.

2 Third Patient Report of the National Emergency Laparotomy Audit. NELA Project Team. *RCoA*, 2017.

3 Howlett DC et al. The Accuracy of interpretation of emergency abdominal CT in adult patients who present with non-traumatic abdominal pain: results of a UK national audit. *Clin Radiol* 2017;**72(1)**:41–51.

4 The High-Risk General Surgical Patient: Raising the Standard. *RCS Engl*, 2018.

5 Fourth Patient Report of the National Emergency Laparotomy Audit. NELA Project Team. *RCoA*, 2018.

6 The benefits of consultant delivered care. *AoMRC*, 2012.

7 Sepsis: recognition, diagnosis and early management (NG51). *NICE*, 2016 (updated 2017).

8 Vester-Andersen M et Al. The Danish Anaesthesia Database. Mortality and postoperative care pathways after emergency gastrointestinal surgery in 2,904 patients: a population-based cohort study. *Br J Anaesth* 2014;**112(5)**:860–870.

9 Parmar K et al. Frailty in older patients undergoing emergency laparotomy, results from the UK observational emergency laparotomy and frailty (ELF) Study. *Age and Ageing* 2019;**48(2)**:ii28–ii29.

10 Eamer G et al. Comprehensive geriatric assessment for older people admitted to a surgical service. *Cochrane Database Syst Rev* 2018;1:CD012485. doi: 10.1002/14651858.CD012485.pub2 (published Online First: 2018/02/01).

11 Death by indifference. Following up the Treat me right! report. MENCAP, 2007.

12 Confidential inquiry into the premature deaths of people with learning disabilities. Final Report. CIPOLD, 2013.

13 2017/18 Reference costs and guidance – National schedule of reference costs NHS Improvement 2017 (https://bit.ly/3gHEFqM).

Glossary

AAA
Age Anaesthesia Association

AAGBI
Association of Anaesthetists of Great Britain and Ireland

Abdomen/Abdominal
Anatomical area between chest and pelvis, which contains numerous organs, including the bowel

Adhesiolysis
Surgical procedure to remove intra-abdominal adhesions that often cause bowel obstruction

ALPINE
Adoption of lung protective ventilation in patients undergoing emergency laparotomy

Anastomotic Leak
Leak from a join in the bowel

APP
Association for Perioperative Practice

ARCP
Annual Review of Competence Progression the annual assessment of doctors in training

ASA
American Society of Anesthesiologists Physical Status score (ASA-PS)

ASGBI
Association of Surgeons of Great Britain and Ireland

Average
A number to describe a series of observations. Depending on the pattern of these observations, the median/or mean will better describe the series

BGS
British Geriatric Society

Bowel
Part of the continuous tube starting at the mouth and finishing at the anus. It includes the stomach, small intestine, large intestine and rectum

CEU
Clinical Effectiveness Unit of the Royal College of Surgeons of England

Colitis
Inflammation of the colon

Colon
Part of the large intestine

Colorectal Resection
Surgical procedure to remove part of the bowel

Colostomy
Surgical procedure to divert one end of the large intestine (colon) through an opening in the abdominal wall (tummy). A colostomy bag is used to collect bowel contents

CRG
Clinical Reference Group. Consists of representatives from partner organisations, stakeholders and patients, acting in an advisory capacity to the NELA Project Team

CT
Computed tomography – a very advanced form of X-ray used in diagnosis and treatment

DARG
Data access request group

EGS
Emergency General Surgery. Often refers to the group of patients admitted to hospital with conditions that require the expertise of general surgeons. 10% require emergency bowel surgery

Elective
In this Report, refers to both to mode of hospital admission and to urgency of surgery. The timing of elective care can usually be planned to suit both patient and hospital (can be weeks to months). In contrast, urgent/emergency care usually has to take place within very short timescales (hours)

ELN
Emergency Laparotomy Network

ELPQuIC
Emergency Laparotomy Pathway Quality Improvement Care Bundle

Emergency laparotomy
Bowel surgery that, due to underlying conditions, must be carried out without undue delay

EPOCH
Enhanced perioperative care for high risk patients

FICM
Faculty of Intensive Care Medicine.

FLOELA
Fluid Optimsaion in Emergency Laparotomy Trial

GCS/Glasgow Coma Scale
An assessment tool that is used to objectively measure a patient's conscious state

GI
Gastrointestinal

GIRFT
Getting it Right First Time programme

Hartmann's Procedure
Surgical procedure to remove part of the large bowel resulting in the formation of an end colostomy, and leaving part of the rectum in-situ

HES
Hospital Episode Statistics

HQIP
Healthcare Quality Improvement Partnership

HSRC
Health Services Research Centre

ICS
Intensive Care Society

Ileostomy
Surgical procedure to divert one end (or two ends in a loop colostomy) of the small intestine (small bowel) through an opening in the abdomen (tummy). An ileostomy bag is used to collect bowel contents

Intestine
Part of the bowel

Intra-abdominal
Inside the abdomen/tummy

Intraoperative
During surgery

IQR
Interquartile range – the middle 50% of observations either side of the median

IR
Interventional Radiology

Ischaemia
Loss of, or insufficient blood supply to an affected area or organ

Laparoscopic
Keyhole surgery

Mean
Mathematical average

Median
Midpoint of all observations when ranked in order from smallest to largest (see average)

NCAAG
National Clinical Audit Advisory Group

NCEPOD
National Confidential Enquiry into Patient Outcome and Deaths

NELA
National Emergency Laparotomy Audit

NIAA
National Institute of Academic Anaesthesia

NIGB
National Information Governance Board

NQB
National Quality Board

OJEU
Official Journal of the European Union

Non-operative
Treatment options that do not require surgery

Obstruction
Blockage of the bowel. It can be caused by a variety of conditions and can cause the bowel to burst (perforate). It has the potential to make people very unwell and can be life threatening

ONS
Office for National Statistics

PEDW
Patient Episode Database of Wales

Perforation
One or more holes in the wall of the bowel. It can be caused by a variety of conditions. It has the potential to make people very unwell very quickly and can be life threatening

Perioperative
Around the time of surgery (incorporating preoperative, intraoperative and postoperative)

Peritonitis
Infection or inflammation within the abdomen, causing severe pain. It has the potential to make people very unwell very quickly and can be life threatening

Postoperative
After surgery

P-POSSUM
A tool that has been validated for estimating an individual patient's risk of death within 30 days of emergency general surgery[4]

Preoperative
Before surgery

Radiological imaging
Diagnostic techniques including X-ray and CT

RCN
Royal College of Nursing

RCoA
Royal College of Anaesthetists

RCR
Royal College of Radiologists

RCS
Royal College of Surgeons of England

Rectum
The final section of the large intestine

Sepsis
Widespread, severe inflammation in the body resulting from infection

Section 8
The final data entry section on the NELA webtool which can be adapted by local teams to collect relevant data of their specific design

SIRS
Systemic Inflammatory Response Syndrome

Small Bowel Resection
Surgical procedure to remove part of the small bowel (small intestine)

Stoma
Surgical opening in the abdominal wall for the bowel to terminate. See also colostomy and ileostomy

STP
Sustainability and Transformation Plan

Subtotal Colectomy
Surgical procedure to remove part of the large bowel except the very lowest part or 'rectum' of the large bowel

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