



# Fifth Patient Report of the National Emergency Laparotomy Audit

December 2017 to November 2018



December 2019



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ISBN: 978-1-900936-19-4

Citation for this Report:

NELA Project Team. Fifth Patient Report of the National Emergency Laparotomy Audit  
RCoA London 2019

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Design and layout by the Royal College of Anaesthetists



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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.



# Report findings at a glance



Results from 2017–2018, the fifth year of the National Emergency Laparotomy Audit

[Principal performance statistics are available here](#)


- National **30-day mortality rate** has remained static for the last two years


**9.6%**  
- Improvements in care have reduced patients' average hospital stay from **19.2 days** in 2013 to **16 days** in 2018

**19.2 days**  
- 77% of patients** now receive a **preoperative assessment of risk** (up from 75% last year, and 56% in Year 1)


 
- 95.5% of high-risk patients** had **consultant surgeon** input before surgery


**90% of high-risk patients** had **consultant anaesthetist** input before surgery



- 77.5%** of high-risk patients admitted to critical care



- 88.5% of patients** received a preoperative CT scan


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


- Both **anaesthetic and surgeon consultant presence** intraoperatively is at 83%, but only **70.2% out of hours**



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


- 84% of patients with sepsis** reached theatres in the appropriate **timeframe**


- Time to antibiotics in patients with sepsis** remains poor with **80.6%** not receiving antibiotics **within one hour**


- 55% of patients** are over the age of 65, but **only 19% of these** had a formal assessment of their frailty

**55%** **over 65**


- 301 people with learning disabilities or autism** had an emergency laparotomy and their 30-day mortality was **10.3%**. They were as likely to receive consultant care and access to critical care

# Acknowledgements

This Report was prepared by members of the National Emergency Laparotomy Audit Project Team on behalf of the Royal College of Anaesthetists. The members of the team 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 five 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 Key messages

## KEY MESSAGE 1

The average mortality rate after emergency laparotomy remains static at 9.6%. Improvements in processes within the gift of the individual clinician have plateaued and it is likely that wider system and organisational change is now required to see further improvement.

## KEY MESSAGE 2

Only 19% of patients with suspected sepsis received antibiotics in the first hour. This has not improved over five years, and is a key area of improvement that must be addressed urgently.

## KEY MESSAGE 3

22.7% of patients did not have their preoperative mortality risk documented. NELA data demonstrates that these patients miss out on the accepted standards of care.

## KEY MESSAGE 4

NELA demonstrates that an assessment of frailty is not routinely performed. Frailty is associated with a greater risk of postoperative mortality and morbidity, which is independent of the risk associated with age. For patients over 65, frailty assessment used alongside clinical risk assessment, plus specialist geriatric input for the older frail patients, is likely to improve their outcomes.

## KEY MESSAGE 5

Patients assessed before their operation as having a  $\geq 5\%$  risk of death should be admitted directly to critical care postoperatively to increase their chance of survival. However, 23% of such patients in NELA were instead admitted to a general ward, and this has remained static over the last three years. Institutional, cultural and organisational change is required to ensure patients consistently receive this standard of care.

# 2 Introduction

This report is the fifth report of [NELA](#) and covers the care received by NHS patients in England and Wales who underwent an emergency laparotomy between 1 December 2017 and 30 November 2018. 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, in addition to 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.<sup>1</sup> Despite this, emergency perioperative care pathways often fall short of the clinical and organisational structures and care processes that benefit most elective patients.<sup>2</sup> Therefore, it is imperative that we continue to collect, present and learn from the data about each patient's care and use it to guide improvement activities, focus research questions and give these patients a voice.

Previous NELA patient reports<sup>3</sup> have reported using three categories of risk of death; low <5%, high ≥5% and highest >10%. In this report we adopt the categories used in the recently published *The High-Risk General Surgical Patient: Raising the Standard* document<sup>4</sup> of low-risk <5% predicted mortality, and high ≥5% mortality.

The RAG tables provide a summary of hospital performance and [are available here](#).<sup>†</sup>

## Total number of patients; England, Wales

Total	England	Wales
24,328	22,511 (92.5%)	1,817 (7.5%)

## Total number of hospitals

**179** hospitals were included in Year 5 of the NELA audit, from December 2017 to November 2018.

More detailed information can be found at [www.nela.org.uk/reports](http://www.nela.org.uk/reports)

<sup>†</sup>Some figures may differ from last year's published RAG tables. This takes into account any updated data subsequently provided by local teams.



# 3 Key findings of the fifth National Emergency Laparotomy Audit

The results from hospitals with a low case ascertainment may not accurately reflect the quality of care they deliver as they may not have provided sufficient information on patient care.

## Key process measure

### Final case ascertainment<sup>†</sup>

- 178 hospitals were included in this metric. Overall case ascertainment was 84%. Overall 104 hospitals were rated green and 22 were rated red.

Data from Hospital episode statistics and 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.

<sup>†</sup>Full comparative details and individualised hospital level reports are provided online.

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 1 NELA Audit

Key standard	Process measure	National figures					Number of Hospitals Green RAG rated	Percentage of Hospitals achieving RAG standards by NELA audit year
		Year 1 (Dec 13–Nov 14) 20,598	Year 2 (Dec 14–Nov 15) 23,599	Year 3 (Dec 15–Nov 16) 25,304	Year 4 (Dec 16–Nov 17) 24,330	Year 5 (Dec 17–Nov 18) 24,328		
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	NA	NA	NA	64.2% n = 21,188	62.4% n = 21,539	NA NA NA 7 2	
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	55.5% n = 20,598	63.7% n = 23,599	70.6% n = 25,304	74.5% n = 24,330	77.3% n = 24,328	23 37 60 55 68	
Trusts should ensure theatre access matches need and ensure prioritisation 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	78.2% n = 9,682	81.6% n = 16,503	82.7% n = 17,934	82.5% n = 17,443	82.4% n = 17,520	94 116 134 77 70	
Proportion of patients with a preoperative risk of death ≥5% who had input from a consultant surgeon and consultant anaesthetist prior to surgery	Proportion of patients with a preoperative risk of death ≥5% who had input from a consultant surgeon and consultant anaesthetist prior to surgery	NA	NA	NA	84.7% n = 15,830	87.1% n = 15,596	NA NA NA 100 124	
	Proportion of patients with a preoperative risk of death ≥5% who had input from a consultant surgeon prior to surgery	NA	NA	NA	95.2% n = 15,830	95.5% n = 15,596	NA NA NA 162 165	
	Proportion of patients with a preoperative risk of death ≥5% who had input from a consultant anaesthetist prior to surgery	NA	NA	NA	87.9% n = 15,830	90.0% n = 15,596	NA NA NA 123 140	
	Proportion of patients with a preoperative risk of death >5% who had input from a consultant intensivist prior to surgery	NA	NA	NA	58.7% n = 15,655	62.0% n = 15,595	NA NA NA 12 20	
Proportion of patients with a preoperative risk of death ≥5% for whom a consultant surgeon and consultant anaesthetist were present in theatre	Proportion of patients with a preoperative risk of death ≥5% for whom a consultant surgeon and consultant anaesthetist were present in theatre	68.1% n = 14,513	72.9% n = 16,297	78.1% n = 16,761	81.7% n = 15,831	83.1% n = 15,597	53 67 95 80 96	

## National figures

Key standard	Process measure	Trend over time					Number of Hospitals Green RAG rated	Percentage of Hospitals achieving RAG standards by NELA audit year
		Year 1 (Dec 13–Nov 14) 20,598	Year 2 (Dec 14–Nov 15) 23,599	Year 3 (Dec 15–Nov 16) 25,304	Year 4 (Dec 16–Nov 17) 24,330	Year 5 (Dec 17–Nov 18) 24,328		
Each high risk case should have the active input of consultant surgeon, anaesthetist	Proportion of patients with a calculated preoperative risk of death $\geq 5\%$ for whom a consultant surgeon was present in theatre	86.0% n = 14,513	88.0% n = 16,297	90.4% n = 16,761	91.7% n = 15,831	92.7% n = 15,597	136 145 156 146 153	
	Proportion of patients with a preoperative risk of death $\geq 5\%$ for whom a consultant anaesthetist was present in theatre	76.4% n = 14,513	80.8% n = 16,297	84.8% n = 16,761	87.5% n = 15,831	88.2% n = 15,597	80 100 130 115 118	
All high risk patients should be admitted to critical care	Proportion of patients with a postoperative risk of death $\geq 5\%$ who were directly admitted to critical care postoperatively	72.5% n = 14,406	74.8% n = 15,648	76.3% n = 16,627	76.6% n = 15,628	77.5% n = 15,399	57 68 80 86 65	
	Proportion of patients with a postoperative risk of death $>10\%$ who were directly admitted to critical care postoperatively	80.9% n = 10,021	83.5% n = 10,483	84.7% n = 11,106	84.7% n = 10,515	85.1% n = 10,460	101 117 127 120 100	
Each patient aged over the age of 70 should have multidisciplinary input that includes early involvement of geriatrician teams	Proportion of patients aged 70 years or over who were assessed by a care of the older person specialist	14.8% n = 6,140	16.5% n = 6,650	19.4% n = 8,526	22.7% n = 8,454	24.3% n = 8,800	2 3 5 7 11	

**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**

Figure 3.1 Proportion of all emergency laparotomy patients in Year 5 who had surgery between December 2017 and November 2018, who received key standards of care

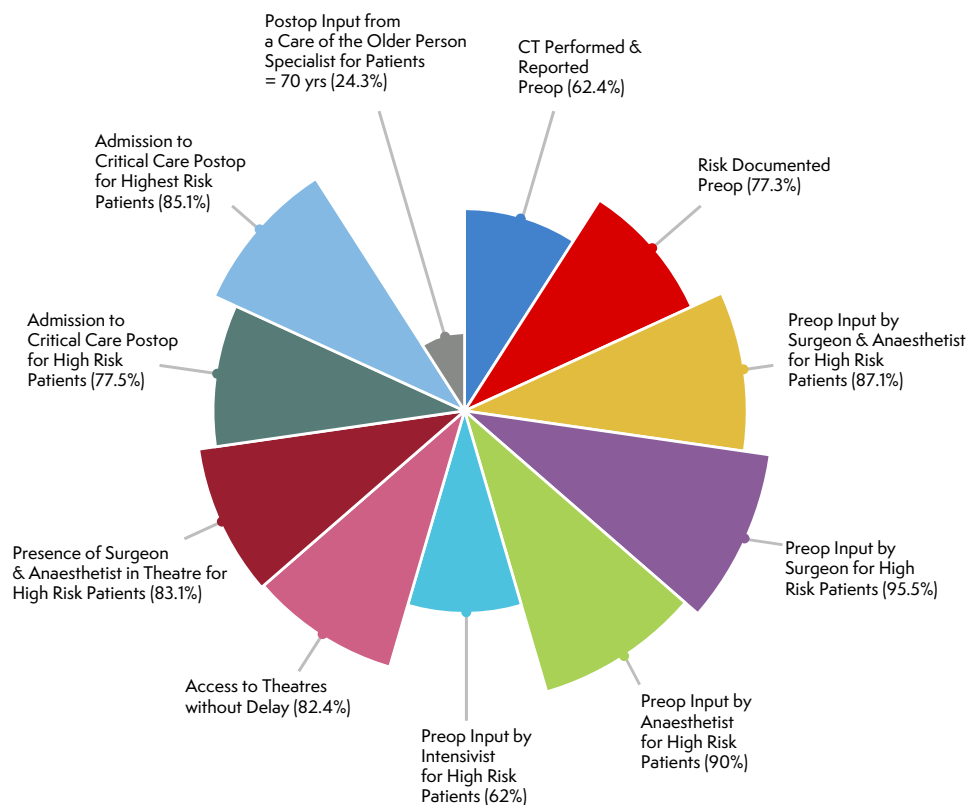
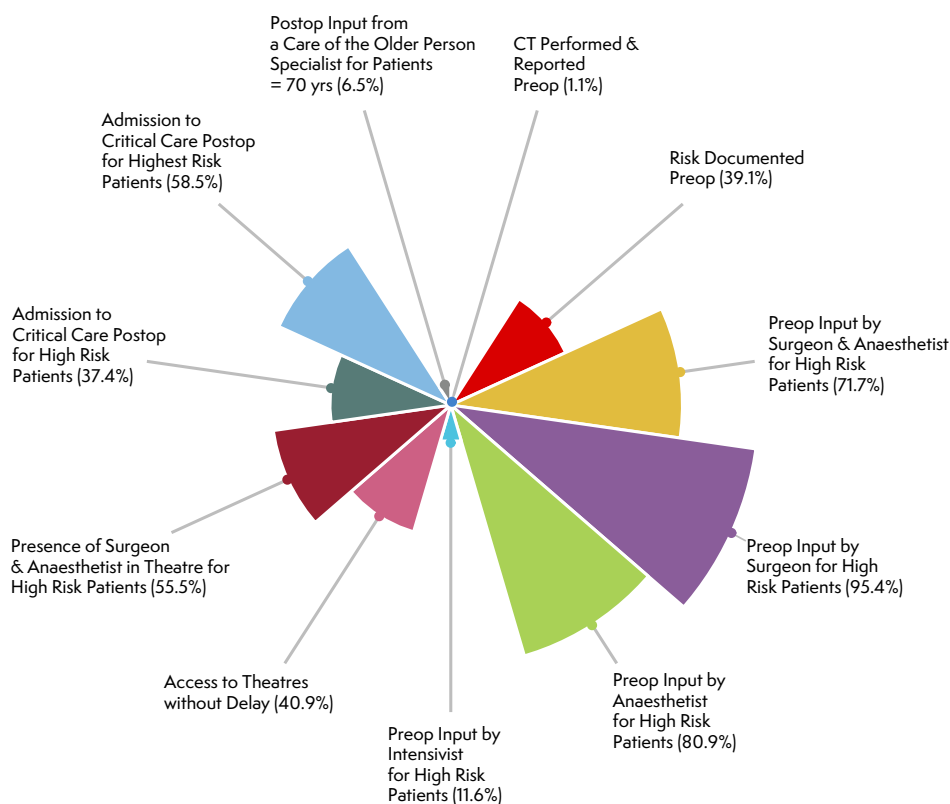


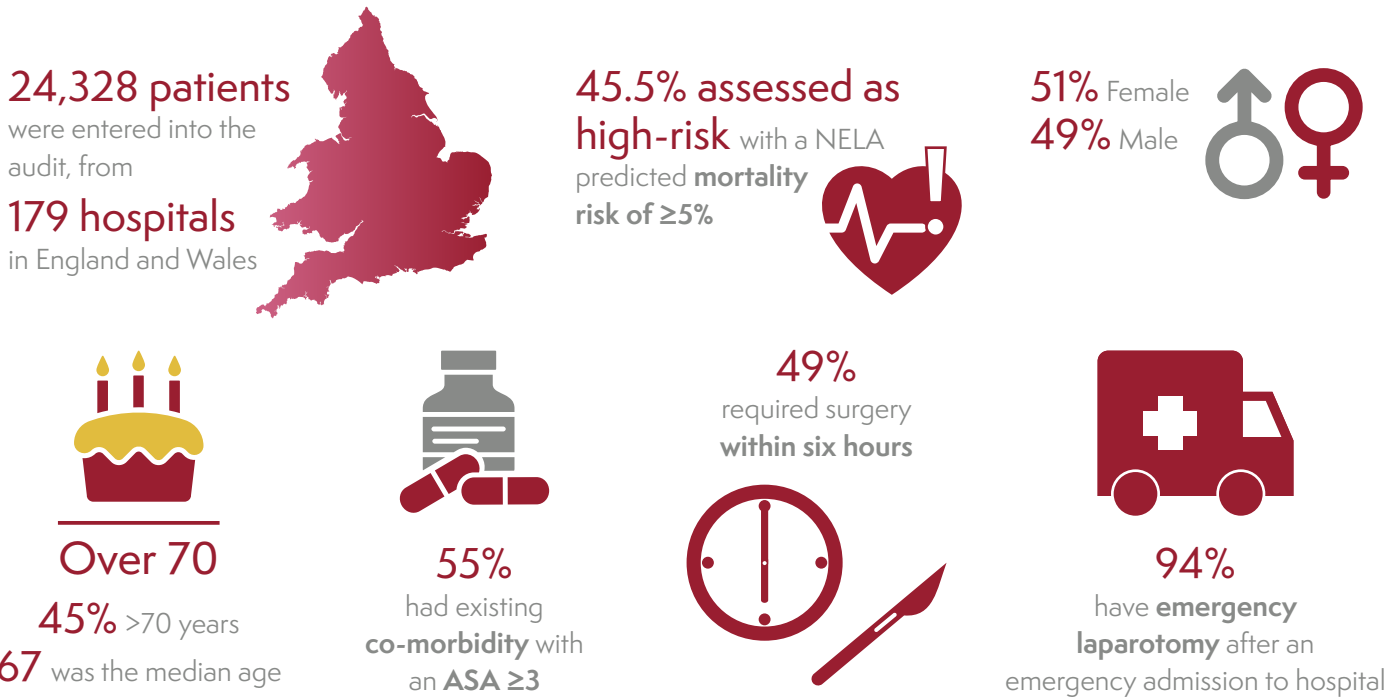
Figure 3.2 Proportion of all hospitals in Year 5, between December 2017 and November 2018, meeting key standards (RAG rated 'green')



### 3.1 Who has emergency laparotomy surgery?

Patients undergoing emergency bowel surgery are a markedly heterogenous group both in demographics and indications for surgery.<sup>5</sup> However, they almost all have the same needs with regard to prompt diagnosis and treatment of any sepsis or underlying disease, assessment of risk, provision of care according to risk, and access to theatre without delay. By analysing patient and surgical characteristics NELA can investigate processes of care and outcomes, and highlight if there is variation for any specific patient group (eg older patients) or for different operations performed. For patients, this means that they can be assured that providers are continually assessing whether their patients are receiving the best possible patient centred care.

**i** Whilst patients needing emergency bowel surgery are heterogenous in their demographics and pathology, they all need the same processes of care to be reliably delivered in order to achieve the best outcomes.



# 4 The emergency laparotomy patient perioperative journey



## 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.



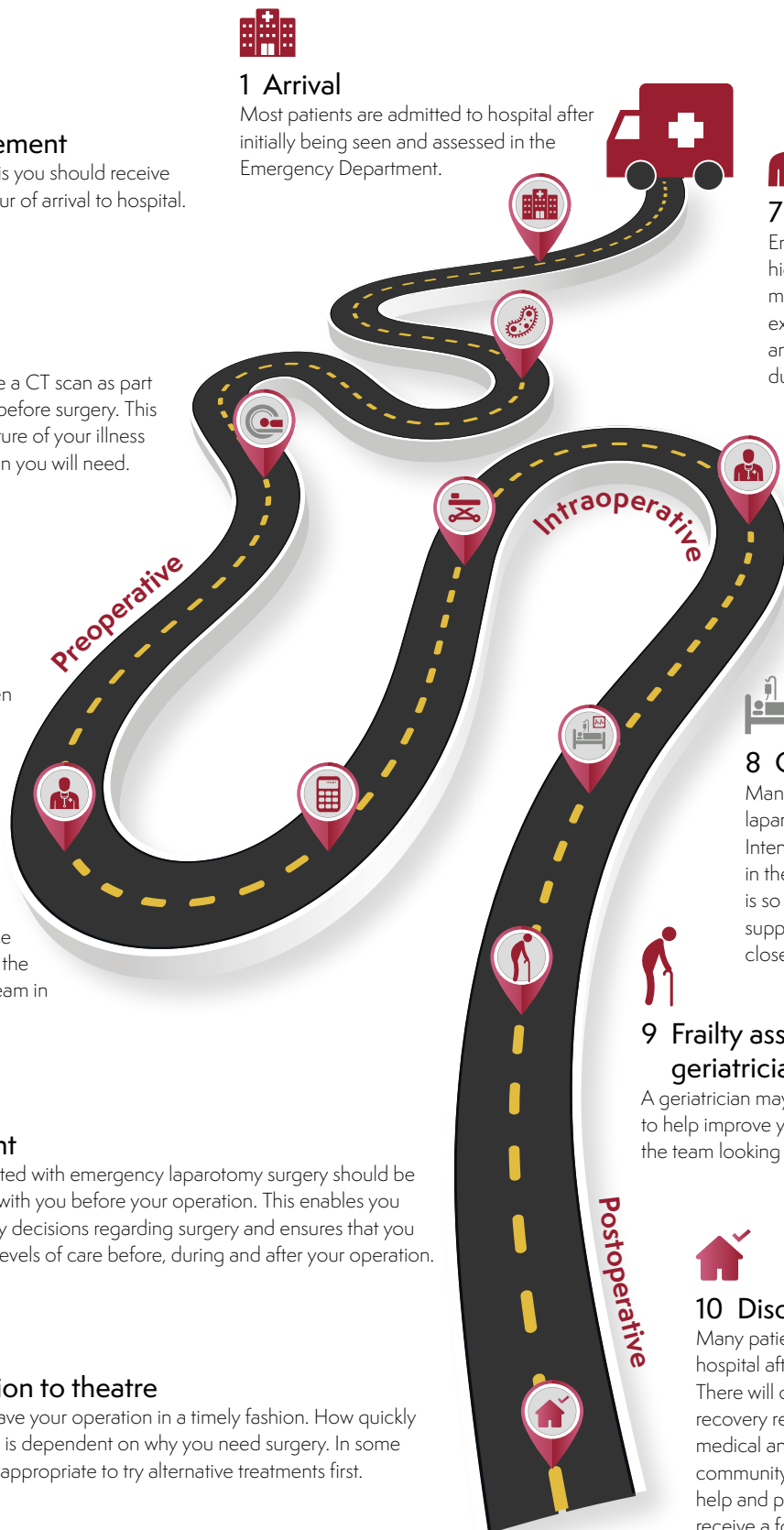
## 1 Arrival

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



## 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 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 to help improve your recovery after surgery as part of the team looking after you.



## 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.

# 5 Preoperative care

## 5.1 How do patients present for emergency laparotomy?

### Route of admission



Almost  $\frac{3}{4}$  of patients undergoing **emergency laparotomy** are admitted via the Emergency Department



1 in 10 are admitted directly to a dedicated **surgical assessment unit (SAU)**

Figure 5.1 Specialty that patients are first admitted under in hospital

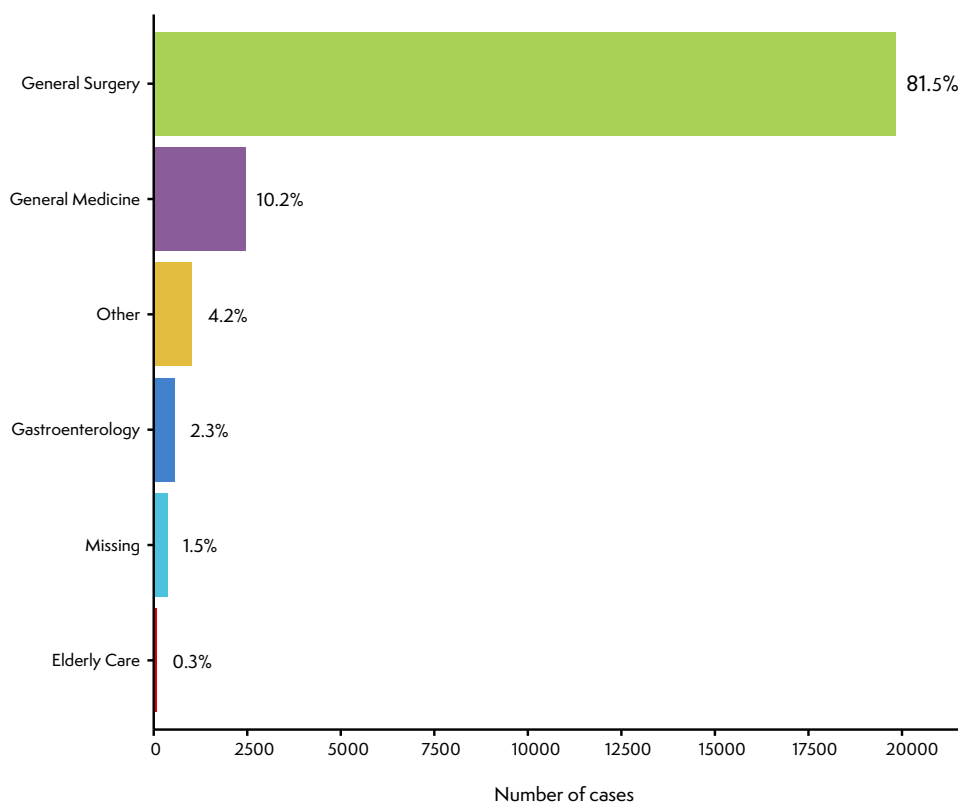
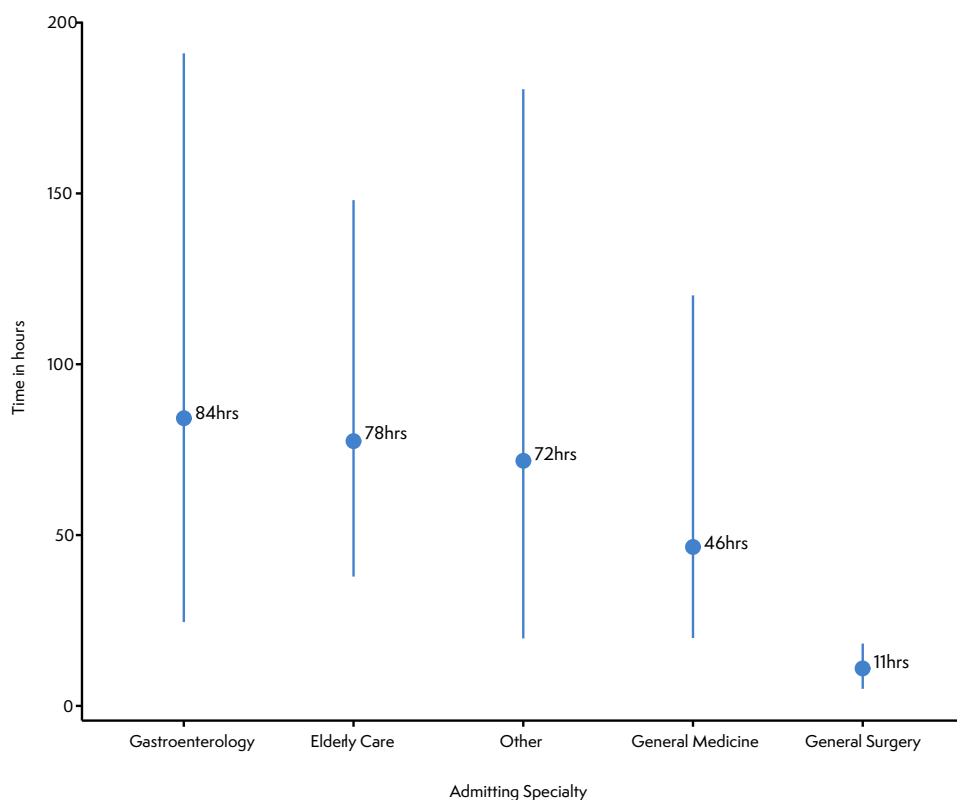


Figure 5.2 Number of hours to consultant surgeon review, from admission, by admitting specialty



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

**Risk profiles of patients according to initial specialty admitted under**

- 86% of patients admitted under Elderly Care are high-risk ( $\geq 5\%$ ).
- 63% of patients admitted under General medicine are high-risk ( $\geq 5\%$ ).
- 43% of those admitted under general surgery are high-risk ( $\geq 5\%$ ).



**ALERT!** NELA does not record the reasons for admission under any given specialty, but patients may wait up to eight times longer for a consultant surgeon review if they are admitted under a non-surgical team.



**How can we improve timely diagnosis and surgery in emergency laparotomy?**

A process map is a good way to analyse a patient pathway, particularly when they cross several departments and clinical teams. If possible, the whole emergency laparotomy team, from presentation in hospital to discharge home should get together to produce the process map. This will allow for helpful discussion between teams about times when the patient crosses from the care of one team to another, eg from the emergency department (ED) to surgical team, or from the theatre team to critical care. The role of each team member can be recorded on the map, and their other responsibilities can be listed in parallel to the patient pathway (sometimes called ‘swimming lanes’), eg what are the surgical registrar’s other responsibilities that may keep them from attending the ED promptly, or the activity in the operating theatre which may delay patient access?

You can annotate your process map with the timings achieved in your own processes, as recorded in the audit. Look at times you fail to meet the key standards, using your NELA dashboard SPC (statistical process control) charts – what happened to your processes on those occasions? Look at any times where you were able to see and treat patients very quickly. What happened on these occasions and can you aim to replicate those circumstances more often?

Members of the team may follow a patient from presentation in hospital to arriving at the operating theatre, or ask carers to keep a diary of their observations – what did you notice about the patients’ journey that could be improved? What information do patients and carers have to help them at these anxious times?



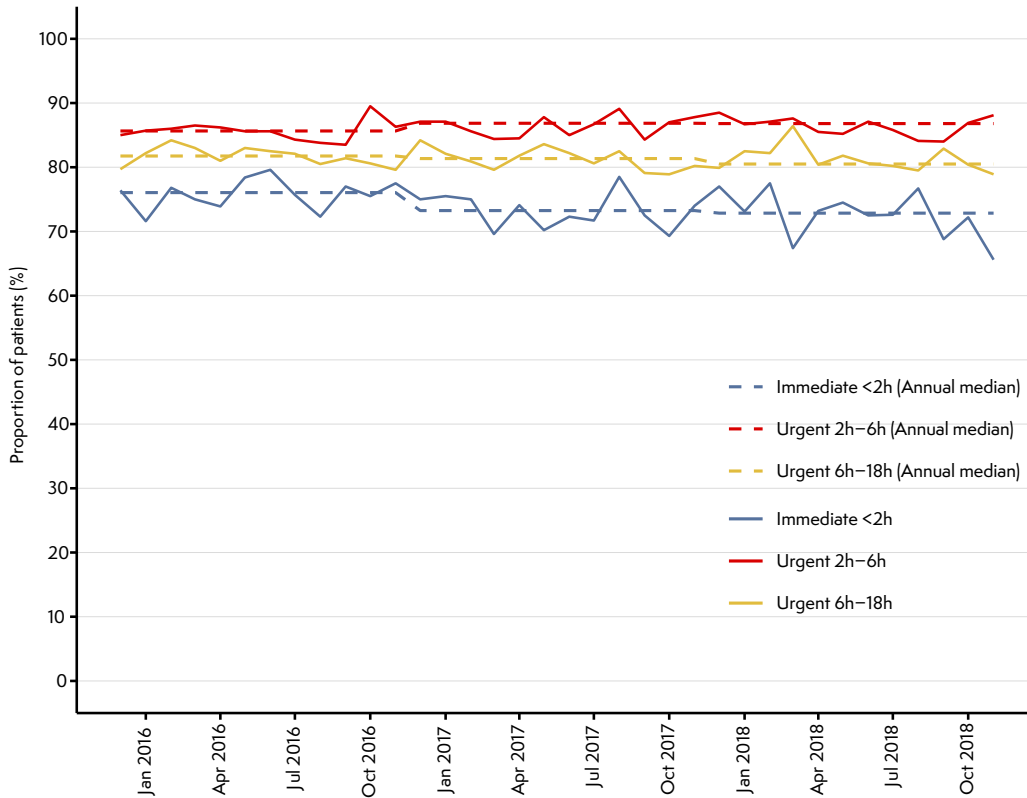
## 5.2 Timeliness of arrival in theatre

### Key process measure

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

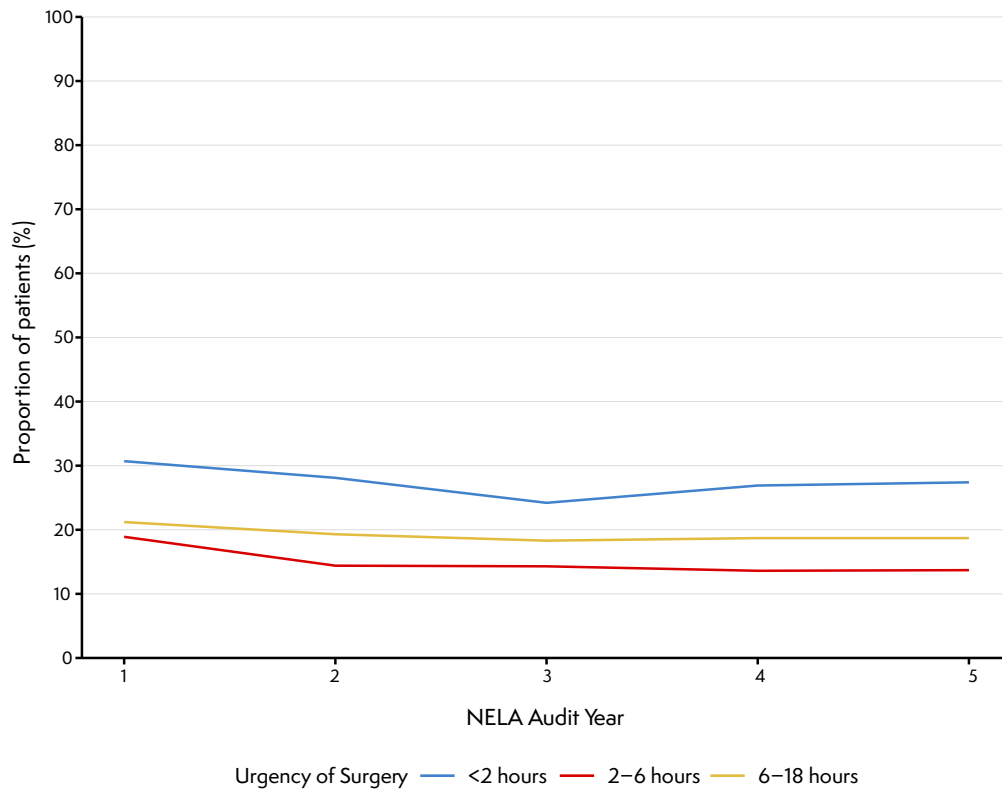
- 82.4% patients arrived within the appropriate time frame to have their operation in accordance with their recorded category of NCEPOD urgency. This is unchanged from last year.
- 171 hospitals were included in this metric. 70 (40.9%) were rated green, 1 (0.6%) were rated red.

Figure 5.3 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)



- Patients admitted under gastroenterology wait the longest to go to theatre (twice as long as other patients average 30 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 (72.6% of patients). This has not changed from previous years.

Figure 5.4 Proportion of patients who experience delays in going to theatre for their surgery, by NCEPOD category of urgency of surgery



**ALERT!** Patients who are more likely to experience delays in getting their emergency laparotomy surgery include:

**Patients who require immediate surgery (within two hours) in the morning**

- 35% of patients experience delay if a decision is made for immediate surgery in the morning 0800–1200 compared to only 19.4% between midnight–0800.

**Patients who do not have a consultant surgeon review**

- Patients who have an in-person consultant surgeon review. 28.4% of this group of patients needing immediate surgery may not arrive in theatre go within two hours. This delay must be balanced with the importance of a consultant surgeon assessment and review and may be entirely necessary.<sup>i</sup>

**Older patients**

- 30.7% of patients over the age of 70 needing immediate surgery experiencing delays.
- The over 70 years are more likely to experience delays for the most urgent surgery.<sup>ii</sup>

<sup>i</sup>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.

<sup>ii</sup>Delays to surgery may be appropriate in order to allow informed discussion with the MDT, patient and relatives, and/or if preoperative optimisation is required.

## 5.3 Radiology

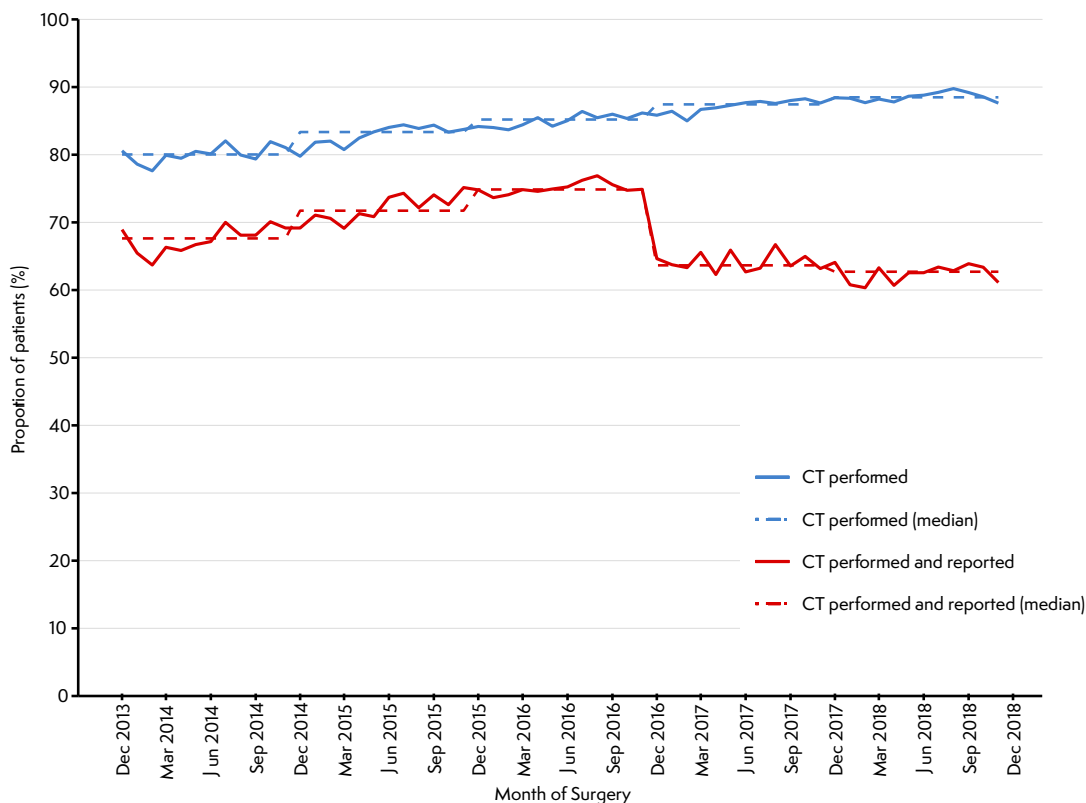
Accurately reported CT scanning is an important diagnostic tool to support timely decision making, appropriate resuscitation and prioritisation of patients during the initial management phase.<sup>8</sup> It is now accepted that enhanced access to cross sectional imaging should be considered a minimum standard within an emergency laparotomy pathway.<sup>4</sup>

### Key process measure

#### The proportion of patients who received a CT scan which was reported by a consultant radiologist before surgery.

- 174 hospitals were included in this metric. 2 (1.1%) were rated green, 49 (28.2%) were rated red.

Figure 5.5 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 4 and 5, whereas Year 1–3 also included outsourced reports)



#### How many patients had a CT scan preoperatively as part of their diagnostic work up?

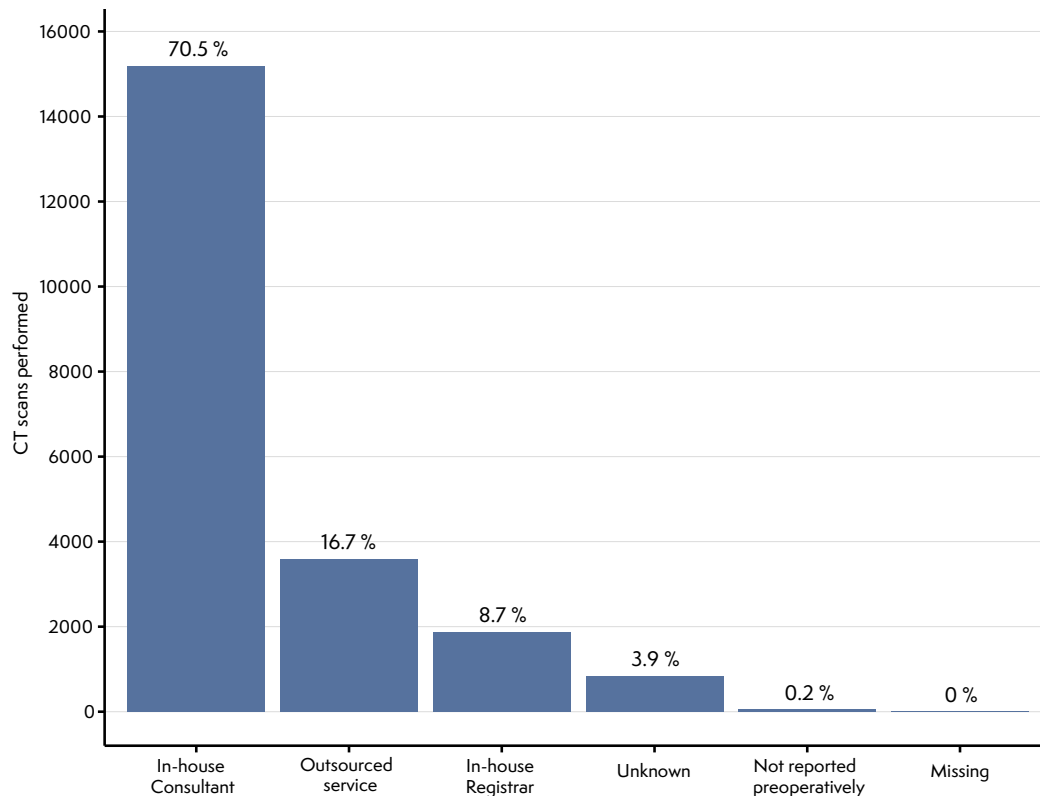
88.5% of patients had a preoperative CT scan performed, compared with 80% in Year 1.

- 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). This may reflect local situations where CT scanning cannot be delivered quickly enough for the most surgically time-critical patients without causing delays to surgery.
- 45.3% of CTs were recorded as having been discussed with surgical team preoperatively.

#### Who reports CT scans and does this vary with the time of day?

- 62% patients had a CT scan performed and reported before surgery by an in-house consultant radiologist, compared with 64% in Year 4.
- 1/3 of CT scans performed between 1800 and 0800 on weekdays are reported by an out-sourced radiology service. This increases to 41% for CT scans performed out of hours at the weekend.

Figure 5.6 The number of reported preoperative CT scans, by reporting radiologist

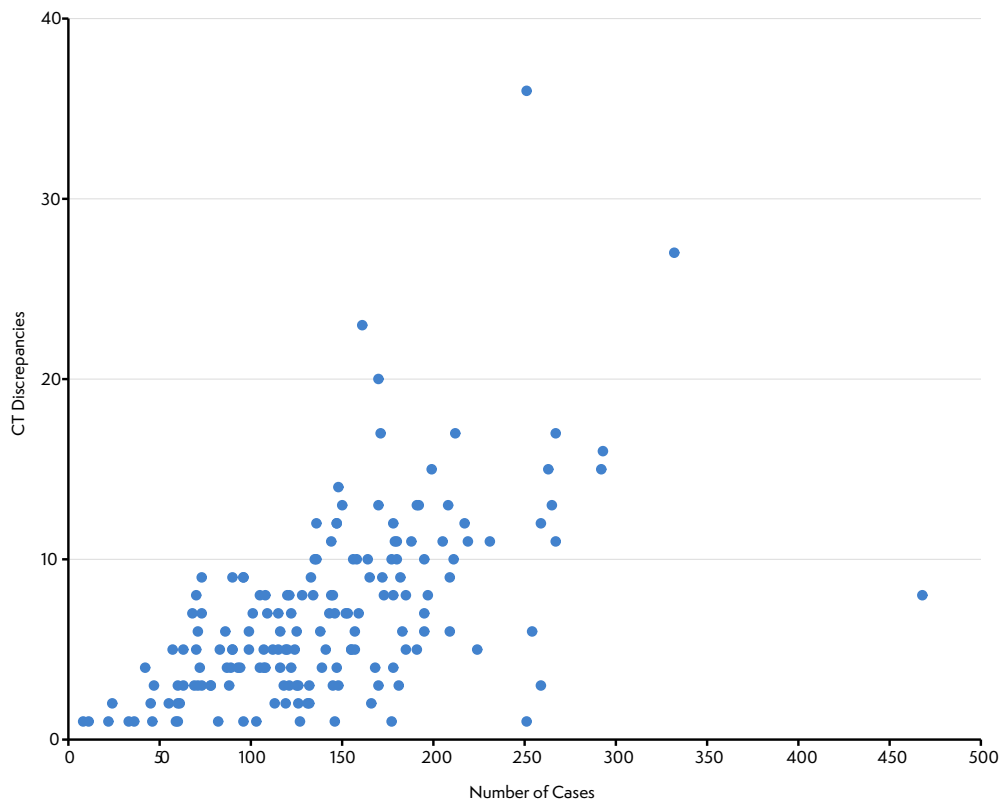


### What factors are associated with higher discrepancy rates between CT findings and surgical findings?

- The accepted discrepancy rate is 5%,<sup>8</sup> regardless of who reports the CT scan.<sup>§</sup>
- 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.<sup>3</sup>
  - In-house consultant discrepancy rate 5.3%
  - In-house registrar discrepancy rate 5.4%
  - Outsourced radiology service discrepancy rate 6.3%
- The highest discrepancy rate (9.4%) 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 7.1% is seen in patients requiring immediate surgery (<2 hours) compared with 4.8% for those who require expedited surgery (>18 hours).
- The discrepancy rate is higher (7.1%) where there has been a preoperative discussion between consultant surgeon and radiology team compared to a rate of 4.7% 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 16.5%.

<sup>§</sup>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.

Figure 5.7 Number of reported CT scans per hospital by number of CT discrepancies by hospital<sup>¶</sup>



The accuracy of in-house radiology registrar reporting almost matches that of in-house consultant radiologist reports. In-house registrar reports have a lower discrepancy rate than out-sourced reporting. This may represent an opportunity to improve the quality of reporting by utilising in-house radiology reports rather than out-sourced services for emergency abdominal CT scans.

<sup>¶</sup>Individual hospital performance can be found at [www.nela.org.uk/reports](http://www.nela.org.uk/reports)

## 5.4 Consultant input before surgery

The advantages of consultant led care throughout the perioperative journey include not only clinical expertise, but also non-technical skills including rapid decision making, management and leadership in time critical situations, efficient use of resources, support of junior doctors and improved outcomes.<sup>7</sup>

### Key process measures

**The proportion of patients who had preoperative input by a consultant anaesthetist prior to surgery when the calculated risk of death  $\geq 5\%$ .**

- 173 hospitals were included in this metric. 140 (80.9%) were rated green, 4 (2.3%) were rated red.

**The proportion of patients who had preoperative input by a consultant surgeon prior to surgery when the calculated risk of death  $\geq 5\%$ .**

- 173 hospitals were included in this metric. 165 (95.4%) were rated green, 0 (0%) were rated red.

**The proportion of patients who had preoperative input by a consultant intensivist prior to surgery when the calculated risk of death  $\geq 5\%$ .**

- 173 hospitals were included in this metric. 20 (11.6%) were rated green, 55 (31.8%) were rated red.

### Preoperative consultant anaesthetist involvement

Consultant anaesthetist review, in comparison to surgical review, is more driven by perception of a patient’s risk; patients who are elderly, have a high American Society of Anesthesiologists (ASA score), or high predicted risk score are more likely to be seen in person than young, fit patients. In comparison to surgeons, anaesthetists are more likely to review patients requiring the most urgent of surgery, which aligns with these patients being more unwell and highest risk group.



**ALERT!** Risk assessment remains a key driver to ensure high-risk patients have consultant led anaesthetic care. Only 3.3% of predicted high-risk patients have no review by a consultant anaesthetist, but in the group which has no preoperative documented risk assessment, 12% of patients do not have consultant input.

60% of patients over age 70 are reviewed in person by consultant anaesthetist.

Figure 5.8 Consultant anaesthetist preoperative review of patients according to predicted risk category

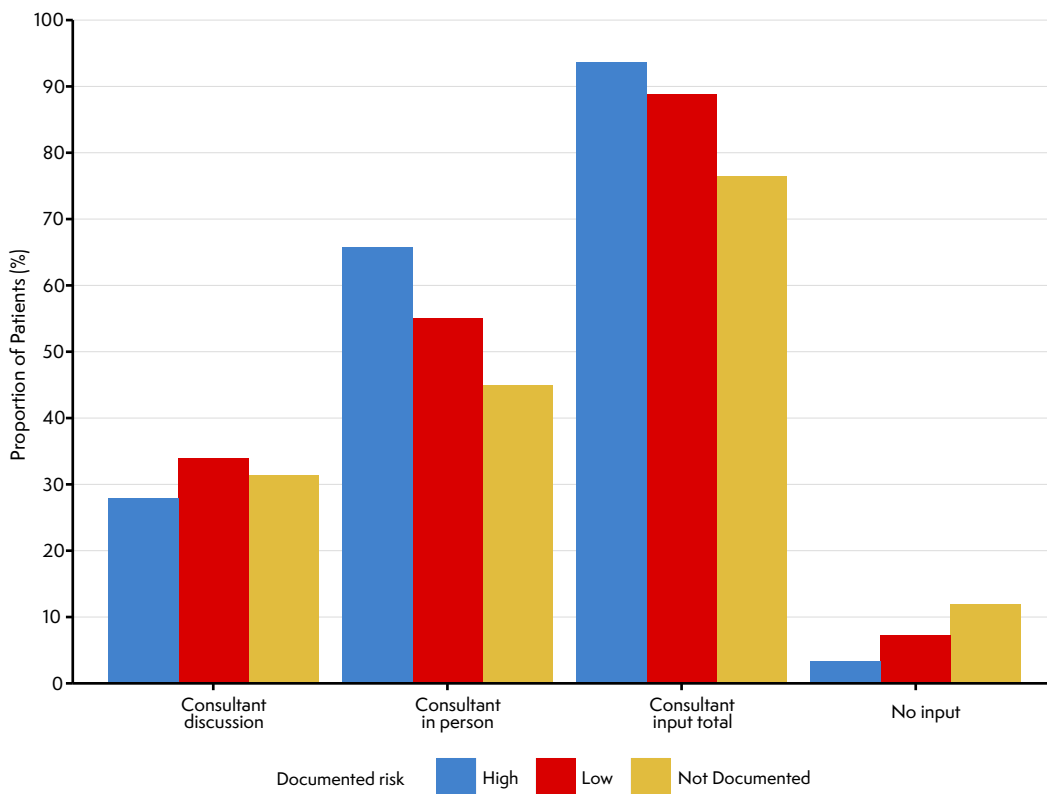


Figure 5.9 Consultant anaesthetist preoperative review according to patient age

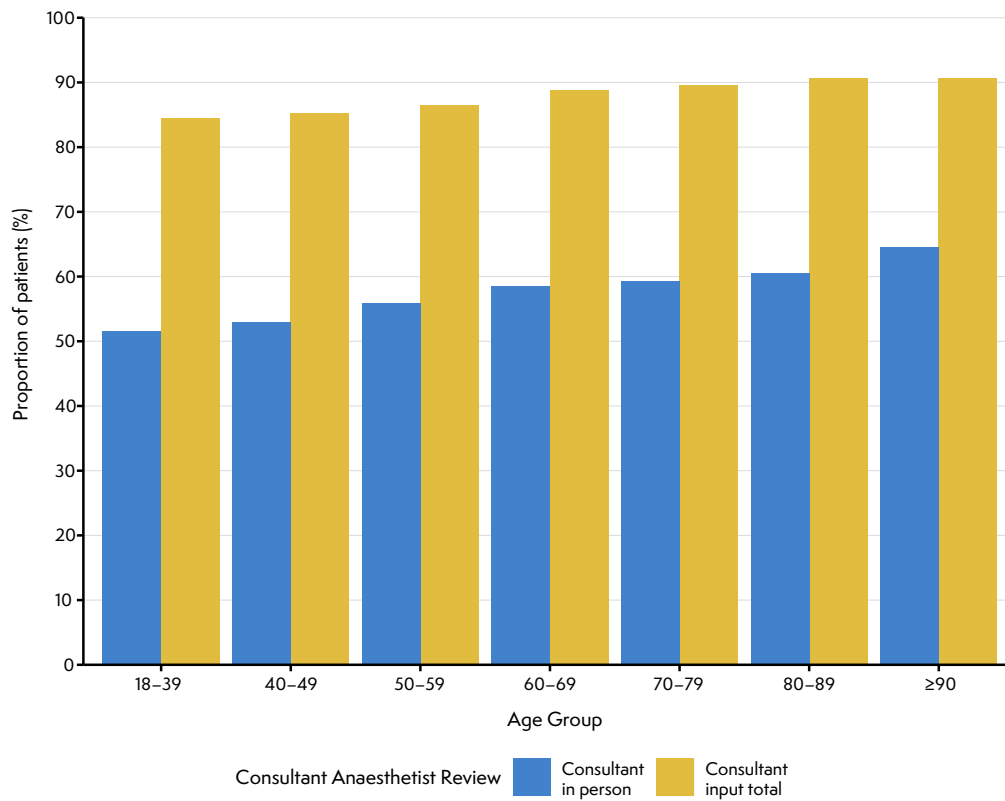
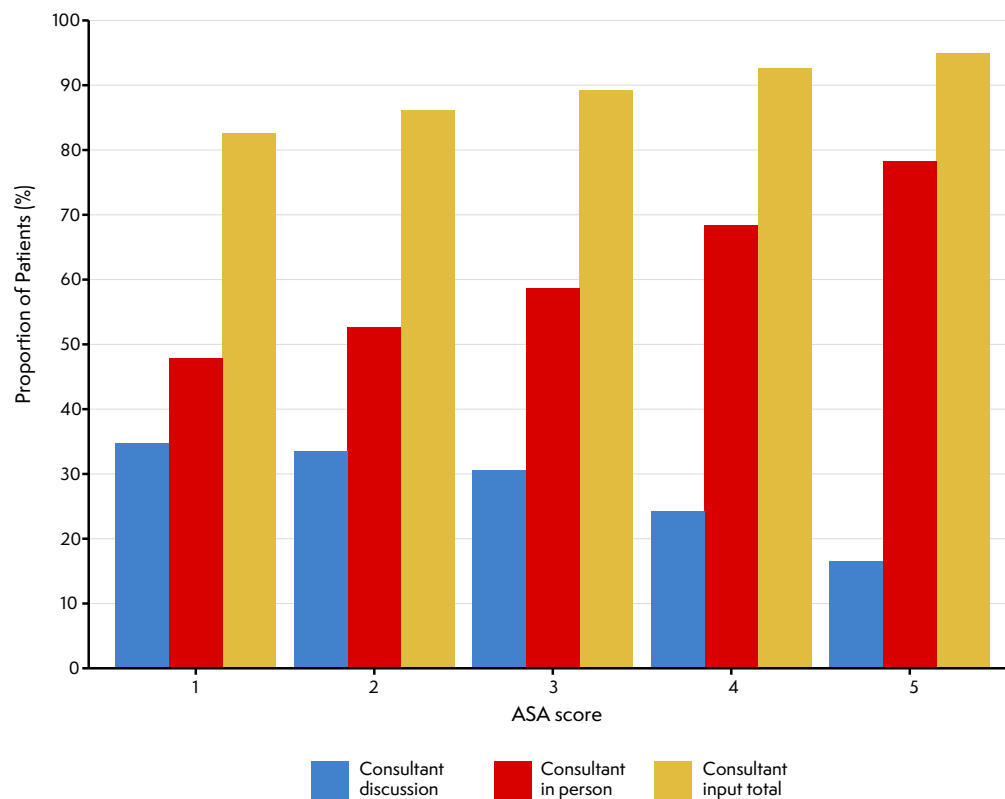


Figure 5.10 Consultant anaesthetist preoperative input according to patient ASA grade



## Preoperative consultant surgeon involvement

95% of all patients have a consultant surgeon involved in their preoperative care.

Patients continue to consistently receive consultant delivered preoperative care, either in person (77% of patients) or as a discussion; regardless of age, risk or ASA.

Figure 5.11 Consultant surgeon preoperative review according to predicted risk category of patient

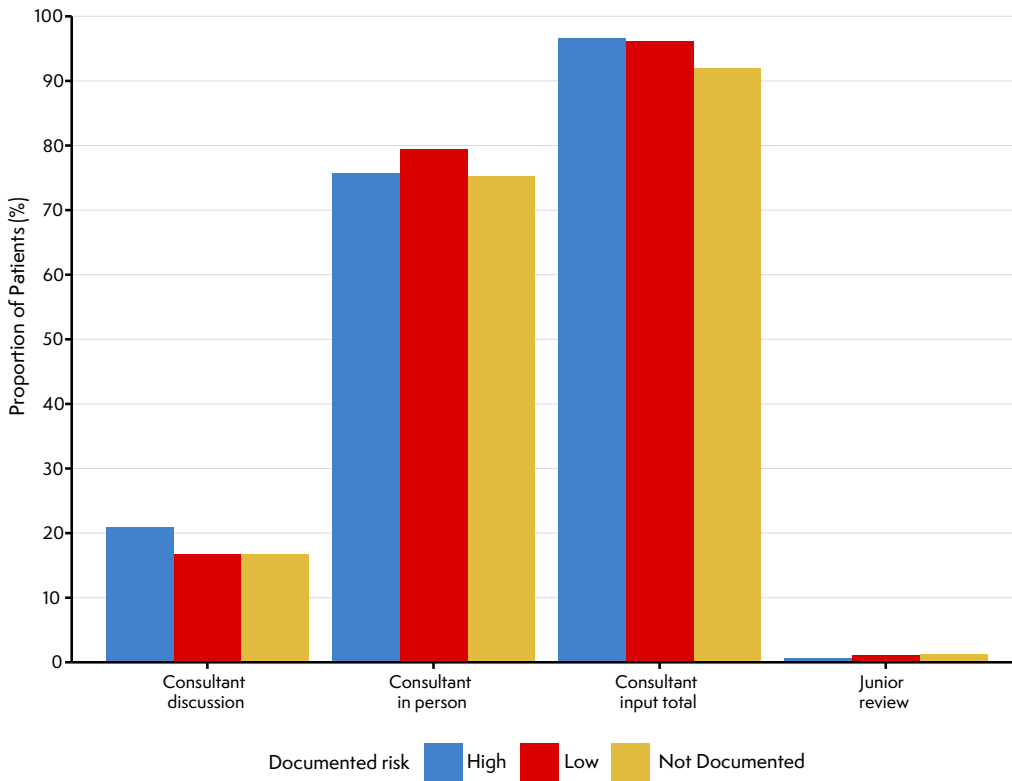


Figure 5.12 Consultant surgeon preoperative input according to patient ASA grade

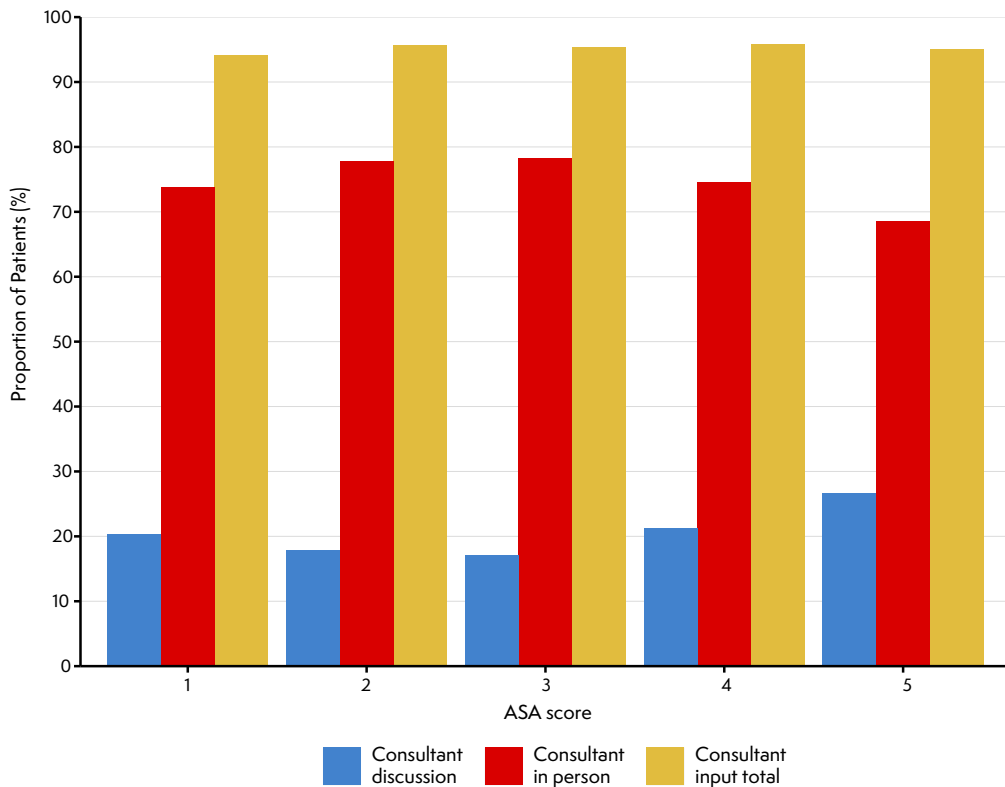
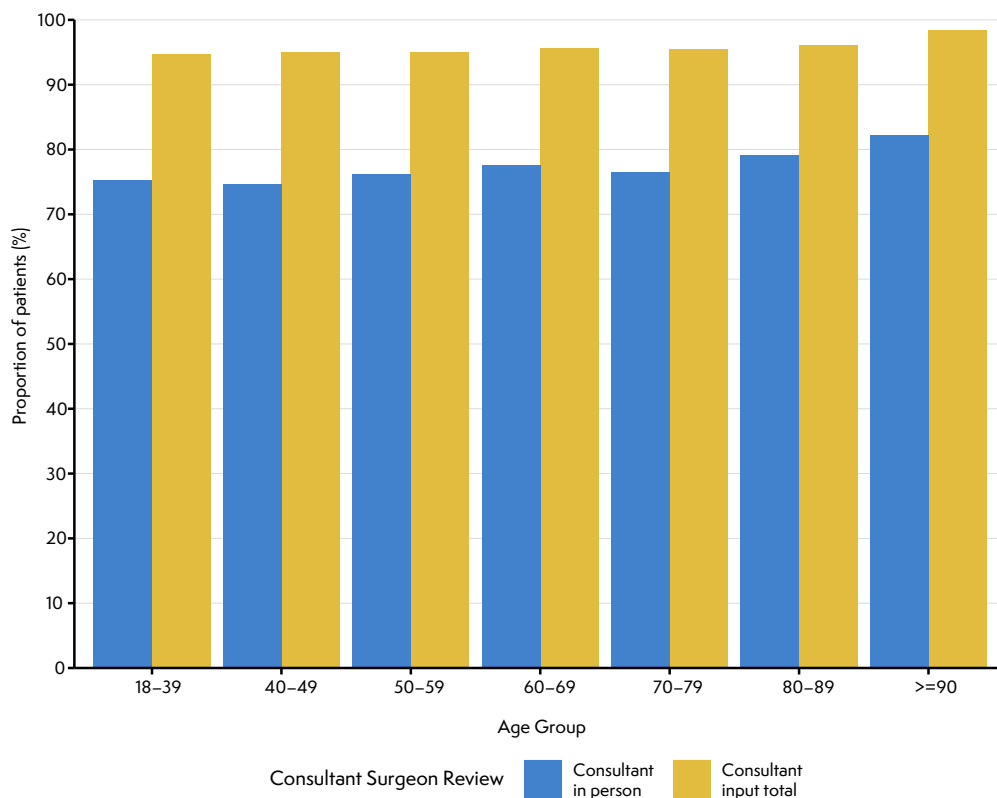




Figure 5.13 Consultant surgeon preoperative review according to patient age



### Preoperative consultant intensivist involvement

Consultant intensivist care input is an important part of the multi-disciplinary team decision making process regarding appropriate admission to critical care units and logistical organisation of post-operative resources. They may also play a part in preoperative patient optimisation and decision making about maximal levels of care.

Consultant intensivists are more likely to be involved if patients:

- have a high preoperative documented risk (70.2% v 35.9% involvement in low-risk patients)
- are elderly (33.5% of under 40 year olds compared with 66.5% of over 90 year olds have preoperative involvement of a consultant intensivist)
- have a high ASA score (27% of patients with an ASA 1 compared to 75.6% of ASA 4 patients).

Figure 5.14 Consultant intensivist preoperative review according to patient age

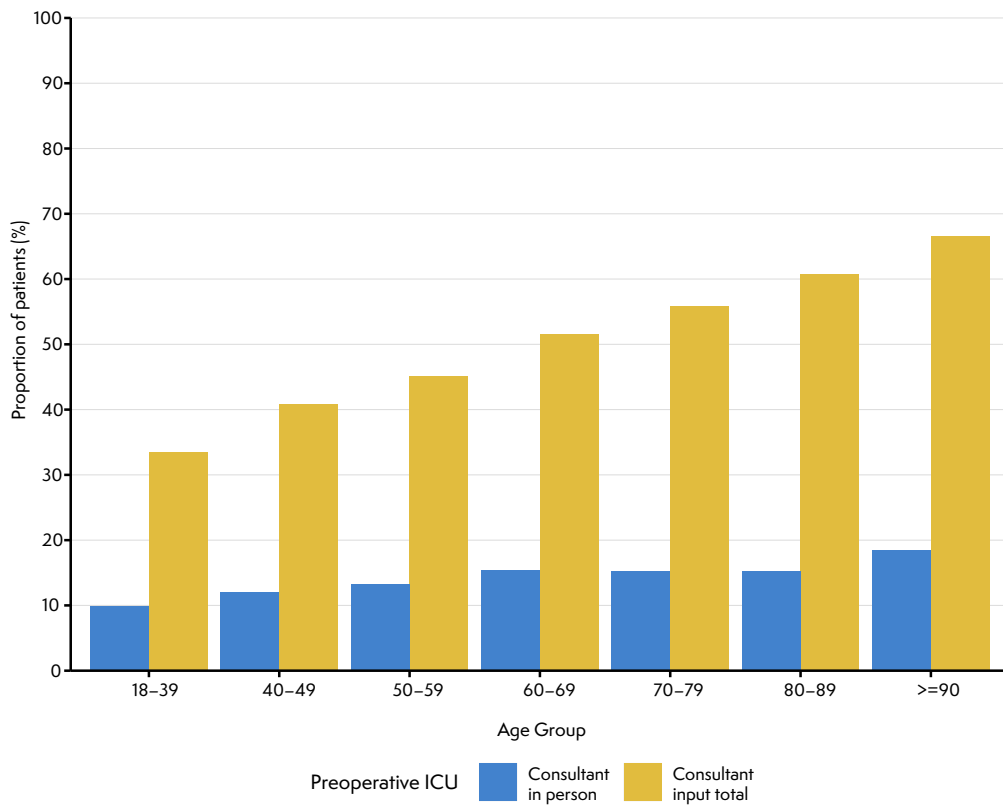


Figure 5.15 Consultant intensivist preoperative review according to predicted risk category of patient

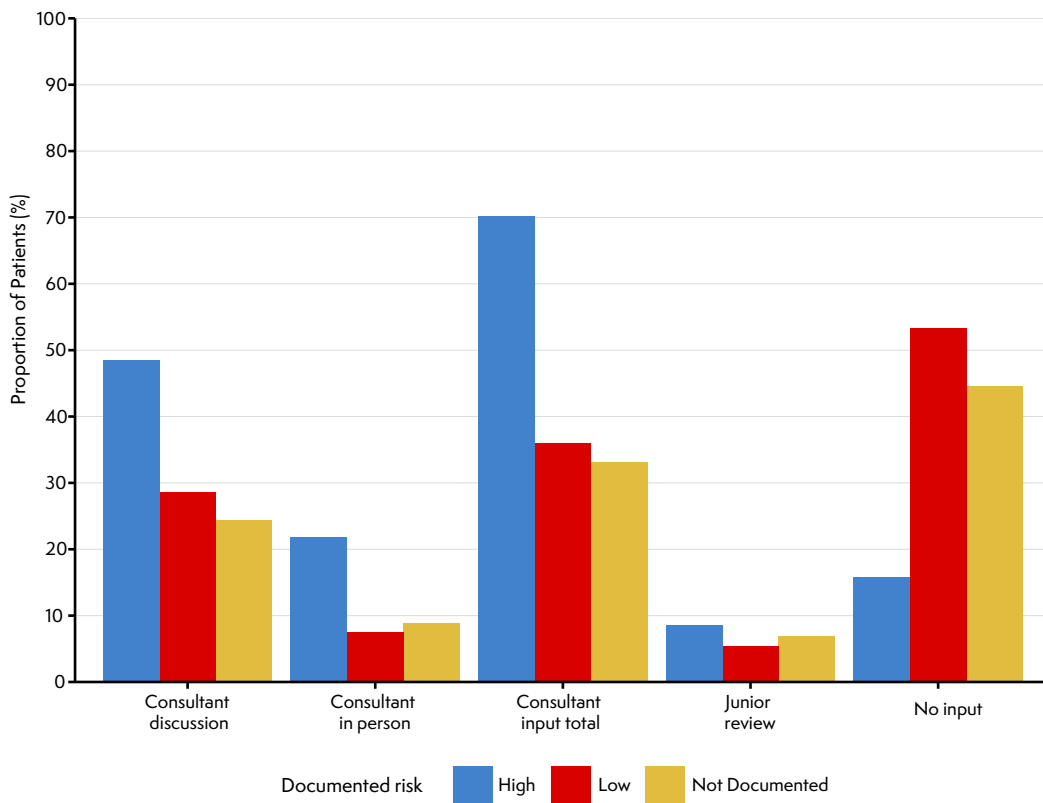
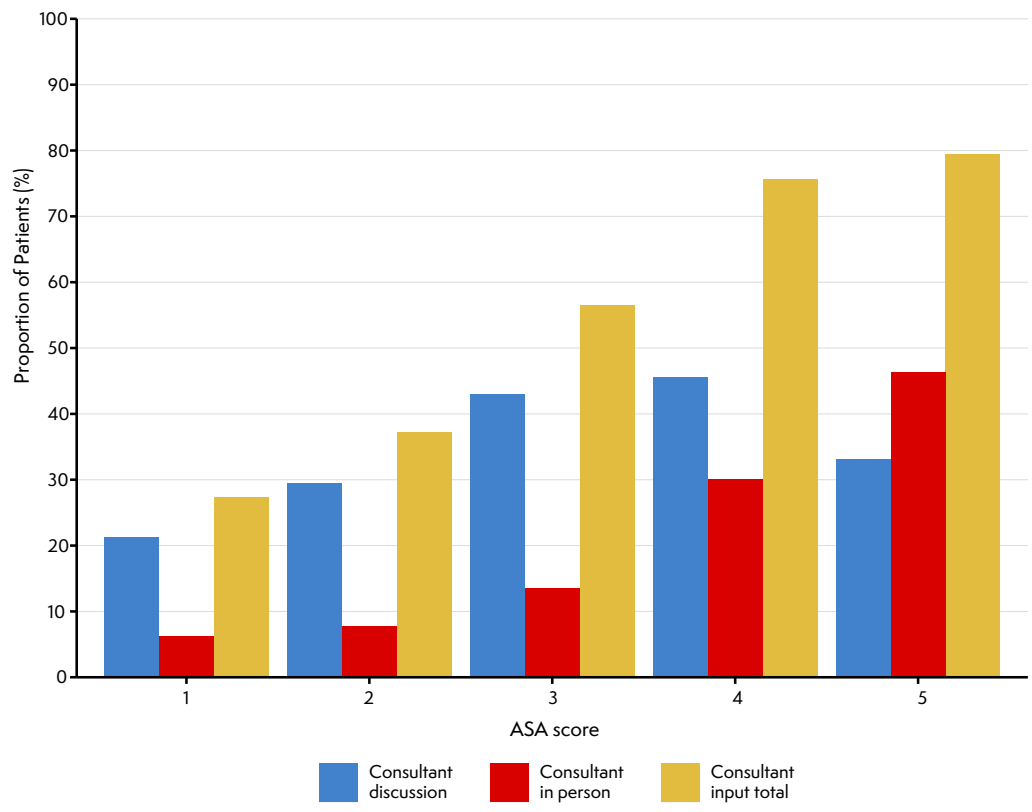


Figure 5.16 Consultant intensivist preoperative input according to patient ASA grade



### Variation according to time of day, day of the week

There is no weekend effect; consultant surgeons, anaesthetist and intensivists are as likely to be involved in preoperative decision making for emergency laparotomy patients regardless of the day of the week.

There is little variation in the proportion of patients seen in person by consultant anaesthetists or intensivists according to the time of day.

## 5.5 Management of patients with peritonitis and sepsis

Sepsis is one of the most significant causes of deterioration and critical illness.<sup>9</sup> 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.

### Key findings

- 10,947 (45%) of patients undergoing emergency laparotomy had signs of sepsis; approximately half of which had generalised peritonitis.
- 31% of patients with sepsis are not cared for in a critical care environment following surgery.



Only 19% of patients with suspected sepsis received antibiotics in the internationally recommended first hour.<sup>10</sup> This has not improved over time, and is a key area of improvement that must be addressed.

How quickly did patients with suspected sepsis receive their antibiotics?

- Patients with suspected sepsis on admission waited on average 3.5 hours for the first dose of antibiotics. There has been no improvement in this time since reporting began.
- 21% of patients were found to have peritonitis on admission; the average time to antibiotics was 4.5 hours in this group compared with six hours in the first NELA report.

How quickly did patients with suspected sepsis arrive in theatre?

- 79% of patients with suspected sepsis required surgery either immediately or urgently, reassuringly 84% of these patients arrived in theatre within the appropriate timeframe.
- Delay to theatre in some patients with sepsis may result from attempts at source control using interventional radiology prior to emergency laparotomy. The NELA data does not allow us to comment further on this.
- On average patients with peritonitis arrive in theatre within 17 hours of admission to hospital and within 2.2 hours (IQR 1.2–4.2) of senior surgical review; which is twice as quick as those without signs of peritonitis.
- The 30-day mortality of patients with sepsis, who do not have their surgery within the recommended NCEPOD category is 15.9% compared to 13% if they have their surgery within an appropriate time frame.



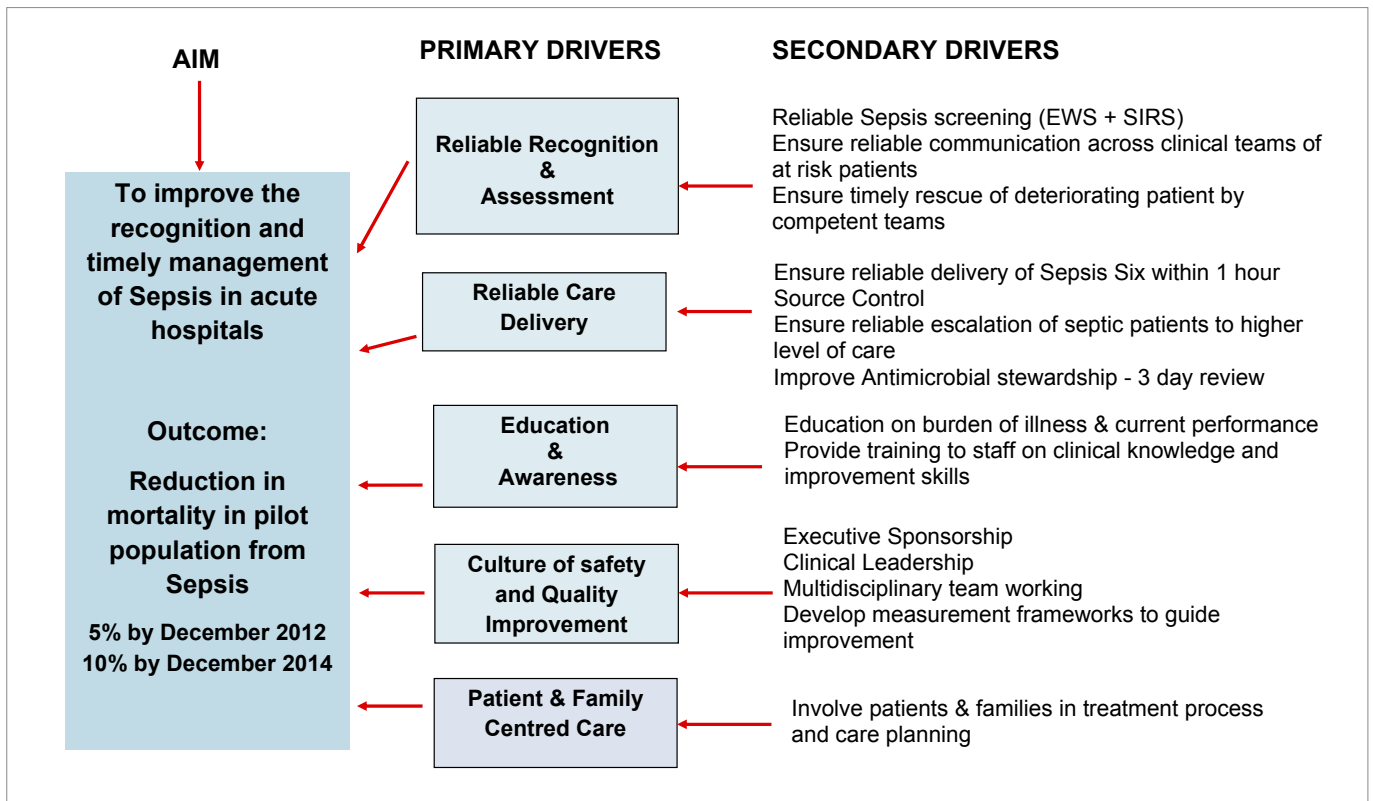
**ALERT!** Comparisons with previous NELA reports demonstrated that there was little improvement in the time to give antibiotics, or the time to take these patients to theatre for surgery.



### Improving access to antibiotics in emergency laparotomy patients with sepsis

Detection and management of sepsis is a common subject for improvement work. Emergency laparotomy teams should seek out those in their hospital who are already working on sepsis improvements, to share learning. There are a myriad of resources available online, from [NHS England](#), [NHS Wales](#), the [Surviving Sepsis Campaign](#) and elsewhere. The detection and management of sepsis is complex, with multiple interconnecting teams and processes required to work in synchrony in order for patients to get prompt appropriate treatment. For this reason, it is helpful to draw out a driver diagram, to outline the various drivers which may help teams to meet their improvement aims.

An example of such a diagram is listed below:



Credit: Healthcare Improvement Scotland

## 5.6 Risk assessment

### Key process measure

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

■ 174 hospitals were included in this metric. 68 (39.1%) were rated green, 20 (11.5%) were rated red.



**ALERT!** Since December 2017, NELA has recommended using the NELA risk score as the sole means of objectively calculating risk as this was specifically formulated for this cohort of patients. P-POSSUM is no longer recommended, for use in emergency laparotomy patients and will not be included in future NELA reports.\*\*



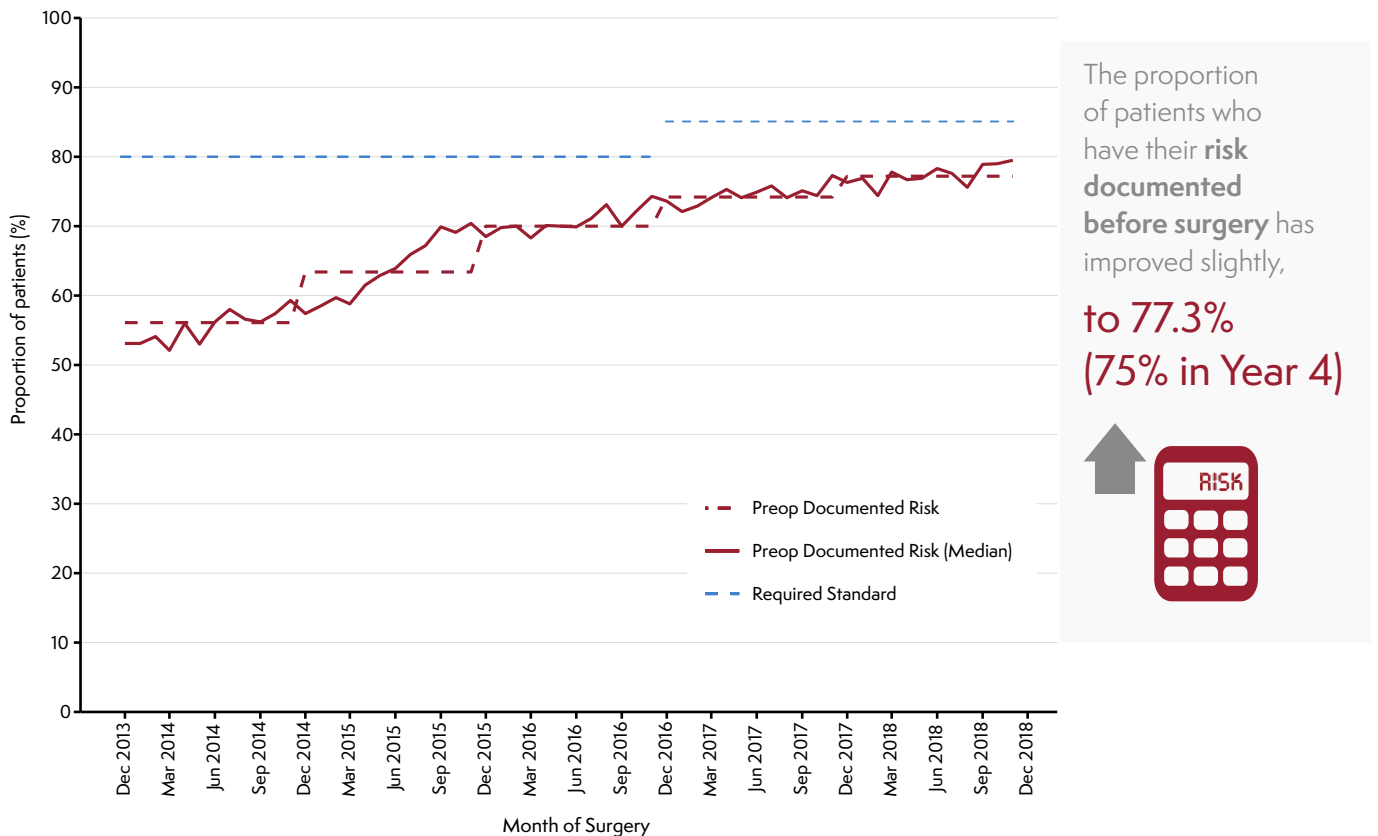
#### Ensure your teams are using current risk assessment tools by covering the new tools at trainee doctor induction

Can you make it easier for teams to use the right tool – eg is it available as a shortcut on trust computers and written into your protocol/pathway documents?

All patients should have an assessment of their individual risk of death to allow clinicians to tailor their care to the patient's individual needs. This should be clearly documented as having been discussed with the patient within the notes, and also recorded on the consent form. Failure to assess risk may result in a patient not being recognised as high-risk, and therefore not receiving the care that they should. Accurate data for predicting risk is important to support objective decision making as well as for calculating a hospital's risk adjusted mortality.

In line with recently published standards,<sup>4</sup> high-risk is now defined as a predicted risk of death 5% or more by any means (clinical judgement and/or risk prediction tools). In this report, any patient with a 'missing' preoperative documented risk score is assumed to be 'high-risk' in view of the findings of previous reports, and in line with published standards.

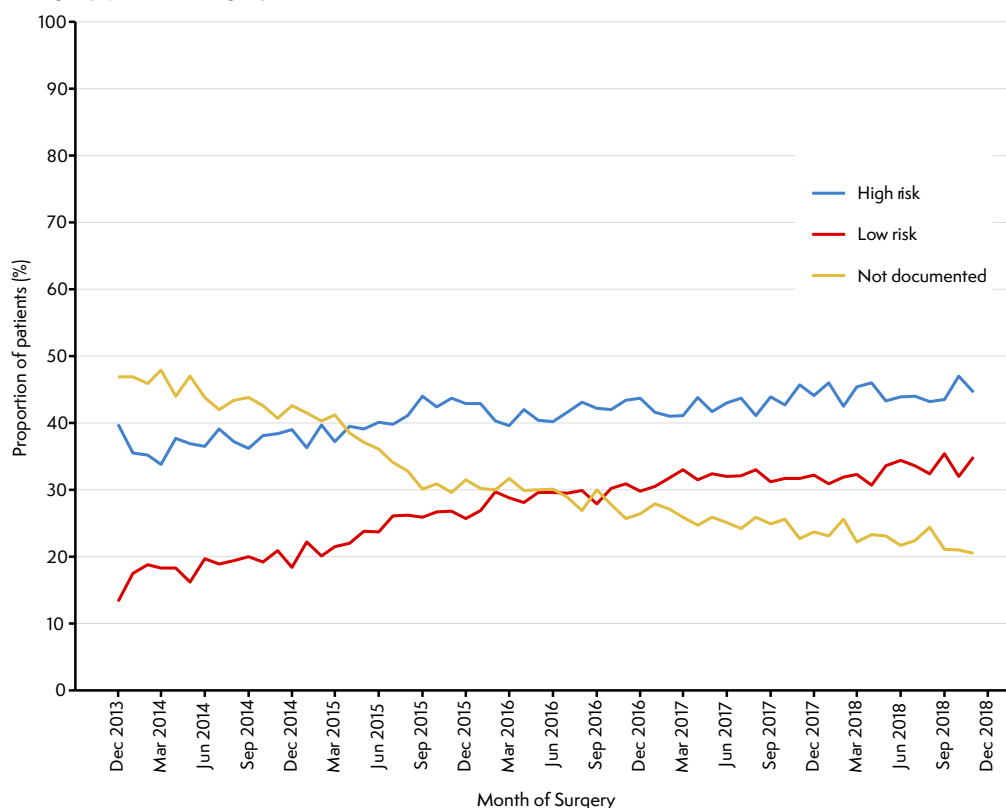
Figure 5.17 Trend in the overall proportion of patients whose risk was documented preoperatively



\*\*P-POSSUM has been included in this report as it was in use as a risk assessment tool at the time of data collection.

- 44.5% were assessed as being high-risk of death ( $\geq 5\%$ ) before surgery.
- 32.9% were assessed as having a risk of death  $< 5\%$  before surgery.
- Risk of death was assessed by utilising a formal calculation tool in 65% of patients, and by clinical judgement alone in 10.8%.

Figure 5.18 Trend in the overall proportion of patients who have their risk assessed according to their predicted risk category prior to surgery



### Which patients are more likely to have risk predicted?

Patients who might be perceived as being at higher risk are more likely to have their preoperative risk of death documented (86.6% v 80.3%). This includes:

- older patients (under 39 years 30.7% not documented, over 70, 19.2% not documented)
- higher ASA grades (ASA 1 24.6% not documented, ASA 4, 14% not documented)
- 16.8% of those requiring the most immediate surgery, are not documented
- patients assessed as being frail (91.5% of frail, 84.7% not frail)
- patients with suspected sepsis on admission (80.6% who are septic, 76.4% who are not septic)
- patients admitted from residential care or nursing home (a group who are predominantly found to be high-risk).

In only 20% of cases was risk assessed both by clinical judgement and a formal risk assessment tool, such as the NELA risk calculator.



**ALERT!** Of the 32.9% who were documented and assessed preoperatively as being low-risk, 1,198 (15%) were found when analysed retrospectively by NELA, to in fact have a preoperative calculated NELA risk score of  $\geq 5\%$ . This represents a group of patients who have potentially missed out on consultant led care and critical care admission. Risk assessment before surgery should be as accurate as possible combining clinical expertise and a formal risk assessment tool.

Table 5.1 Relative proportions of patients in each risk category when preoperative documented risk is compared to preoperative calculated NELA risk of death

Document risk prior to surgery	Number of patients in each risk category n (%)	Preoperative calculated Low NELA Risk n (%)	Preoperative calculated High NELA Risk n (%)
High	10,820 (44.5%)	2,693 (24.9%)	8,032 (74.2%)
Low	7,992 (32.9%)	6,707 (83.9%)	1,198 (15%)
Not documented	5,516 (22.7%)	3,516 (63.7%)	1,831 (33.2%)

Table 5.2 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	Risk prediction tool	Both clinical and formal assessment
High	1,224 (11.3%)	6,723 (62.1%)	2,206 (20.4%)
Low	1,414 (17.7%)	5,075 (63.5%)	1,118 (14%)

### Patients who do not have their risk documented before surgery

The group of patients who do not have a documented preoperative assessment of risk remain an important cohort who are less likely to benefit from the standards of care expected for their surgery. Whilst objective risk assessment scores are not perfect, they are an important adjunct to support clinical assessment and guide implementation of care pathways. Delivery of care, such as consultant review before surgery, presence in theatre, admission to critical care all vary according to whether risk has been assessed and documented before surgery.

### What was the risk profile of those who did not have their risk assessed preoperatively?

- 22.7% of patients did not have their risk assessed and documented before surgery. This is an improvement from Year 4 (25.5%).
- Of this group, 3,516 patients (63.7%) had a calculated NELA risk that was low-risk, 1,831 patients (33.2%) had a calculated risk of greater than 5% and an observed 30-day mortality of 5.4%.



In line with previous report findings and the *High-Risk General Surgical Patient* recommendations,<sup>4</sup> in the absence of a formal calculated risk score a patient should be considered as high-risk.

Table 5.3 30-day and 90-day inpatient mortality according to preoperative documented risk

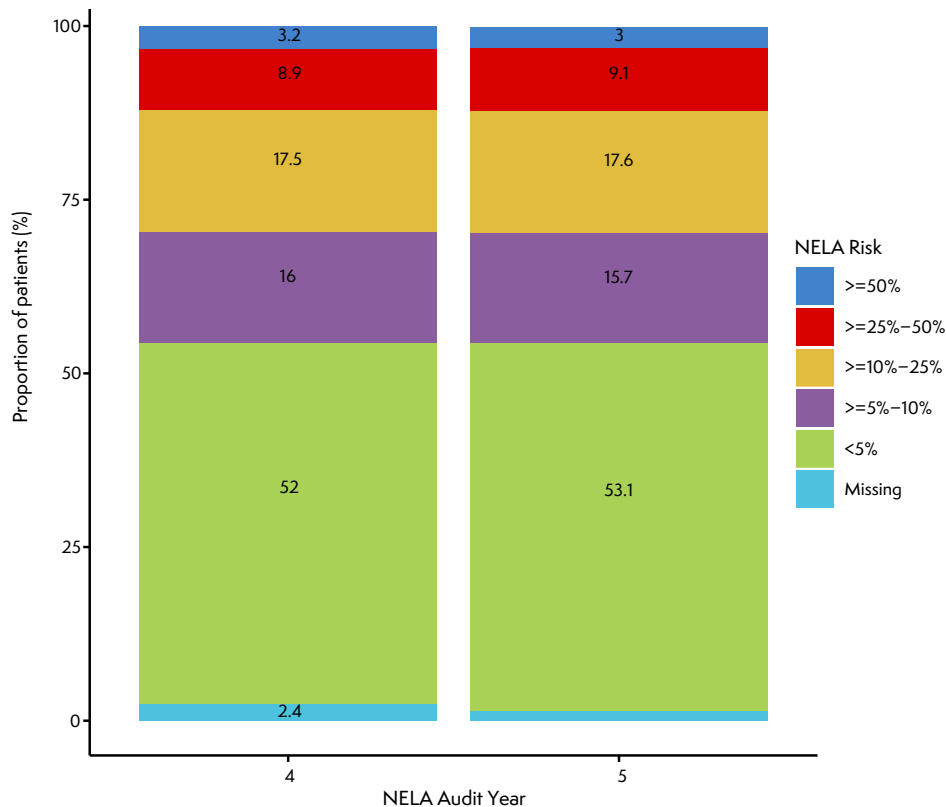
Calculated preoperative risk of death	30-day in patient mortality	90-day in patient mortality
High	16.9%	18.8%
Low	1.6%	1.8%
Not documented	5.4%	6.2%



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



## What is the effect on processes of care when risk is not documented?



**ALERT!** Patients who do not have their risk documented have the lowest level of consultant delivered care and are the least likely to be admitted to critical care after their surgery. This is lower than even the patients with predicted mortality <5%.



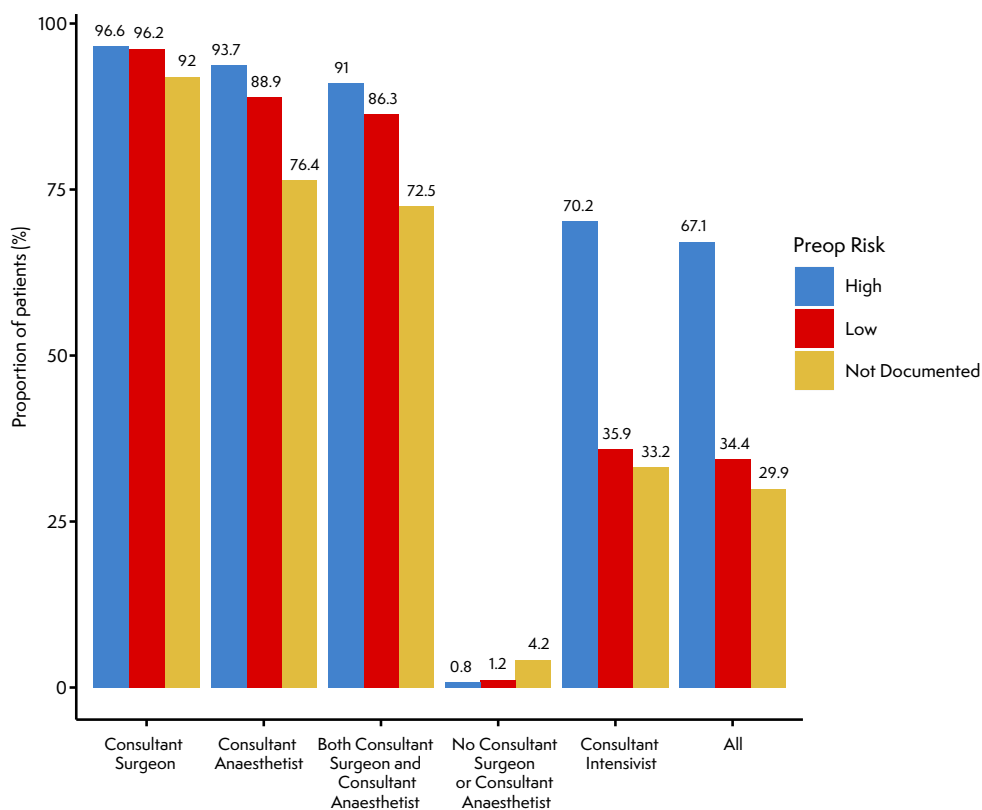
### Examine your data to highlight the patients who do not have a formal risk assessment documented

Are there any common features to address? Is it dependent on time available (and so can you make it easier for teams to access the right tools), is it dependent on who sees the patient (could you improve this with individual level feedback)?



Documenting risk before emergency laparotomy may be considered as a proxy marker of good quality care; where it is not done, analysis of NELA data demonstrates that patients miss out on care that meets standards.

Figure 5.20 Proportion of patients receiving input prior to surgery by consultant surgeon, anaesthetist and intensivist, by documented preoperative risk category



### What should 'documented preoperative risk' mean?

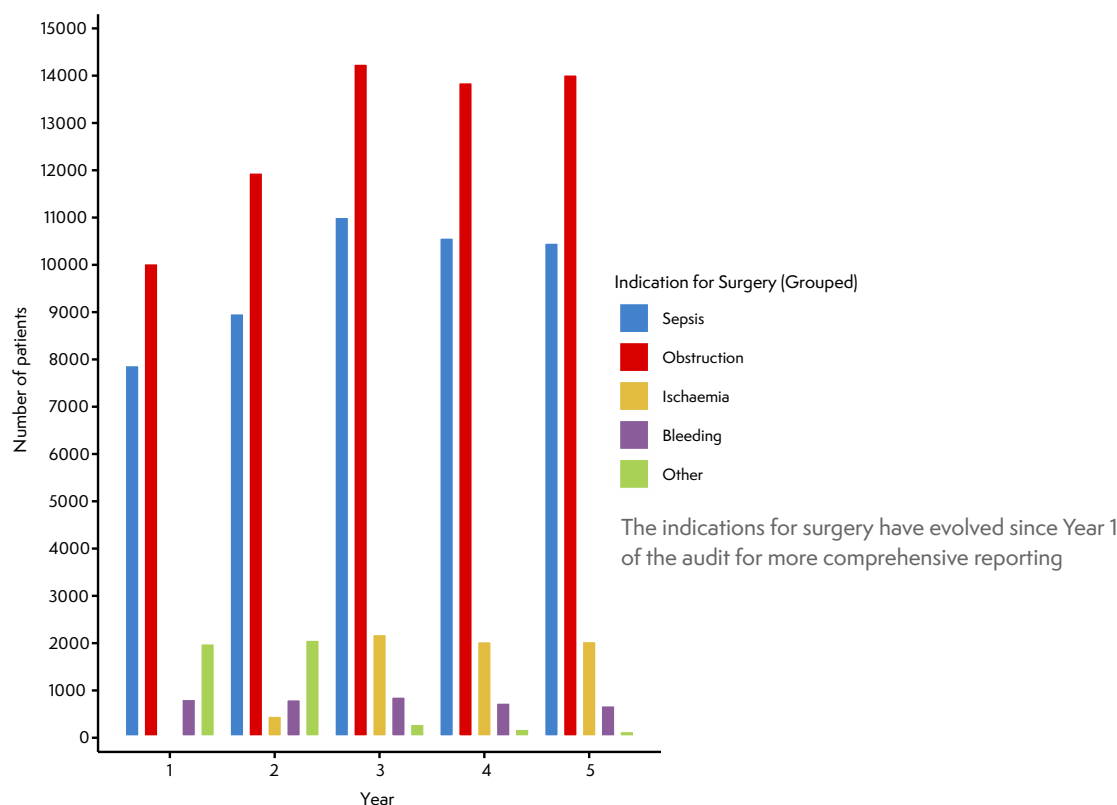
The standards that NELA audit against are set by several bodies, including NCEPOD, RCS<sup>11</sup> and the RCoA. The wording of this standard implies that the risk must be documented in the notes or on the consent form. However, consent is more than simply signing a form and the risks of the emergency procedure should be made explicit to the patient, and their families. Good clinical practice deems that the person taking consent from a patient should establish and maintain an effective relationship with them, and be honest and sensitive during the discussion about their treatment options. In addition, the Montgomery ruling<sup>12</sup> mandates that material risks must be discussed with the patient, and individualised for them. However, patient feedback about their recollection of risk discussions (even when it has been marked as done on the NELA database) often reveals that they and their families had no understanding of the level of risk that their emergency laparotomy surgery poses. Therefore, translating this standard into reality means that population based risk scores must be used in combination with clinical judgement, and when patients are able to consent, the individualised risk should not only be clearly documented on the consent form but also that they have been specifically discussed with the patient, and their family.<sup>13</sup>

# 6 Intraoperative care

## 6.1 What are the indications for emergency laparotomy?

The indications for emergency laparotomy are numerous but can be broadly divided into intestinal obstruction; infection due to intestinal perforation, peritonitis or abdominal abscess, or ischaemia and haemorrhage. This year, to assist with clarity of reporting, the indications have been analysed within these broad categories.

Figure 6.1 Indications for emergency laparotomy, by NELA year



- The majority of emergency laparotomy are performed for either obstruction or abdominal infection, however patients with ischaemia or bleeding represent those patients with the highest preoperative risk of death.
- Patients with ischaemia and bleeding are more likely to have both consultant anaesthetist and surgeon present intraoperatively than patients presenting with obstruction
- Hospitals can now review their most common indications for surgery, updated in real time on their NELA QI dashboard.
- 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 or ischaemia required the most emergent intervention, 88% of patients with bleeding and 85% of patients with ischaemia arrived in theatre within the appropriate time frame.
  - 84% of patients with signs of sepsis arrived in theatre within the appropriate time frame.
  - 81% of patients with obstruction arrived in theatre within the appropriate time frame.
- The reasons for delay to theatre are likely multifactorial and include patient, anaesthetic, surgical and organisational factors.

## 6.2 What are the surgical findings at emergency laparotomy?

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



**45.3% of patients** have **bowel obstruction**.



**40.7% of patients** have evidence of **infection/inflammation** at emergency laparotomy.



**18.6% of patients** have **cancer**.



**11.8% of patients** have **ischaemic bowel**.



**5.2% of patients** had evidence of a **postoperative complication**.

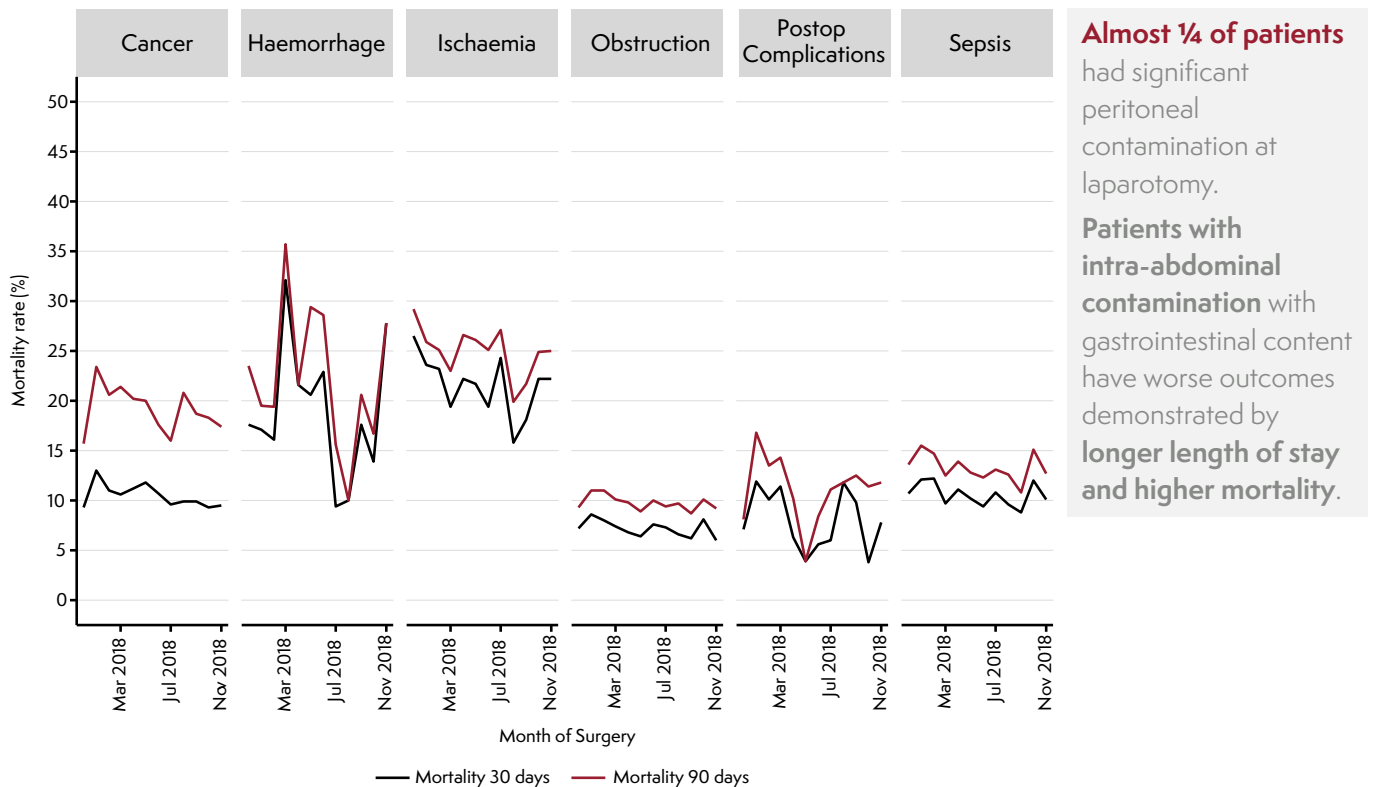


**1.7% of patients** are found to have **bleeding**.



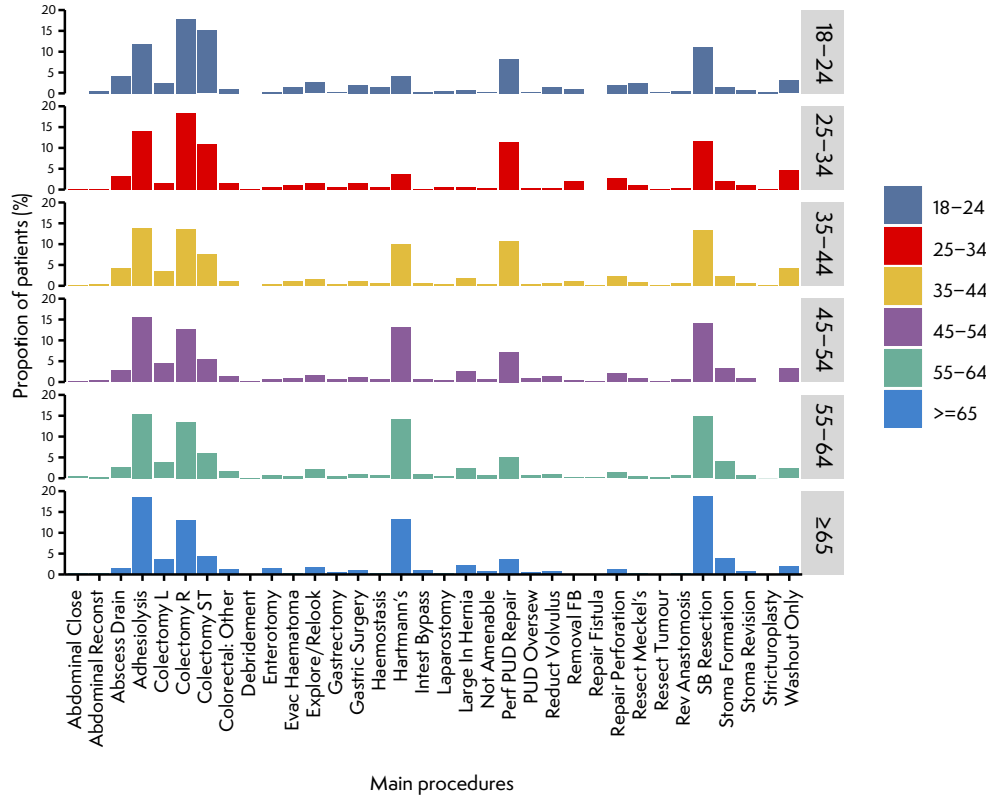
**1.4% of patients** had a **negative laparotomy** with normal intra-abdominal findings. This is unchanged since Year 1 meaning that **very few patients have unnecessary surgery**.

Figure 6.2 30-day ONS mortality for grouped intra-abdominal surgical findings



## 6.3 What are the procedures performed at emergency laparotomy?

Figure 6.3 Procedures performed at laparotomy, by age group



■ Adhesiolysis remains the most commonly performed procedure.

Figure 6.4 Top ten most commonly performed surgical procedures and associated 30 day in-patient mortality (NB hospital teams can see this data contemporaneously on their own database and the [NELA webtool](#)). Figures in brackets are the 30-day mortality for the procedure performed

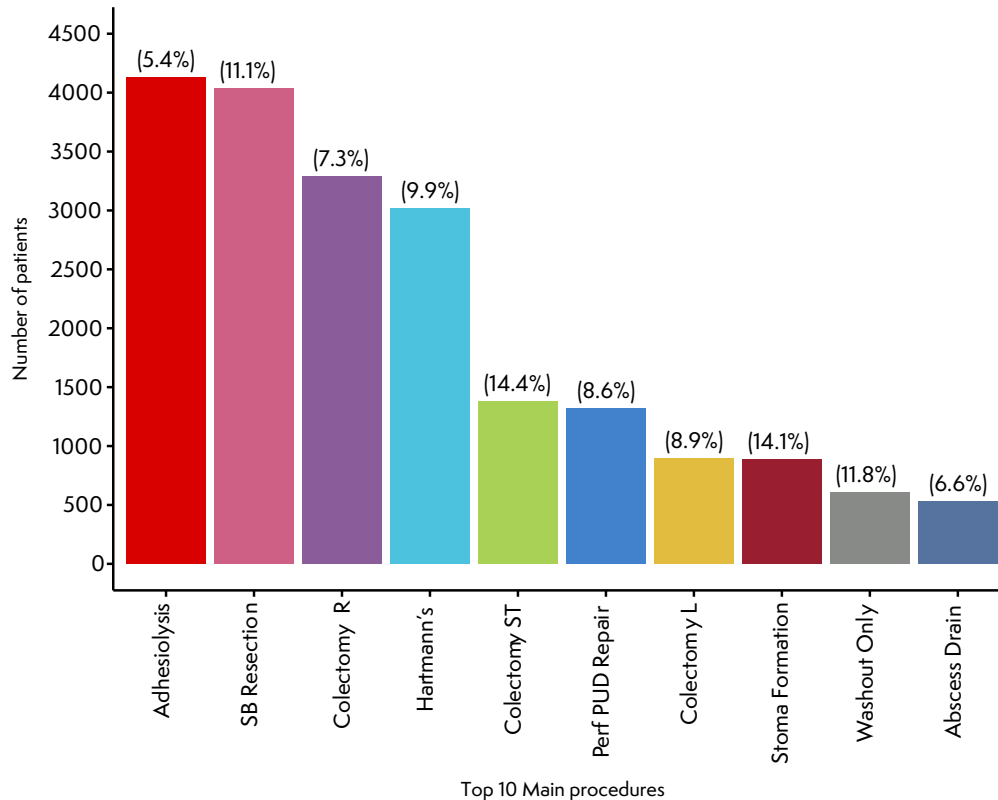
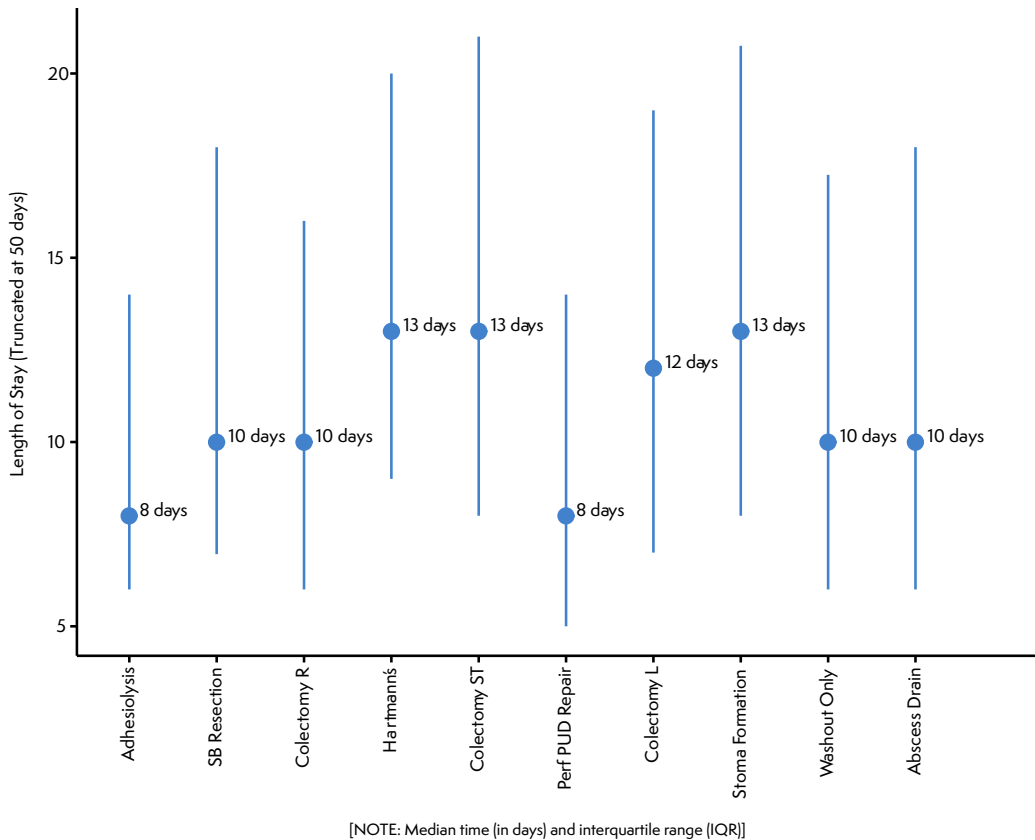


Figure 6.5 Top ten most commonly performed surgical procedures and associated length of stay in days



## 6.4 Laparoscopic emergency bowel surgery

Emergency laparotomy remains predominantly an open procedure.

- There is an increase in the laparoscopic rate in Year 5 with 9.5% of emergency laparotomies being completed laparoscopically compared with 8% in Year 4.
- For patients undergoing laparoscopic surgery the in patient 30-day mortality is 3.5% compared to 10% if surgery is via an open approach. This likely represents the fact that these patients are less unwell with lower preoperatively predicted mortality.
- Only 23% of laparoscopic cases are performed out of hours. 77% 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.
- The median length of stay for patients undergoing laparoscopic surgery is six days compared with 11 days for those who have an open emergency laparotomy.

Figure 6.6 Length of stay in days, by operative approach

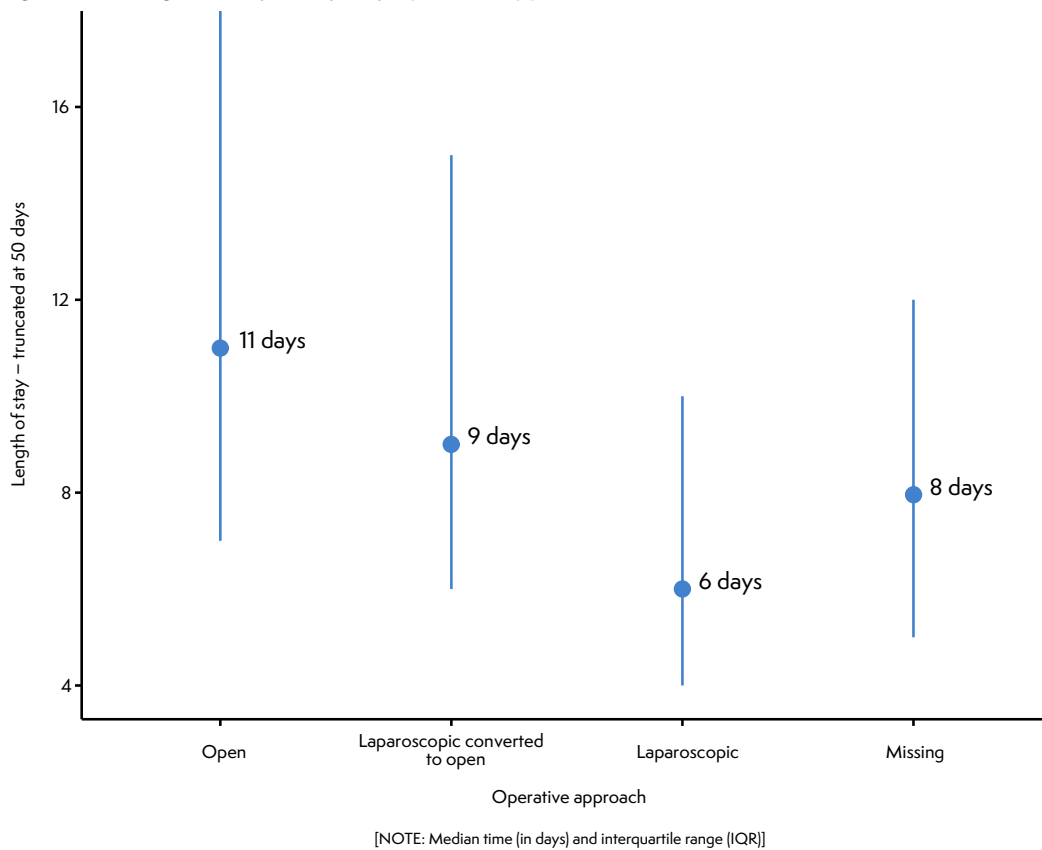
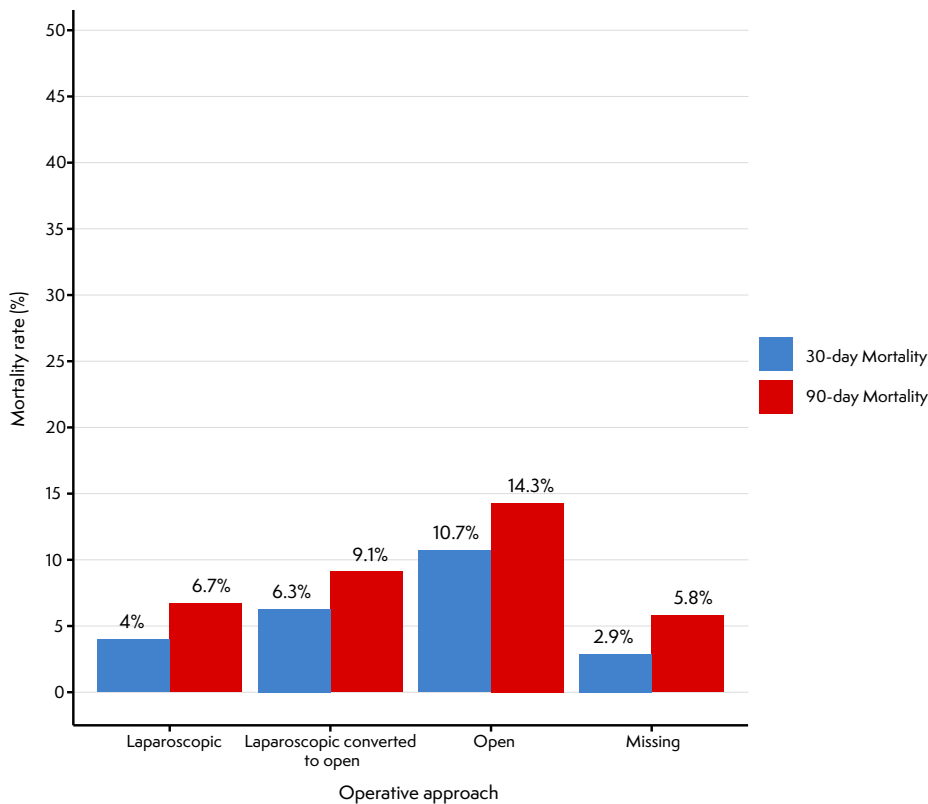


Figure 6.7 30-day and 90-day mortality by operative approach



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.

## 6.5 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  $\geq 5\%$ .<sup>††</sup>**

- 173 hospitals were included in this metric. 96 (55.5%) were rated green, 6 (3.5%) were rated red.

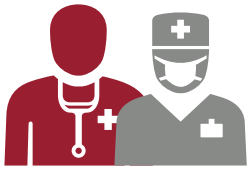
**The proportion of patients who had a consultant surgeon present in theatre when risk of death  $\geq 5\%$ .**

- 173 hospitals were included in this metric. 153 (88.4%) were rated green, 0 (0%) were rated red.

**The proportion of patients who had a consultant anaesthetist present in theatre when risk of death  $\geq 5\%$ .**

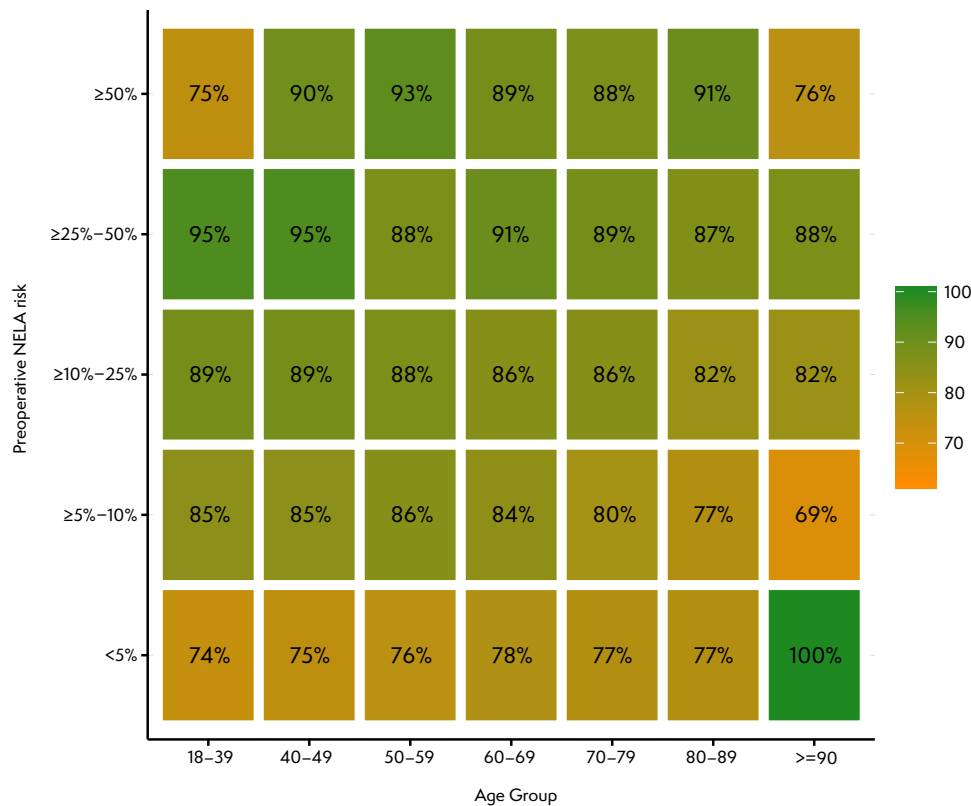
- 173 hospitals were included in this metric. 118 (68.2%) were rated green, 2 (1.2%) were rated red.

### Key findings



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

Figure 6.8 Proportion of patients who had both a consultant surgeon and anaesthetist present in theatre, by age group and calculated NELA risk score



<sup>††</sup>For the purpose of RAG rating against standards and reporting process measures, the risk of death of  $\geq 5\%$  is defined either from the NELA, P-POSSUM risk score or clinical judgement – whichever is recorded to be the highest.



Figure 6.9 Proportion of high-risk patients who had a consultant surgeon and anaesthetist present in theatre, by time of day and day of the week

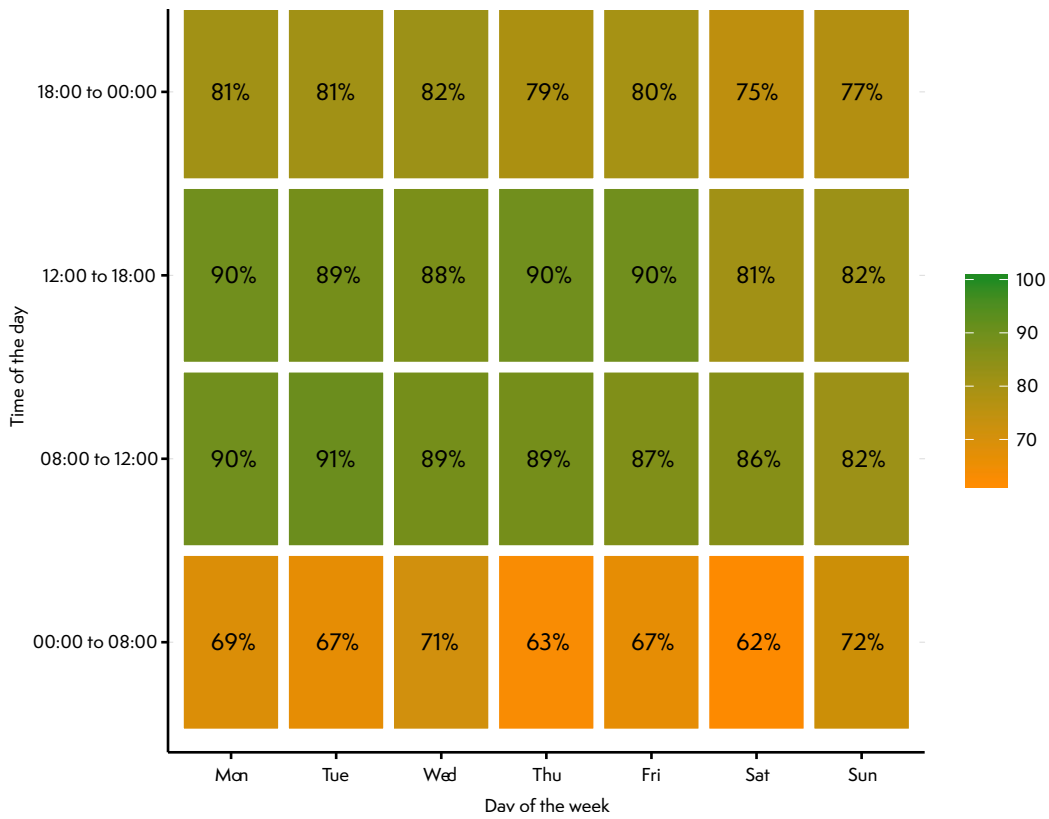


Figure 6.10 Proportion of patients who had a consultant surgeon and anaesthetist present by intraoperative findings and NELA calculated risk score

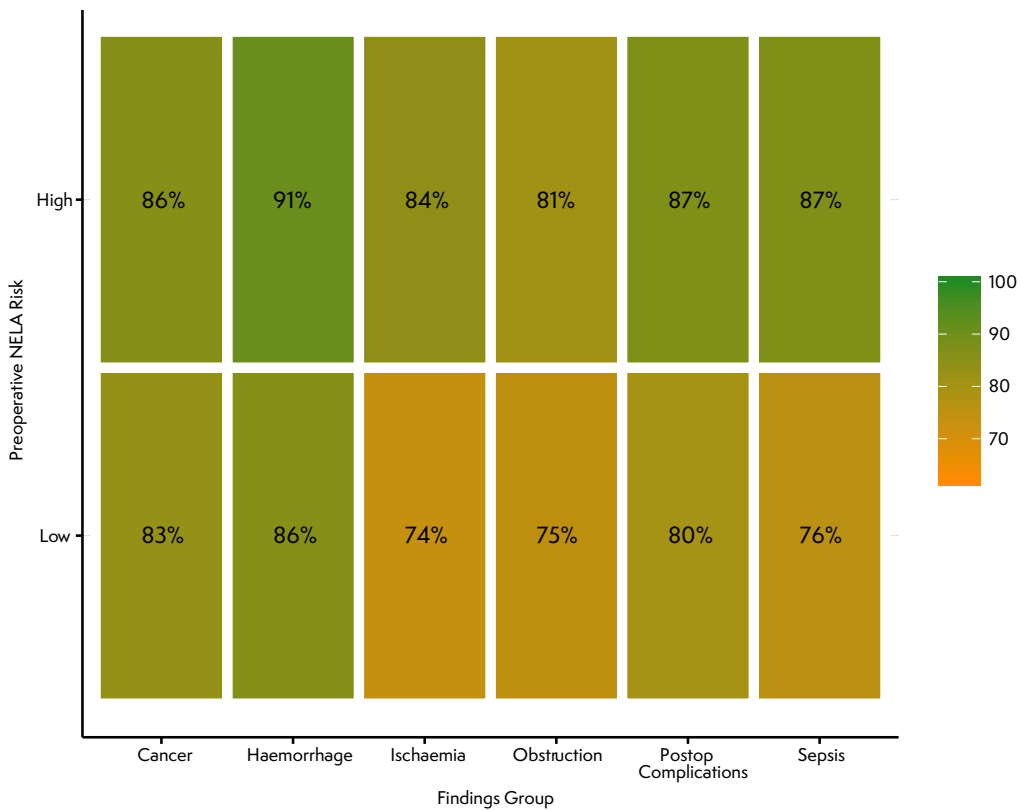
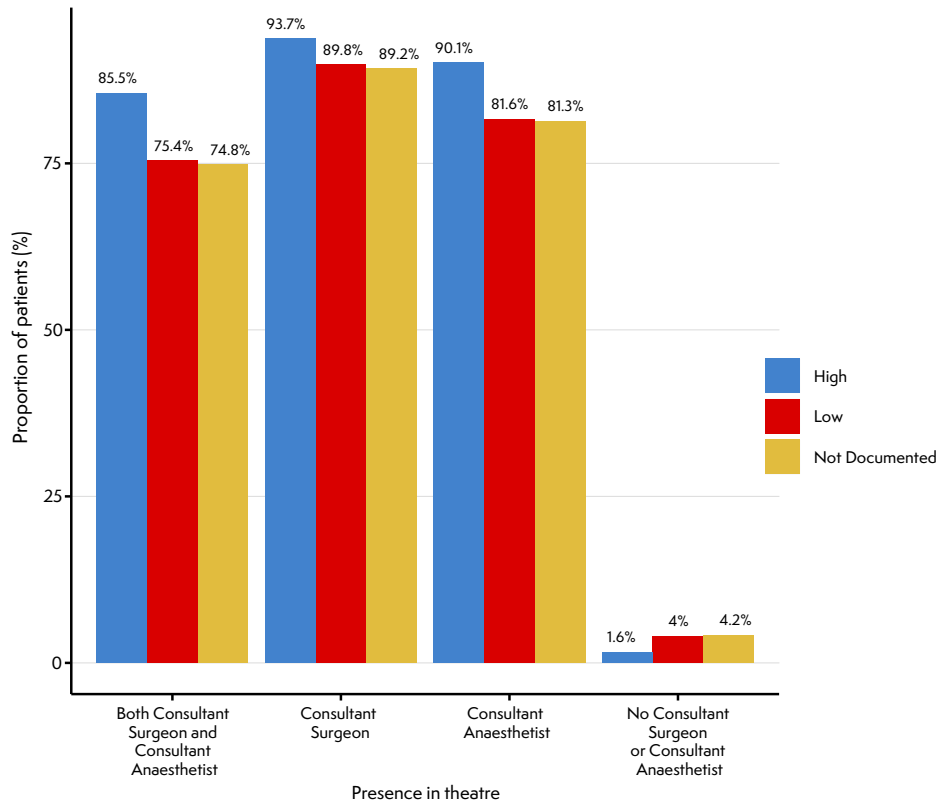


Figure 6.11 Proportion of patients whose care during surgery was directly supervised by a consultant surgeon and anaesthetist by documented preoperative risk category



# 7 Postoperative care

## 7.1 Postoperative admission to critical care

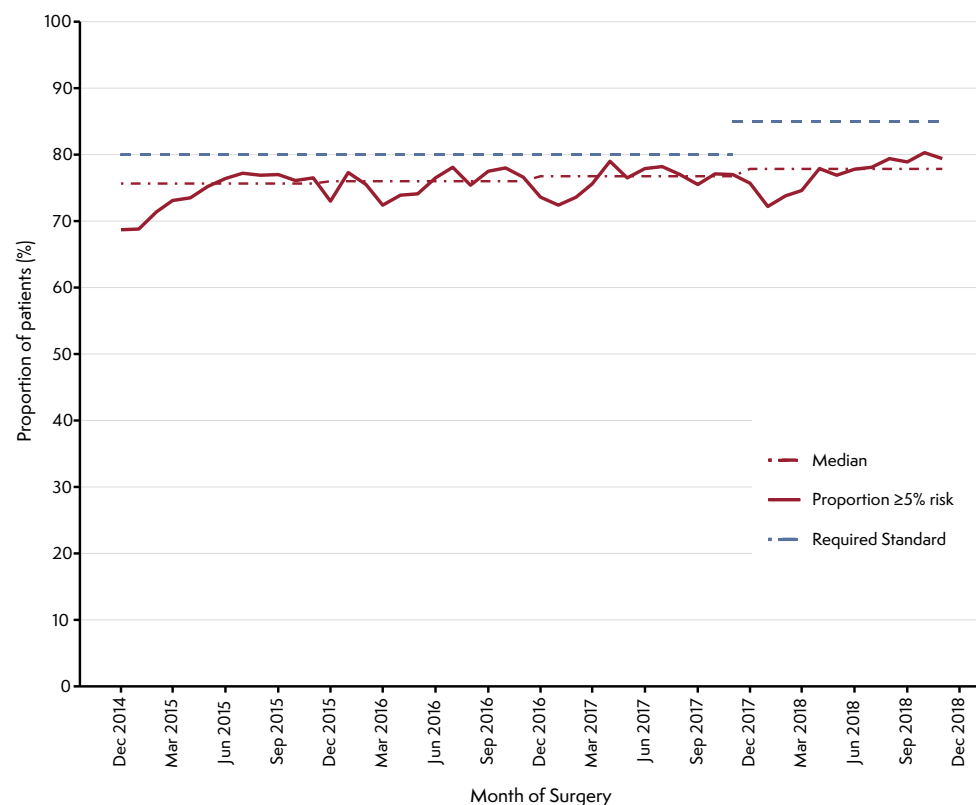
Critical care provides patients with advanced treatments and organ support not available on general surgical wards, alongside a higher staff to patient ratio. Patients are more likely to die if they are admitted to a general ward, deteriorate and require subsequent admission to critical care, than if they are admitted directly to critical care.<sup>14,1</sup>

### Key process measure

#### The proportion of patients who were admitted directly to critical care when risk of death $\geq 5\%$

■ 174 hospitals were included in this metric. 65 (37.4%) were rated green, 11 (6.3%) were rated red.

Figure 7.1 Trends in the proportion of patients with a risk of death  $\geq 5\%$  admitted directly to critical care after surgery



Where were patients admitted to after their surgery?

- 61% of all patients undergoing emergency laparotomy were admitted directly to critical care unit (CCU).
- 6% were admitted to another 'enhanced care area.'
- 33% 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.
- 7.9% of patients assessed to be frail were admitted to critical care.
- 18.9% patients who did not have their risk documented went to critical care.
- Patients aged >70 years were 1.6 times more likely to have direct critical care admission compared with <50 years old.



**ALERT!** Failure to consistently admit high-risk patients to critical care, as demonstrated by the RAG rating figures, remains concerning. Figures have not improved over the last three years of reporting.



### **All high-risk patients who are not admitted to critical care are listed on a NELA best practice tariff (England only) report**

This report should be reviewed regularly by the surgical and critical care teams in an MDT meeting, and actions put in place to improve care. The provision of critical care beds is limited due to lack of resources. Within England this measure is part of the best practice tariff which may bring extra income to the hospital if all high-risk patients are admitted to critical care, however, data is also useful for hospitals in Wales.

# 8 Care of the older patient and vulnerable patients

## 8.1 Patients over the age of 70 having emergency laparotomy

### Key process measure

#### The proportion of patients aged 70 years or over who were assessed by a geriatrician.

- 168 hospitals were included in this metric. 11 (6.5%) were rated green, 142 (84.5%) were rated red.\*\*

NELA has previously reported on the risk of increased adverse outcomes and complications after surgery for older patients. In the fifth year, an additional question asking if and how frailty was assessed was added. The use of comprehensive geriatric assessment methodology facilitates targeted patient-centred interventions that has shown to result in improved patient outcomes.<sup>15</sup> *The High-Risk General Surgical Patient* document<sup>4</sup> states that all patients over the age of 65 should have frailty assessed, and if found to be frail are reviewed by geriatricians. However, this report is based upon data entered by teams before the publication of these latest recommendations and therefore benchmarks against the age of over 70 years, which reflects the guidance in place at this time. Future reports will reflect the updated standards.



44.7% of all patients in NELA are over the age of 70



Patients older than 70 years have a higher 30-day mortality (14.5% v 5.6%)



Mean length of stay for patients over the age of 70 is 18 days compared with 12 days for patients aged 18–24 years

What proportion of patients over the age of 70 were seen by a geriatrician?



**ALERT!** There has been no improvement in the proportion of patients over the age of 70 benefiting from geriatric specialist input.

Table 8.1 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
70–79	6,162	19.1%
80–89	4,200	26%
≥90	516	33.9%
Overall	10,878	22.5%

\*\*RAG rating is for patients over the age of 70, but in line with the more recent published guidance in this report, NELA is also reporting the findings for patients over the age of 65.

Figure 8.1 ONS 30-day and 90-day mortality, by age

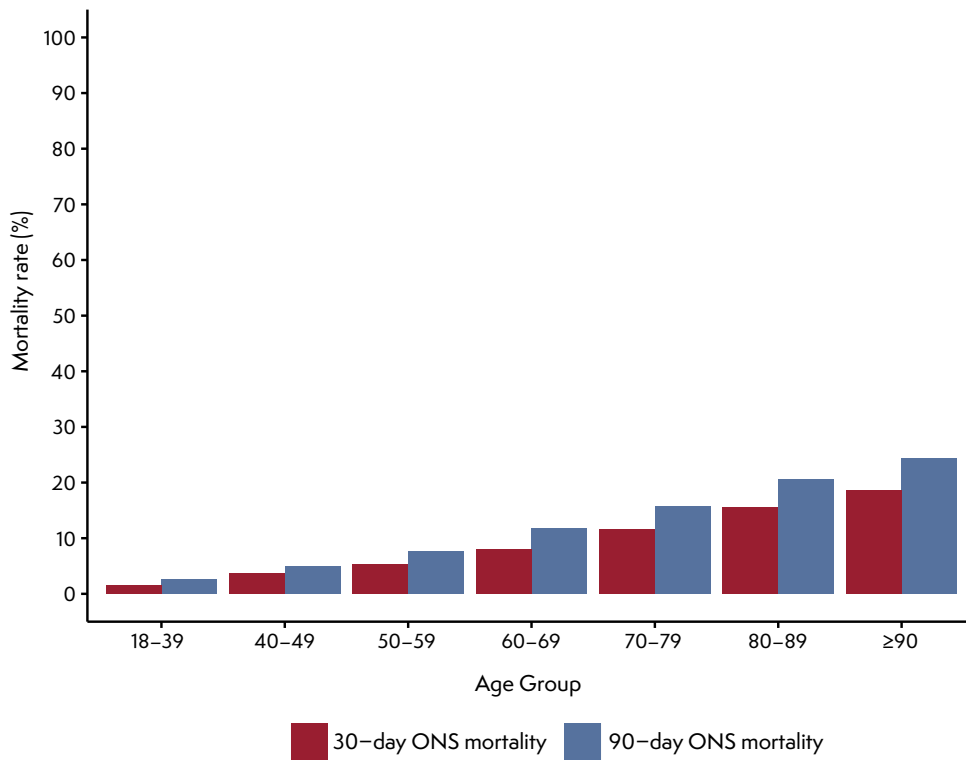


Figure 8.2 Postoperative length of stay in patients surviving to hospital discharge, by patient age

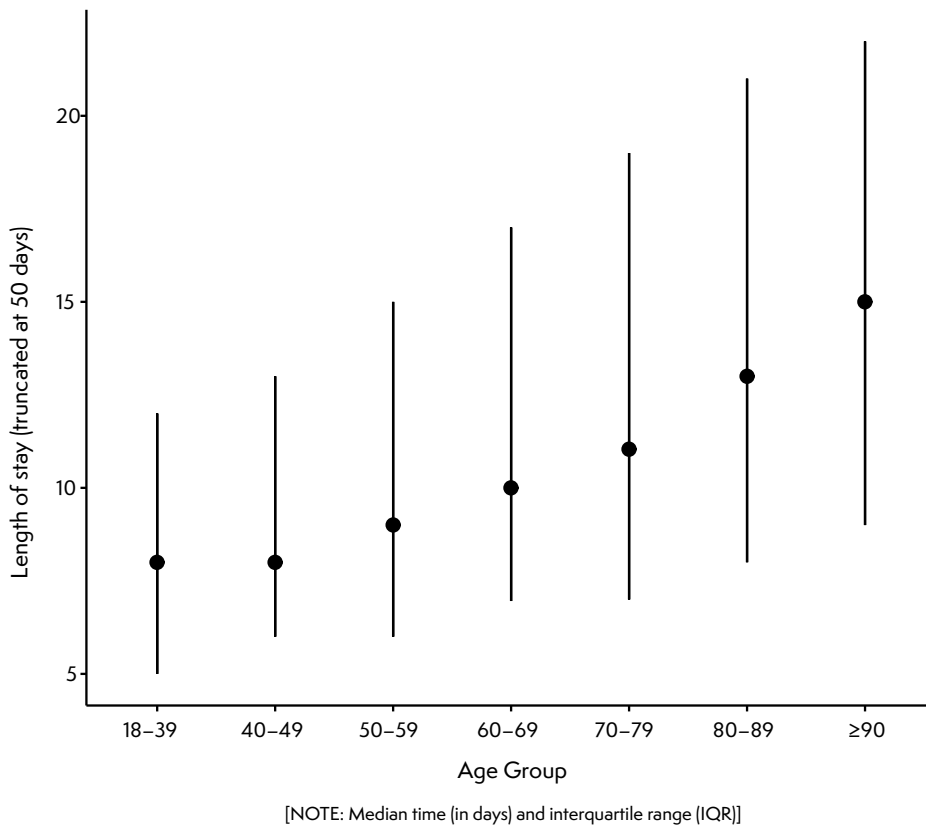
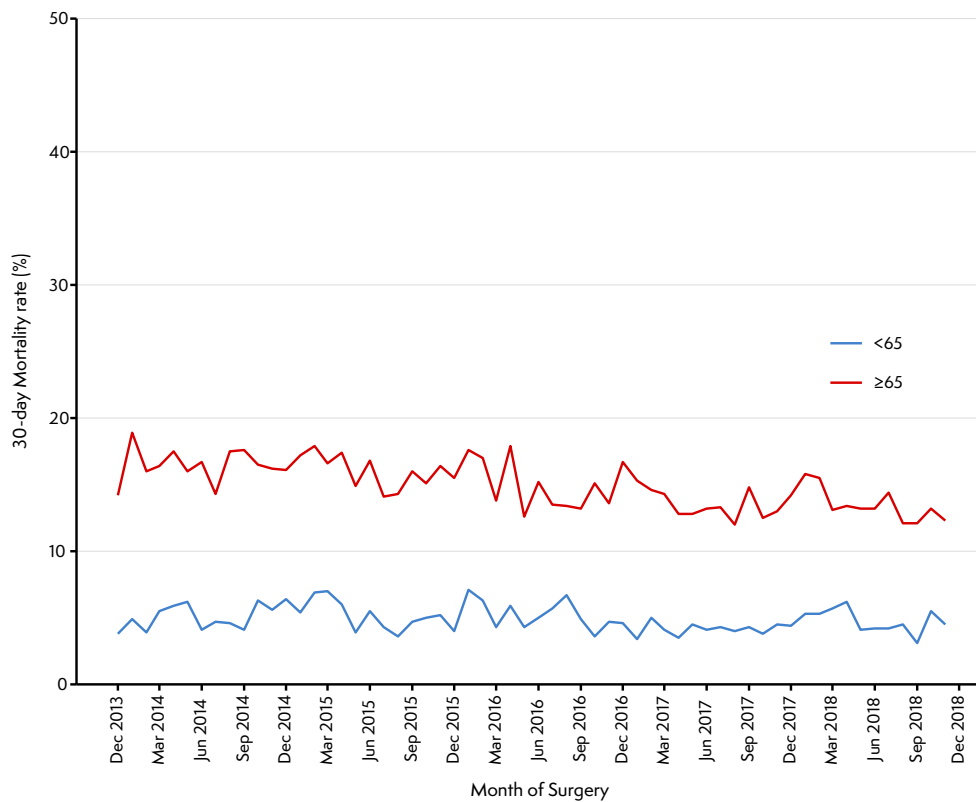


Figure 8.3 Comparison of 30-day mortality in two groups of patients over time; patients over the age of 65 years and patients under the age of 65 years



## 8.2 Frailty and emergency laparotomy

Older patients may suffer from multi-morbidity and geriatric syndromes including frailty, with frailty a known risk factor for postoperative morbidity and mortality, 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.<sup>16</sup>

- 14% of all patients, across all age groups, within the NELA dataset (n = 24,328) were assessed for frailty using a recognised frailty scoring system.
- 19% of patients over age of 65 underwent a frailty assessment, and 50.8% of patients who had a frailty assessment met the criteria for frailty syndrome.
- Frailty was associated with increased mortality, regardless of patients age.
- If found to be frail and aged over 70 years, 30-day mortality was 23.4% compared to 14.5% if not frail.

### How was frailty assessed?

Table 8.2 Methods used in frailty assessment

Frailty Assessment Tool	Total of patients (%)
No assessment	17,374 (71.4%)
Edmonton frail scale	45 (0.2%)
Electronic frailty Index	122 (0.5%)
Other objective scoring system	349 (1.4%)
Rockwood score	664 (2.7%)
Subjective assessment	2,272 (9.3%)
Missing	3,502 (14.4%)

The majority of patients did not have a frailty assessment performed. Of those who did, a formal frailty tool was not used or the form of assessment was unclear.

Table 8.3 Year 5 data to describe the proportion of patients over the age of 70 years who had a frailty assessment and risk adjusted mortality

Frailty assessment result	Number of patients in total	30-day mortality	90-day mortality
Not frail	1,790	5.1%	8.3%
Frail	1,476	21.7%	28.1%
Unknown/missing	186	13.3%	22%

Table 8.4 30-day mortality of patients who have had a frailty assessment, by frailty score and age

Age group	Number of patients who had frailty assessed in each age group	Mortality according to frailty status				
		Number of patients who were assessed as 'Frail'	30-day mortality	Number of patients assessed as 'Not Frail'	30-day mortality	Unknown/missing
18–24	34	5	60%	28	(3.6%)	1 (100%)
25–34	63	3	0%	58	(0%)	2 (0%)
35–44	108	16	25%	89	(2.2%)	3 (0%)
45–54	256	45	24.4%	203	(1%)	8 (12.5%)
55–64	426	104	20.2%	307	(5.2%)	15 (6.7%)
≥65	2,565	1,303	23.3%	1,105	(6.9%)	157 (13.4%)



**ALERT!** NELA has found that an assessment of frailty is not routinely performed in the preoperative work up of patients over 65 having emergency laparotomy surgery. Frailty assessment must be used alongside clinical risk assessment.



**ALERT!** Given the high incidence of frailty, and the high associated mortality,<sup>16</sup> patients over the age of 65 who are not frailty assessed should be treated as being high-risk.



**Assessment of frailty should be part of the multi-disciplinary team pathway, using a tool that the team performing the assessment are familiar with using**

This should be developed with elderly care physicians and may be informed by work already done on local fragility fracture pathways.

### Frailty and risk assessment

Of the patients who had their frailty assessed, the majority (80.1%) were also documented as being in the high-risk group. However, 11.3% of frail patients were recorded as being low-risk, which is not in keeping with published data.<sup>16</sup> 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. It is expected that introducing frailty assessment into the risk score will improve its predictive value.

The 8.5% of frail patients who did not have any other risk assessment documented formally before surgery, had a 30-day mortality of 19.8%.





**ALERT!** If a patient is assessed as being frail, clinical judgement of risk should be used and unilateral reliance on risk prediction models should be avoided. NELA risk score is based upon physiological and biochemical markers and does not reflect frailty.



Frailty is associated with poorer clinical outcomes and must be form part of the preoperative assessment in patients over the age of 65.

Table 8.5 Proportion of patients who were assessed as being frail who were assessed by geriatricians, by age

Age group	Total assessed as frail	Assessed by geriatricians	Not assessed by geriatricians
< 65	173	15 (8.7 %)	158 (91.3%)
65–69	101	17 (16.8 %)	84 (83.2%)
70–74	188	61 (32.4 %)	127 (67.6%)
75–79	243	101 (41.6 %)	142 (58.4%)
80–84	344	127 (36.9 %)	217 (63.1%)
85–89	286	119 (41.6 %)	167 (58.4%)
≥90	141	56 (39.7 %)	85 (60.3%)

### 8.3 Patients with learning disabilities (LD) or autism spectrum disorder (ASD)

In Year 5 of data collection, NELA introduced new specific questions which aimed to identify any patient requiring emergency laparotomy with LD or ASD. This important question was added to help understand if there is any unwanted variation in the standards of care that this cohort of patients receive.<sup>§§</sup>

Patients with learning disabilities, or autism who present for major emergency surgery are a vulnerable group,<sup>17</sup> and almost all will have one or more long term health condition.<sup>18</sup> 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](#). Assumptions about the quality of life or appropriateness of surgery should be avoided.

301 patients having emergency laparotomy surgery were identified as having either learning disabilities, or autism. (774 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. 82.7% (regardless of risk category) having consultant delivered intraoperative care, and 89% of high-risk.

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

- 67.7% of all patients with LD/ASD were admitted to critical care (compared to 60.8% admission rate overall for all patients).
- 82.7% of all patients recorded as having LD or ASD and 89% of those documented as being high-risk, had consultant delivered intraoperative care.
- Length of stay was longer for patients in this group with a mean duration of admission of 20 days (compared to 16 days).
- 30-day mortality was 10.3%.

<sup>§§</sup>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.

## 8.4 Intraoperative deaths and end of life care pathways

- 57 patients (0.23%) died in theatre, nearly half of whom had sepsis and two-thirds of whom were aged between 70–90 years old.
- Of those patients who died in theatre, 89.5% 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.
- 405 patients were placed on an end of life pathway after their surgery, which was more likely in older patients. Patients with cancer, ischaemia or bleeding found at laparotomy were more likely to be placed on an end of life pathway.



**ALERT!** 70–90 year olds are most likely to die in theatre but should not have surgery withheld from them if they have good pre-morbid and functional status. Decision making about ceilings of care must be made with the patient and their family.



Decisions on treatment should be discussed with the patient, taking in their wishes and preferences. This discussion should be informed by risk prediction and the patient outcomes detailed in this report. Although it may be difficult in the emergency situation, encouraging shared decision making is still possible. [NHS England's shared decision making resources](#) can help teams to include patients in important treatment decisions.

# 9 Outcomes

As the world's largest database of prospectively identified patients undergoing emergency laparotomy we are able to report upon risk adjusted death within 30 days, length of stay, and longer term outcomes. Understanding the effect of prolonged durations of hospital admissions is important not only from a health economics perspective but as an indicator of care quality. It may also indicate external systems pressures that prevents the discharge of patients out of hospitals. This knowledge, including the likelihood of needing to return to theatre for further surgery and the potential changes to patients' place of residence, helps patients and their clinical teams to have informed discussions about the risks and benefits of surgery.

## 9.1 Risk adjusted mortality

All cause 30-day mortality after surgery fell for the first four years of reporting. However, for the first time, mortality has not improved and has remained static.

Figure 9.1 Trend in the overall unadjusted 30-day and 90-day ONS mortality rates by NELA dataset year

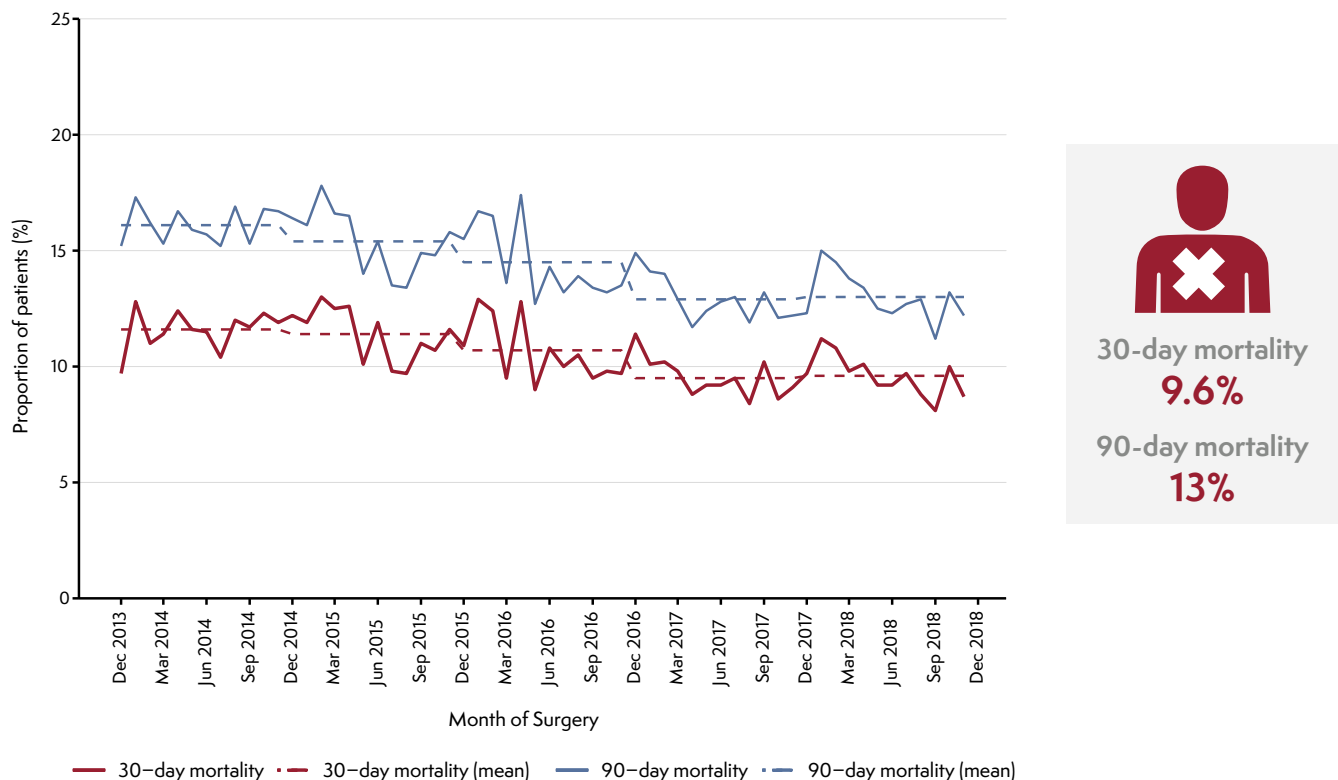
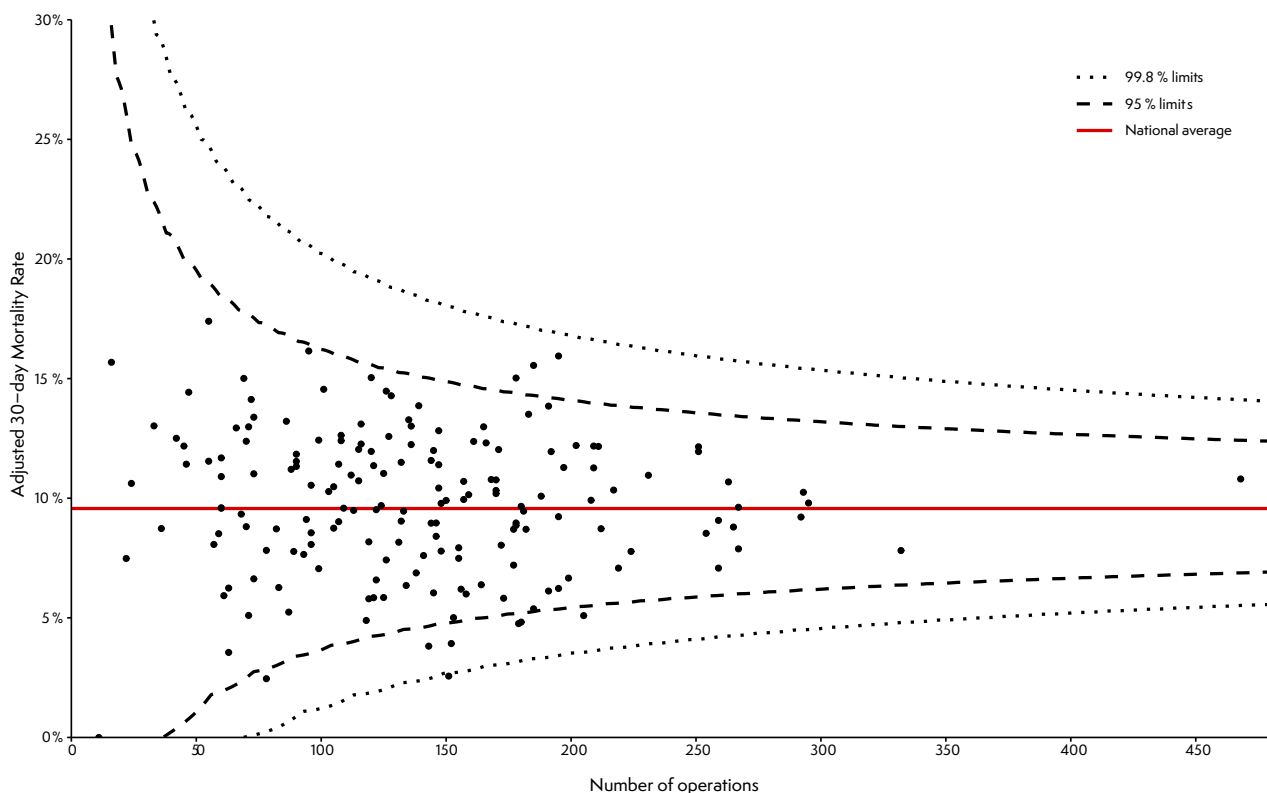


Figure 9.2 Funnel plot of risk-adjusted ONS 30-day mortality rates



Notes: This plot shows data from 174 hospitals. Five hospitals with fewer than ten operations in Year 5 were excluded.

### Hospital level mortality

Following adjustment for casemix differences, of the 179 hospitals contributing data to this year’s report, no hospital was an outlier (alarm status) with their with outcomes lying above the 99.8% control limits. Three hospitals triggered alert status (between 95% and 99.8% upper control limits) for this year only. 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](#).

### Hospitals with the best outcomes

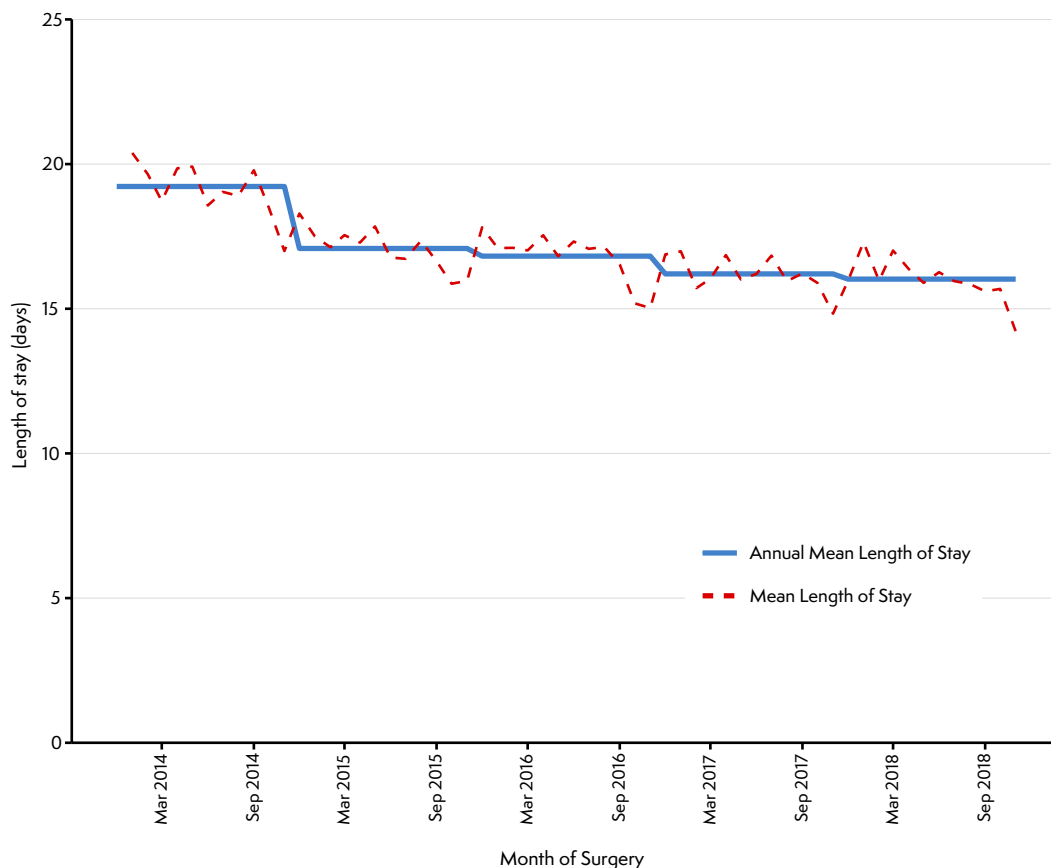
Six hospitals (shown in the table below) had a risk-adjusted mortality below the lower 95% control limit, meaning that these hospitals have some of the best outcomes in England and Wales. The hope is that collaborative learning events will provide opportunities for hospital teams to learn from one another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

Hospital	Caseload	Risk adjusted 30-day mortality
Weston General Hospital	78	2.5%
St Thomas’ Hospital	152	3.9%
Southmead Hospital	179	4.8%
Salford Royal Hospital	151	2.6%
Royal Devon and Exeter Hospital	180	4.8%
Kings Mill Hospital	143	3.8%
Addenbrookes Hospital	205	5.1%

## 9.2 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, but is also better for many patients meaning they are back to their own homes and starting their journey back to normality sooner.<sup>11</sup>

Figure 9.3 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** (9–26), low-risk = **8 days** (6–13).



**More co-morbidities:** ASA 1 = **7 days**, ASA 4 = **19 days**.



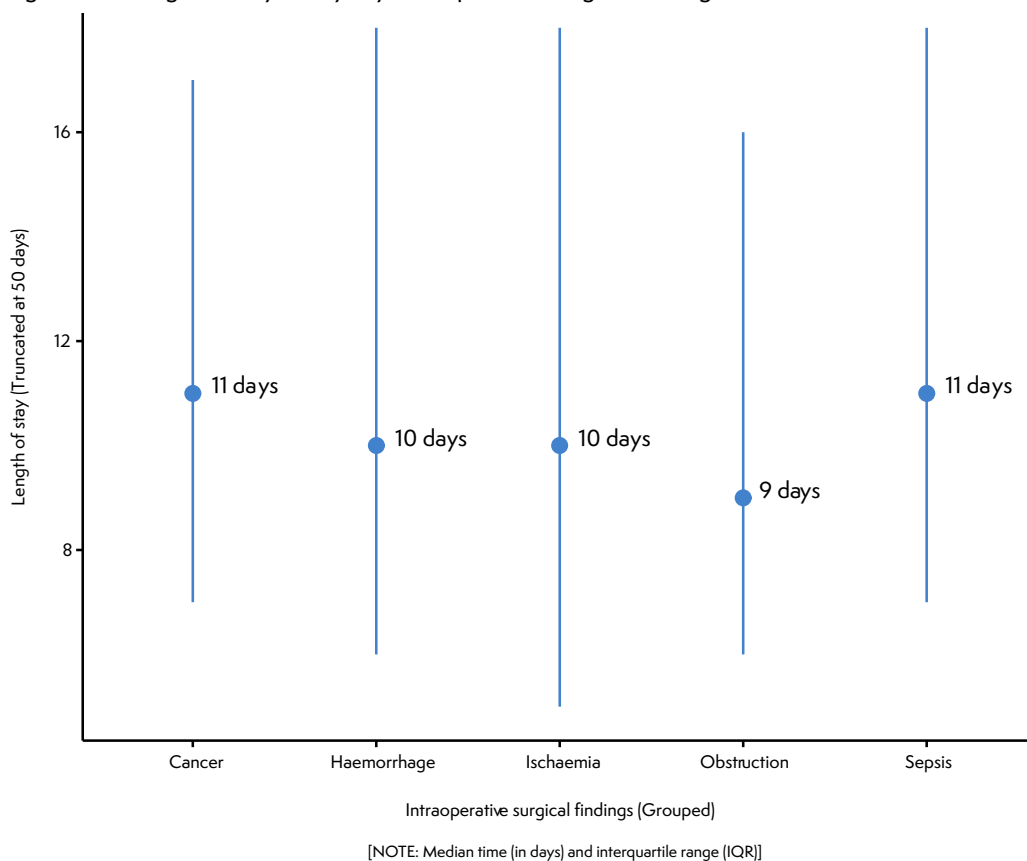
**A return to theatre** which more than doubles the median LOS from **10 up to 29 days**.



**An unplanned admission to critical care** which is associated with a significantly prolonged LOS with around an extra **13 days** in hospital (unplanned admission median LOS = **21 days** (12–38) v no unplanned admission LOS = **10 days** (6–18).

<sup>11</sup>We only report on patients who survive to discharge in this section and all are median LOS reported alongside the interquartile range.

Figure 9.4 Length of stay in days by intraoperative surgical findings



### 9.3 Unplanned returns to theatre

Following emergency laparotomy 8.9% of patients need to return to theatre for further operative intervention. For some patients (n =730) this may be as a planned return, usually following initial 'damage control' surgery. Some patients may have an unplanned return to theatre for a number of reasons (n =1,414). This includes those who are not improving at the expected rate; patients who have ongoing pathology not adequately dealt with at initial laparotomy and those who develop a post-operative surgical complication.

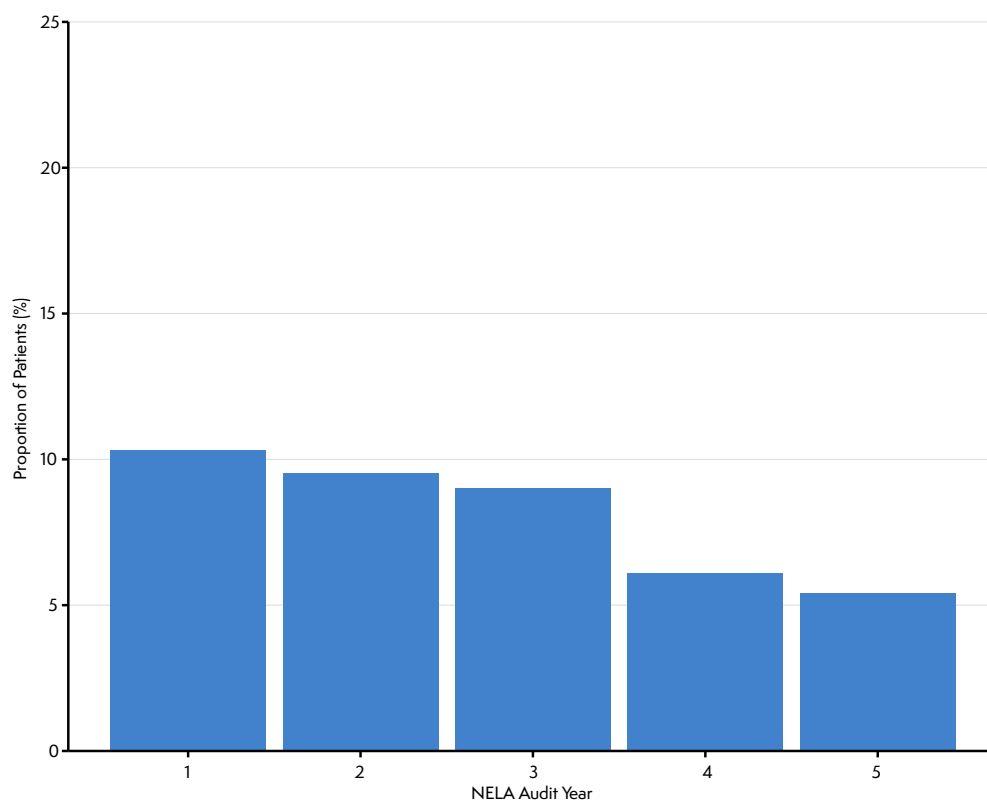
It is important to try and identify which patients are at risk of an unplanned return to theatre and to have appropriate pathways in place to ensure these patients are managed promptly with appropriate consultant level input.

#### Key findings

- 3% have a planned return to theatre, 5.4% have an unplanned return to theatre, 0.5% of patients had both a planned and unplanned return.

The overall rate of unplanned return to theatre after initial emergency laparotomy continues to improve.

Figure 9.5 Proportion of patients who have an unplanned return to theatre, by NELA year



- Unplanned return to theatre is:
  - more than twice as likely if the patient is under age 70 years
  - twice as likely if the patient is predicted high-risk (>5%)
  - 1.7 times more likely if the patient requires immediate (most urgent) surgery
  - 1.3 times more likely if the patient is male.
- 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 29 days.

Table 9.1 Mortality rate by operative finding

Operative findings	Total patients	ONS 30-day mortality	ONS 90-day mortality
Adhesions	6,750	6.9	9.5
Perforation SB Colonic	5,076	14	17.3
Intestinal Ischaemia	2,875	21.5	25
Abscess	2,673	6.6	9.9
Colorectal Cancer	2,227	8.4	15.4
Malignancy Localised	2,065	7	11.3
Incarcerated Hernia	1,760	8.5	10.9
Diverticulitis	1,501	7.3	9
Perforation Peptic Ulcer	1,496	9.8	12.3
Internal Hernia	1,341	7.8	10.1
Malignancy Disseminated	1,315	18.8	37.4
Stricture	1,097	6.5	9.6
Volvulus	995	9.7	11.9
Crohns Disease	746	2.8	3.4
Anastomotic Leak	571	7.9	11.2
Ulcerative Colitis	436	4.1	5.7
Intestinal Fistula	428	8.2	12.6
Normal Findings	349	12	16.6
Colitis	303	17.2	19.5
Stoma Complications	300	6	10.7
Gallstone Ileus	295	4.4	6.4
Haemorrhage Postop	279	6.5	7.9
Haemorrhage Intestinal	271	16.6	19.2
Meckels Diverticulum	228	2.2	2.2
Foreign Body	196	2	3.6
Intussusception	196	2.6	5.6
Pseudo Obstruction	176	11.4	14.8
Haemorrhage Peptic Ulcer	140	22.9	27.9
Wound Dehiscence	113	8	12.4
Gastric Cancer	83	13.3	30.1
AbdoCompartment Synd	36	36.1	41.7
Necrotising Fasciitis	33	33.3	33.3



## 9.4 Unplanned admission to critical care

822 (3.4%) patients had an unplanned admission to critical care. The rate of unplanned admission varied between 0–28.8% between hospitals. Unplanned admission to critical care resulted in a longer median duration of stay of 21 days (IQR 12–38) compared with ten days if there was no unplanned admission. Mortality was 16.8% if an unplanned admission to critical care occurred.

Table 9.2 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	606 (73.7%)
Enhanced care area	45 (5.5%)
Ward	171 (20.8%)

Table 9.3 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	23,288 (95.9%)	9.1%
Unplanned admission to critical care	822 (3.4%)	16.8%
Unknown	161 (0.7%)	14.9%

## 9.5 Place of residence after discharge



**ALERT!** Data quality for this question is poor, with 12.6% marked as unknown, making meaningful analysis of this important question difficult. Understanding the likelihood of return to independent living or change in functional status is imperative. Local teams should improve their data accuracy to facilitate this.

The impact on patients and their families after major surgery can be huge. In addition to the physical changes, chances of chronic pain or associated co-morbidities, many patients suffer a decline in their abilities to perform activities of daily living. Understanding the potential impact on the social as well as the medical wellbeing of patients is important in the process of consent and shared decision making, as well as when planning discharge from hospital.

# 10 The NELA recommendations; improving outcomes and reducing complications

Local clinical teams should use the data from quarterly reports, and the contemporaneous webtool, to support raising concerns or challenging apparent gaps in care pathways or delivery of care.

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. The findings of the [EPOCH study](#) must be noted by not only clinicians but by hospital senior management and leadership. Clinical teams report lack of time as a key barrier to implementing change. The study also reported that improvements were easier when relationships between teams were good, and so senior leaders are responsible for ensuring their clinical teams have the time and resources to make improvements.

## 1 Provide care within an appropriate time frame for all patients

- 1.1 Write locally agreed pathways of care that makes sure all patients receive all elements of care, in a timely fashion.
- 1.2 Give antibiotics within one hour in all patients with [suspected sepsis](#).
- 1.3 Ensure patients have their emergency laparotomy within the time frame decided by the perioperative and surgical team and are not delayed by capacity or infrastructure issues.

## 2 Facilitate effective team working

- 2.1 Include the wider multi-disciplinary team, such as intensivists, geriatricians, radiologists, physicians and emergency department doctors in the design and delivery of the care pathway.

## 3 Assess all patients' risk of death and morbidity

- 3.1 Assess the risks of surgery in a holistic way, including validated tools, assessment of frailty for patients over 65, and other factors such as nutritional status and risk of kidney injury for all patients.
- 3.2 Teach all clinicians involved in the care of patients needing emergency laparotomy surgery how to assess risk of death and frailty.
- 3.3 Communicate and document the risk assessment with both the clinical team and the patient.

## 4 Recognise high-risk patients and provide appropriate standards of care

- 4.1 Treat all patients as if they are high-risk ( $\geq 5\%$  mortality) unless a consultant clinically assesses them to be low-risk.
- 4.2 Treat all patients over the age of 65 who do not have a formal frailty assessment as high-risk.

## 5 Use your local data to effect change

- 5.1 Access and present local data regularly and use it to inform improvements in care pathways.
- 5.2 Enable clinical and non-clinical teams to attend local collaborative events.
- 5.3 Ensure clinical and non-clinical staff have dedicated job planned time to gather and act upon NELA data, design and implement improvements to patient care, and to attend regional events.
- 5.4 Use performance against the NELA key standards of care (in the [exception/excellence toolkit](#)) as part of the structured review of deaths in patients who have undergone an emergency laparotomy.

# 11 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 120,000 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.



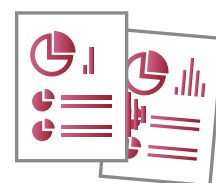
**Nine peer reviewed** publications based upon detailed analysis of NELA data



There are **ten more ongoing research projects** using the NELA dataset



NELA data has been presented at over **40 conferences and meetings** across the world



NELA is cited in **over 48 papers**



The findings of NELA has underpinned the development of national guidance on the **care of high-risk patients** (Anaesthesia Clinical Services Accreditation (ACSA)/ Guidelines for the Provision of Anaesthetic Services (GPAS)/Royal College of Surgeons Higher Risk General Surgical Patient)



**Development of a nurse specialist role**;<sup>19</sup> in recognition of the need for continuity of care, **the role of emergency laparotomy specialist nurses has begun to evolve**<sup>20</sup>



**NELA perioperative medicine teams** with specific goals of **improving outcomes for patients** who have had emergency laparotomy have been established



**Projects around the world are beginning to collect data** and report on the **outcomes of patients in recognition of the need to ensure the right care**, at the right time for emergency laparotomy patients. Jersey/Scotland/Isle of Man/Australian and New Zealand Emergency Laparotomy Audit (ANZELA)/Emergency Laparotomy and Laparoscopic Scottish Audit (ELLSA) now have projects underway

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