Third Patient Report of the National Emergency Laparotomy Audit (NELA)

December 2015 to November 2016

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

NELA National Emergency Laparotomy Audit

October 2017

The third Patient Report of the National Emergency Laparotomy Audit (NELA)

December 2015 to November 2016

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Cover: Donna Armitage-Taylor and her daughter Stephanie Taylor

The National Emergency Laparotomy Audit (NELA) is commissioned by the Healthcare Quality Improvement Partnership as part of the National Clinical Audit Programme on behalf of NHS England and the Welsh Government.

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Design and layout by the Royal College of Anaesthetists

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National Emergency Laparotomy Audit

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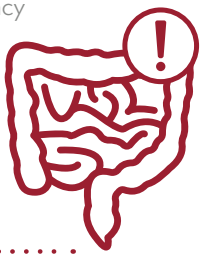
An emergency laparotomy (emergency bowel surgery) is a surgical operation for patients, often with severe abdominal pain, to find the cause of the problem and treat it. General anaesthetic is used and usually an incision made to gain access to the abdomen. Emergency bowel surgery can be carried out to clear a bowel obstruction, close a bowel perforation and stop bleeding in the abdomen, or to treat complications of previous surgery. If left untreated, 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.

1 **30,000**

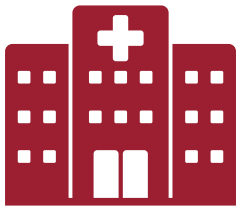
Almost **30,000** laparotomies are carried out each year across **England and Wales** and **24,897** of these were entered into the audit.

2 A patient undergoing emergency bowel surgery often receives care from many parts of the hospital, often within a short period of time: **emergency department, radiology (X rays), operating theatres, critical care** and **ward care**.



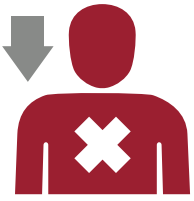
3 Improvements in care have reduced patients' average hospital stay from **19.2 days** in **2013** to **16.6 days** in **2016**.

19.2 days
16.6 days



4 Improvements in care have saved **NHS hospitals** an estimated **£30 million annually**.

5 Since **2013**, national **30-day mortality rate** has fallen from **11.8%** to **10.6%**.



6 **~300 patient lives saved** each year compared with **2013**.

7 **Consultant care** is crucial. They provide care in theatre for **79% of high risk patients**.

79%

8 **600+**

600+ doctors worked with nursing and management colleagues to collect this data, and implement improvements.

9 **76%** of hospitals meet the target for getting most of their most urgent patients to the operating theatre **within two hours**.

76%

10 **78%** of hospitals meet the accepted standard of admitting their **high risk patients** directly to critical care after surgery.

11 **~50%** of patients are aged **over 70**. Only **3%** of hospitals provide **regular proactive assessments** from geriatricians for older patients after surgery.

50%
over 70

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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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Acknowledgements

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 (www.nela.org.uk/NELALeadDb); without this engagement, patients would not have benefited from improved care and NELA would not be the success it has become over the last three 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 FOREWORD

(from left to right): Melissa Taylor (aged 11), Donna Armitage-Taylor, Stephanie Taylor (aged 6) and Darren Taylor

I had spent the day before my emergency bowel surgery on the local beach with my family, enjoying the blustery weather and an unseasonal ice cream. Unbelievably, within 24 hours, I became acutely unwell and I was admitted to hospital with severe abdominal pain.

I had, like most patients, never heard of the National Emergency Laparotomy Audit. I had little idea of quality improvement, audit, data, or how many other patients would undergo similar surgery to me. I had no time to appreciate how many different professionals would be working together to help me. I had no idea that I would need to rely on a team of staff who had been driving improvements in the care of patients like me, using NELA data to improve outcomes. All we knew as a family was that I was very unwell and I needed some kind of operation, very quickly, to save my life.

As a patient, when you are in the position of needing this kind of high-risk emergency surgery you, and your family, depend on multidisicplinary teams to work closely and effectively together to ensure that you are cared for in the best possible manner.

Because of the often rapid onset of symptoms that lead to needing emergency bowel surgery, and because you may feel so unwell, you may not have the opportunity to choose where you have your surgery, who performs your anaesthetic, or even look into what will be involved. Unlike elective surgery, these choices are taken away from you and as a patient, you are wholly reliant upon the team at the hospital to function at as high a level as possible to ultimately save your life.

I was cared for by ED nurses, junior doctors, radiographers, consultant surgeons, consultant anaesthetists, ODPs, and theatre nurses. All of them had significant influence on ensuring that I, as a high-risk patient, had the best chance of survival. I now know that, not only did staff care for me to the absolute best of their clinical abilities, but also that they were supported in doing so by significant pieces of work designed to improve the way the hospital provides care to patients like me.

Without the work done by this local NELA multid isciplinary team, including non-clinical audit and quality improvement staff, I would not have had my CT scan reported rapidly, and would not have had a consultant anaesthetist and a consultant surgeon reviewing me together preoperatively, working together to get me to theatre so fast, and ensuring I was looked after on the ICU after my surgery. All of this contributed, undoubtedly, to saving my life.

So, what do audits mean for patients? The truth is, very little unless they translate into improved care for us and are presented in such a way that we can use them to understand the care that we should receive. The team who cared for me had been working together using the NELA data, sharing it in innovative ways, and acting upon it to improve the care that I and other patients received.

Simply collecting data on each of us who has an emergency laparotomy is not enough. Data needs to turn into actions, as this is what makes a difference in outcomes for patients. NELA data needs to be used in such a way that it empowers and enables the dedicated teams of staff who work throughout the day and night to do the very best for their patients and provide the highest quality of care for us.

NELA has collected data on thousands of patients who have had an emergency laparotomy in the last year, and presents that here in this Report. As you read this Report, **remember that every single number, percentage or dot on a graph, represents someone like me; a patient,** someone's mum, dad, daughter, brother, or friend. And every time this dot of data is used constructively it improves care for future patients.

Donna Armitage-Taylor
Emergency Laparotomy Patient

NELA
National Emergency Laparotomy Audit

2 EXECUTIVE SUMMARY

Overview

1 The National Emergency Laparotomy Audit (NELA) is an ongoing national clinical audit of patients having emergency bowel surgery, which is a surgical procedure with high associated mortality. The quality of care and outcomes for patients can be improved through planning and delivering care based upon a comprehensive assessment of each patient's risk of death.

2 This is the Third Patient Report of the National Emergency Laparotomy Audit. It includes data from the second Organisational Audit performed in October 2016 and from the third annual cycle of patient-data collection.

3 The Organisational Audit provides information on how hospitals have organised their emergency general surgical service, and whether this service meets published standards for facilities and governance.

4 The Patient Audit collected information on 24,897 patients who had surgery between 1 December 2015 and 30 November 2016. This is an increase on last year, and represents around 82% of all patients who had emergency bowel surgery in England. All 187 hospitals in England and Wales that perform emergency laparotomies provided data for NELA and we have thus been able to provide a comprehensive 'state of the nation' report.

5 This Report includes hospital-level mortality data for patients undergoing emergency bowel surgery. It includes the results of an outlier analysis to assess whether any hospital had 30-day postoperative mortality rates that were higher than would be expected given their patient case mix.

6 The NELA data have allowed us to develop a bespoke emergency laparotomy risk assessment tool to predict the risk of 30-day mortality; this is based upon the data of the 45,000 patients whose information was submitted to the Audit in 2014 and 2015. This should provide a more accurate assessment compared to existing risk assessment tools which were developed for different patient cohorts and may not take into account patient factors specific to emergency laparotomy patients. The NELA risk prediction tool will be assessed further, in particular by validating it by using more recent data submitted to NELA. The tool is available for use on our website (http://data.nela.org.uk/riskcalculator) and as an 'app', and we encourage other groups and clinicians to also evaluate its performance in patients eligible for inclusion in NELA.

7 NELA allows hospitals to quality-assure their service by comparing care against published standards and reporting this at hospital level. At present, hospitals are considered to have provided good quality care (rated Green) if a standard has been met for more than 80% of patients. This 'bar' will be raised over time as the Audit develops and quality improves. Many of these standards and ratings are publicly reported on the MyNHS website and used by the Care Quality Commission (CQC) for hospital inspections.

8 NELA also makes data readily available to local clinicians, managers, and commissioners to support quality improvement activity, so that changes to the service can be monitored in an ongoing fashion to facilitate improvements in care. This includes publically available quarterly reports (https://data.nela.org.uk/Reports/Hospital-reports.aspx).

9 The Royal College of Anaesthetists has been awarded the contract to continue running NELA until 2020. Over the coming years, we will be making changes to the way NELA is delivered. These will include:

- greater input by patients and service users into the way the Audit is run, and the way we report results
- more emphasis on collecting data to support quality improvement
- looking for ways to reduce the burden of data collection.

10 This Report provides recommendations for commissioners, providers, clinical teams, and patients, aimed at improving delivery of care to this high-risk group of patients.

11 This Report also includes an overview of additional purposes that NELA data are being used for over and above quality assurance and quality improvement. These include:

- research activity which aims to better define what interventions are effective in emergency laparotomy care

- development of an NHS 'Best Practice Tariff', which is scheduled to be introduced in April 2019. Candidate process measures will be consulted upon, and include:
  - assessment of risk
  - timeliness of access to theatres
  - consultant presence in theatres
  - admission to critical care
  - input by specialists in the care of older people.

Findings

The organisation of emergency general surgical services

12 There have been positive changes in the infrastructure that hospitals provide for patients having emergency bowel surgery since NELA began reporting. These include:

- 142 hospitals have 24/7 emergency operating theatre capacity, and an increased number of hospitals have devised procedures to facilitate the provision of surgery to emergency laparotomy patients in a timely manner
- improved logistics for providing and reporting urgent CT scans
- improved consistency in the assessment of risk for patients undergoing emergency laparotomy
- an increase in the use of protocols that utilise this assessment of risk to ensure that high-risk patients receive appropriate care, such as intraoperative care provided by consultant anaesthetists and surgeons, and postoperative admission to critical care
- increased acknowledgement that working patterns should support the provision of this care.

Quality assurance of patient care

13 There have been **improvements in care** over the last three years of patient-data collection.

14 30-day postoperative mortality has improved from 11.8% to 10.6%, representing around 300 lives saved each year.

15 Standards of care have improved: more hospitals are now RAG-rated Green for meeting published standards. Out of the nine key standards, the average number of standards met in each hospital has risen since the start of the Audit from 3.5 to 4.7[†] Particular improvement has been seen in:

- reporting on CT scans before surgery
- risk assessment before surgery
- consultant presence in theatre for high-risk patients.

There remain some important areas where improvement is necessary if outcomes are to improve further:

- active preoperative input by both consultant anaesthetists and consultant surgeons remains inconsistent and this needs to be addressed
- arrival in theatre within an appropriate timeframe, especially for the most urgent patients
- the number of highest-risk patients (P-POSSUM risk of death >10%) admitted directly to critical care after surgery
- providing appropriate care for patients aged 70 years or over who may benefit from the clinical expertise of a geriatrician or care of the older person team.

16 **Variation in care still exists in several areas**:

- between hospitals – some hospitals are meeting more standards of care than others
- within hospitals – NELA's aim is to drive the provision of consistent high-quality care for all patients. Data show that some hospitals are achieving this for more than 80% of patients. However, many hospitals are not meeting standards consistently. This means that one patient may receive good care, but the next one may not, despite being admitted to the same hospital under the same clinical team
- At different times of the day – there remains a 'time-of-day' effect, where good care is delivered during daytime, but care is less likely to meet all standards at night-time.

[†]Calculated by dividing the total number of processes with a Green RAG-rating (819) by the total number of hospitals for which full data was available (175).

17 Patients should expect to receive, and should receive, the same standards of care for emergency laparotomy regardless of where and when they present for care. Commissioners and providers of care need to ensure that services are organised so that emergency patients are prioritised appropriately and have access to the right care, at the right time, from the right people. Hospitals that support clinical teams in undertaking local quality improvement work are likely to achieve higher standards of care.

Quality improvement

18 Delivery of high-quality care requires input and engagement both at organisational level from senior leadership teams, and from the frontline multidisciplinary clinical teams.

19 Hospitals that have improved and achieved sustained improvement have utilised robust improvement methodology by working with multidisciplinary teams, including anaesthetists, surgeons, theatre teams, and nurses, and with emergency departments and critical care units. Importantly, the effectiveness of these teams is potentiated further by involving non-clinical audit staff. These teams have been supported in these endeavours by senior management and the executive team.

20 There is unlikely to be one 'best way' of organising delivery of care. Each hospital will need to organise services according to the needs and pressures faced: different issues will exist in each hospital. NELA provides tools and data to empower local teams to develop and 'own' the solutions most effective in their individual environments.

21 NELA makes a range of resources available to support and facilitate continued quality improvement, and will continue to develop these. These resources include:

- publicly available quarterly reports for individual hospitals
- realtime reporting of data via quality improvement dashboards
- short films providing 'how to' guides on delivering quality improvement
- regional quality improvement workshops to facilitate greater local networking
- action-planning templates to address areas in need of improvement
- sharing of best practice
- a database of local NELA leads
- exception reporting and alerting hospitals that fall below expected standards
- working together with other major quality improvement and research projects to study how best to improve care for laparotomy patients.

NINE KEY STANDARDS CURRENTLY SUBJECT TO RAG-RATING

- CT scan reported before surgery.
- Risk of death documented preoperatively.
- Arrival in theatre within a timescale appropriate to urgency.
- Preoperative review by a consultant surgeon and a consultant anaesthetist when P-POSSUM risk of death ≥5%.
- Consultant surgeon and consultant anaesthetist both present in theatre when P-POSSUM risk of death ≥5%.
- Consultant surgeon present in theatre when P-POSSUM risk of death ≥5%.
- Consultant anaesthetist present in theatre when P-POSSUM risk of death ≥5%.
- Admission directly to critical care after surgery when P-POSSUM risk of death >10%.
- Assessment by a care for the older person specialist for patients aged 70 years and over.

Figure 1
Proportion of all patients in Year 3 (who had surgery between December 2015 and November 2016) meeting the required standard

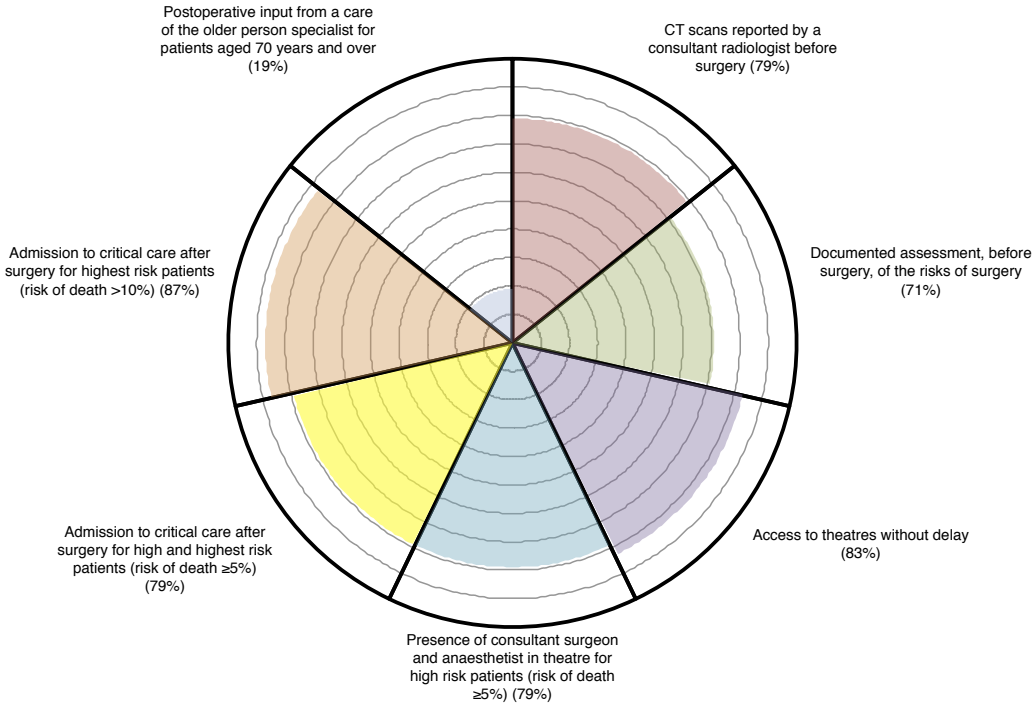


Figure 2
Proportion of hospitals in Year 3 rated 'Green' for each process measure ('Green' equates to the standard being met for at least 80% of patients)

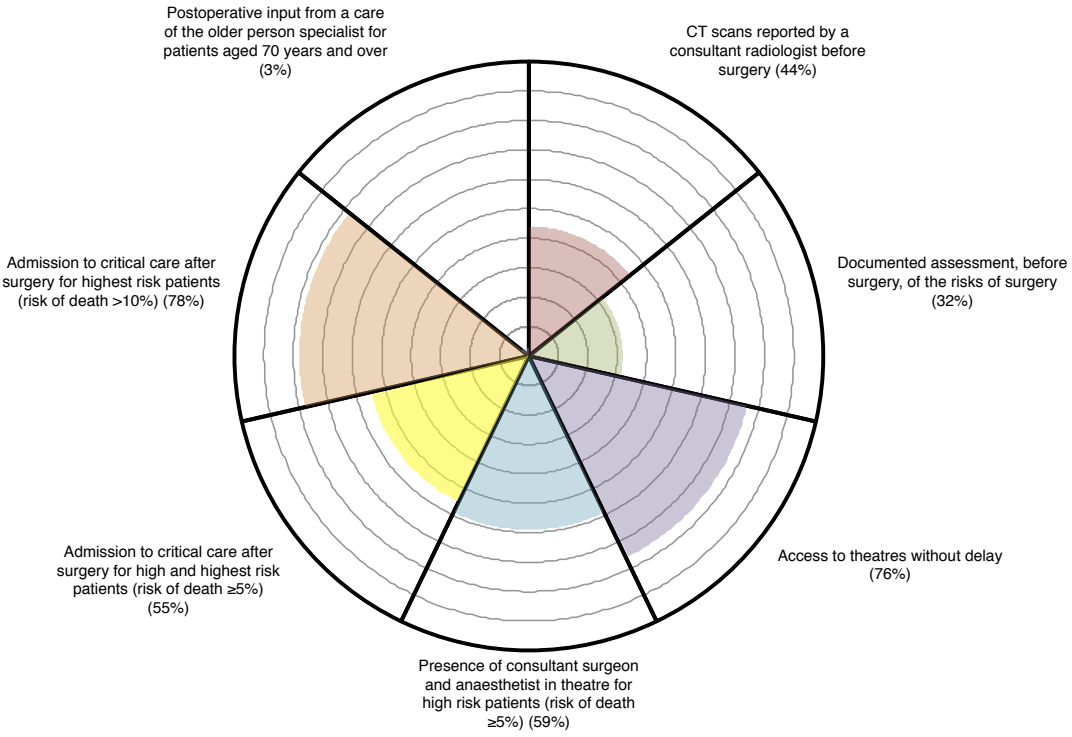
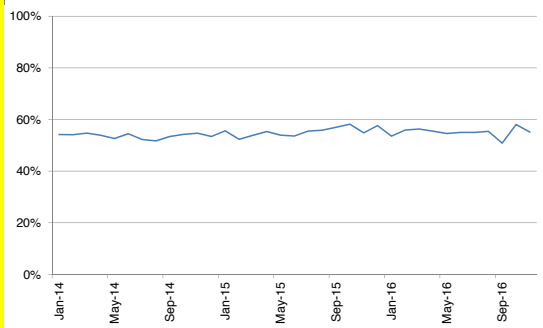
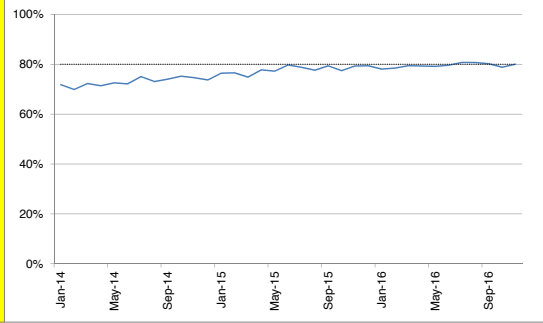
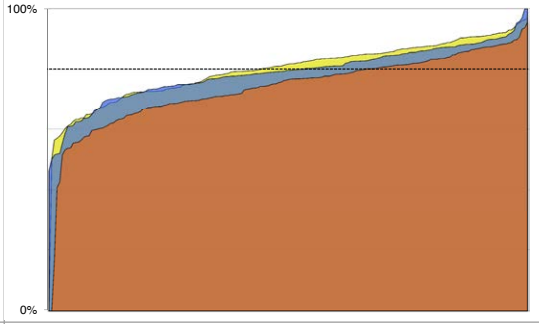
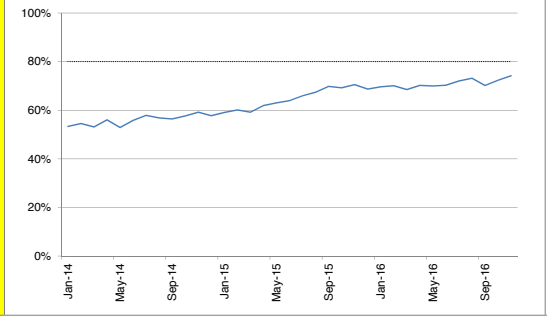
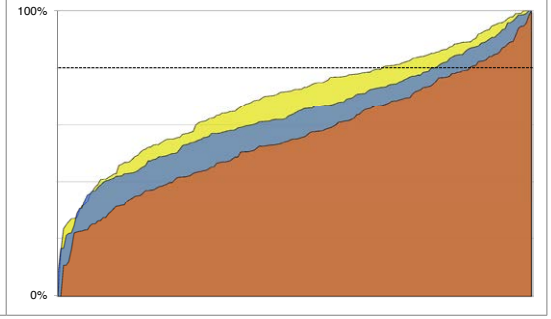
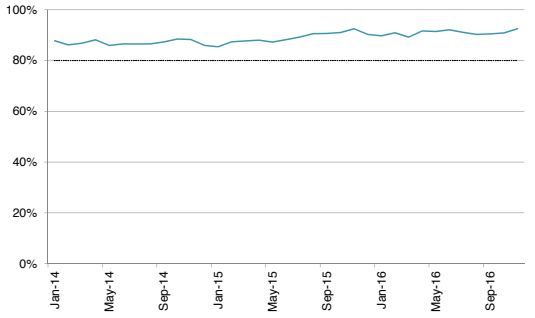
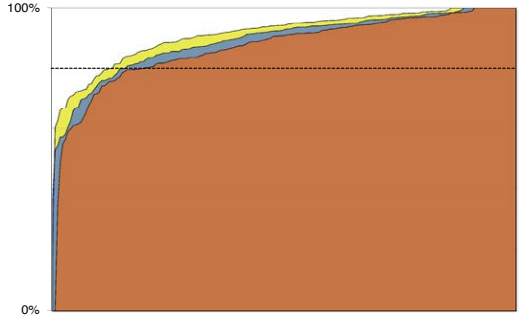
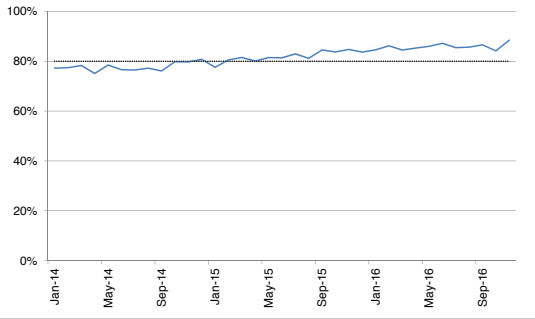
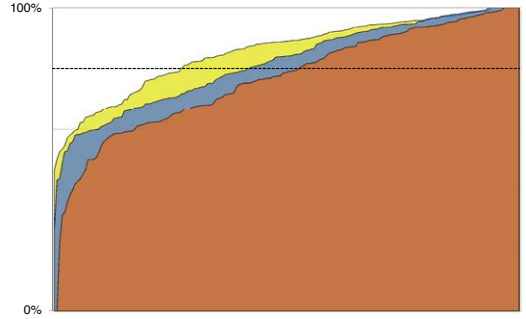
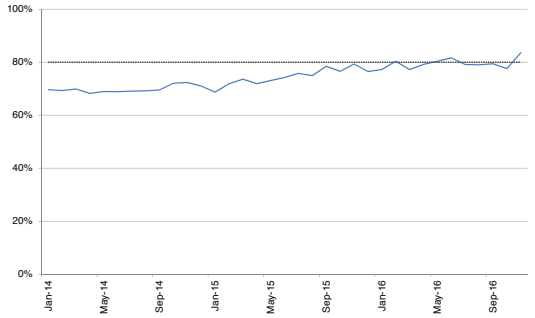
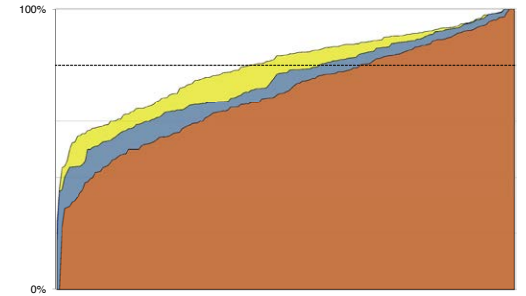


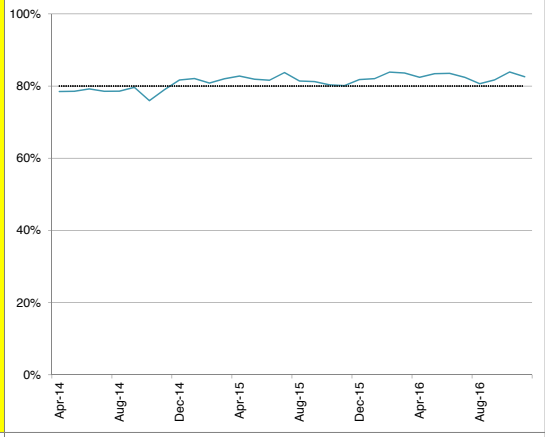
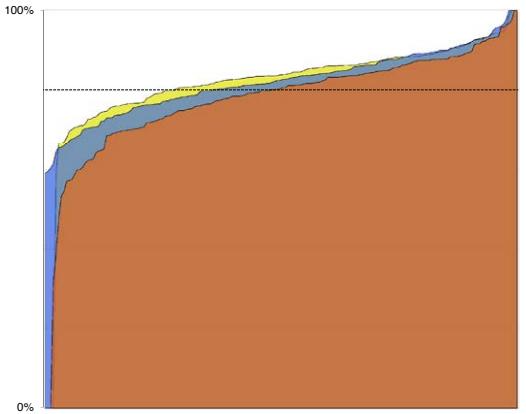
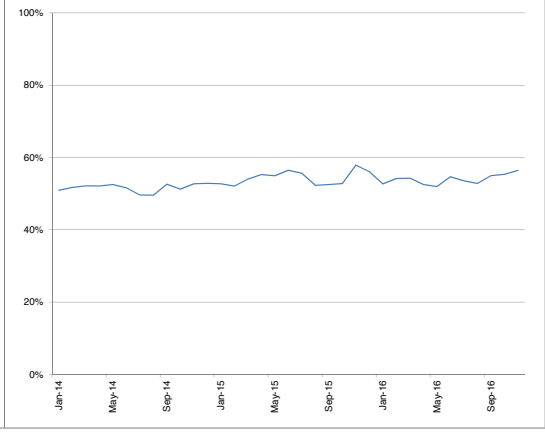
Table 1
Comparison of the number of hospitals rated Green (standard achieved for ≥80% of patients) in the First, Second and Third NELA Patient Reports for each key standard*
***Note: The shaded row was not a key standard, but is under consideration for future years**

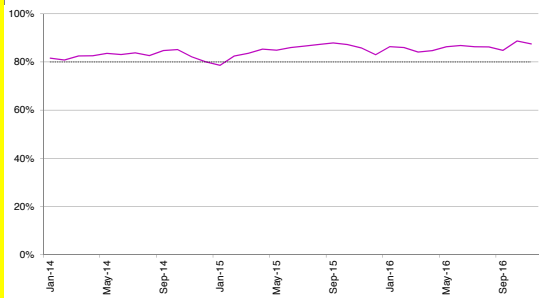
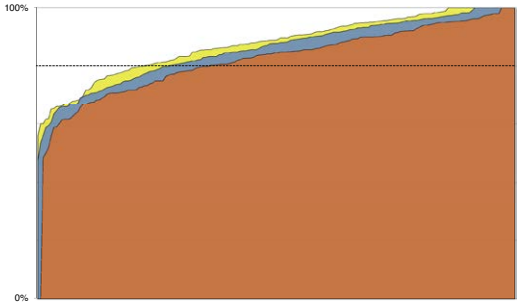
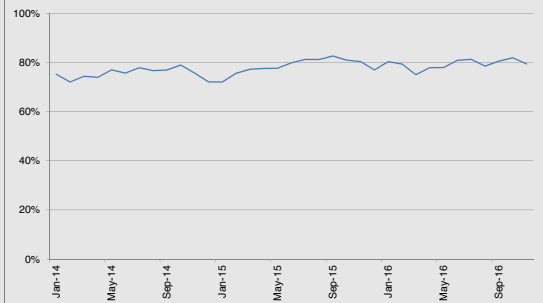
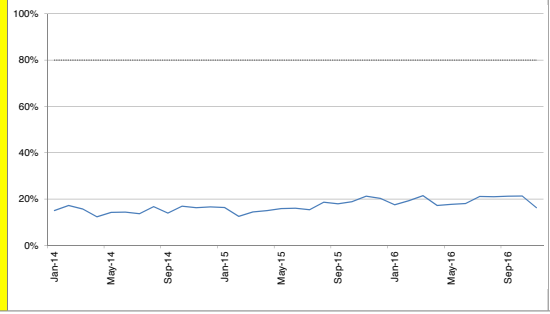
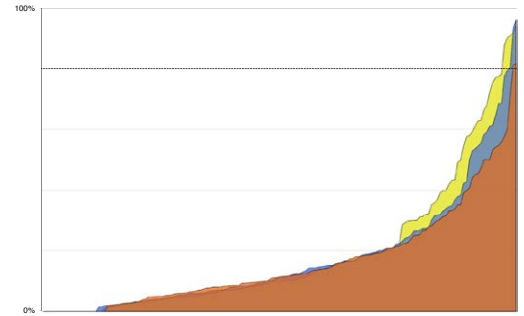
Key standard	Number (%) of hospitals rated Green		
	First NELA Patient Report Dec 2013 – Nov 2014 n = 193	Second NELA Patient Report Dec 2014 – Nov 2015 n = 188	Third NELA Patient Report Dec 2015 – Nov 2016 n = 187
CT scan reported before surgery	45 (25%)	65 (36%)	79 (44%)
Risk of death documented preoperatively	24 (13%)	39 (22%)	57 (32%)
Arrival in theatre within a timescale appropriate to urgency	97 (55%)	119 (67%)	133 (76%)
Preoperative review by a consultant surgeon and anaesthetist when P-POSSUM risk of death ≥5%	29 (16%)	30 (17%)	20 (11%)
Consultant surgeon and consultant anaesthetist both present in theatre when P-POSSUM risk of death ≥5%	61 (34%)	76 (43%)	104 (59%)
Consultant surgeon present in theatre when P-POSSUM risk of death ≥5%	146 (82%)	152 (86%)	157 (89%)
Consultant anaesthetist present in theatre when P-POSSUM risk of death ≥5%	86 (48%)	104 (59%)	129 (73%)
*Admission directly to critical care after surgery when P-POSSUM risk of death ≥5%	76 (43%)	92 (52%)	96 (55%)
Admission directly to critical care after surgery when P-POSSUM risk of death >10%	117 (66%)	129 (75%)	135 (78%)
Assessment by a specialist in care of the older person for patients aged 70 years and over	2 (1%)	3 (2%)	5 (3%)

Table 2
Summary of standards, process measures, Years 1, 2 and 3 performance, performance over time and hospital level performance

Key standard	Process measure	First NELA Patient Report Dec 13 – Nov 14	Second NELA Patient Report Dec 14 – Nov 15	Third NELA Patient Report Dec 15 – Nov 16	Trend over time Vertical axis: % of all patients receiving that standard of care. Dashed line: minimum standard (where applicable).	Hospital-level performance over time Horizontal axis: range of hospitals. Vertical axis: proportion of patients in each hospital who received that standard of care. Dashed line: minimum standard for acceptable care.
All emergency admissions must be seen and have a thorough clinical assessment by a suitable consultant as soon as possible but at the latest within 14 hours from the time of arrival at hospital.	Proportion of all patients who were reviewed within 14 hours of hospital admission by a consultant surgeon.	54%	55%	55%		Hospital level data not currently reported due to data quality.
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 patients who received a CT scan which was reported by a consultant radiologist before surgery.	73%	77%	79%		
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.	56%	64%	71%		

Key standard	Process measure	First NELA Patient Report Dec 13 – Nov 14	Second NELA Patient Report Dec 14 – Nov 15	Third NELA Patient Report Dec 15 – Nov 16	Trend over time Vertical axis: % of all patients receiving that standard of care. Dashed line: minimum standard (where applicable).	Hospital-level performance over time Horizontal axis: range of hospitals. Vertical axis: proportion of patients in each hospital who received that standard of care. Dashed line: minimum standard for acceptable care.
Each higher risk case (predicted mortality ≥5%) should have the active input of consultant surgeon and consultant anaesthetist.	Proportion of patients with preoperative P-POSSUM risk of death ≥5% for whom a consultant surgeon was present in theatre.	87%	89%	91%		
	Proportion of patients with preoperative P-POSSUM risk of death ≥5% for whom a consultant anaesthetist was present in theatre.	77%	82%	86%		
	Proportion of patients with preoperative P-POSSUM risk of death ≥5% for whom both consultants were present in theatre.	70%	74%	79%		

Key standard	Process measure	First NELA Patient Report Dec 13 – Nov 14	Second NELA Patient Report Dec 14 – Nov 15	Third NELA Patient Report Dec 15 – Nov 16	Trend over time Vertical axis: % of all patients receiving that standard of care. Dashed line: minimum standard (where applicable).	Hospital-level performance over time Horizontal axis: range of hospitals. Vertical axis: proportion of patients in each hospital who received that standard of care. Dashed line: minimum standard for acceptable care.
Trusts should ensure emergency theatre access matches need and ensure prioritisation of access is given to emergency surgical patients ahead of elective patients whenever necessary as significant delays are common and affect outcomes.	Proportion of patients arriving in theatre within a time appropriate for the urgency of surgery.	78%	82%	83%		
Note: due to limited evidence base, there are no relevant standards against which this process measure is reported.	Proportion of patients receiving goal directed fluid therapy.	52%	54%	54%		Hospital level data not reported due to clinical equipoise and lack of relevant standard.

Key standard	Process measure	First NELA Patient Report Dec 13 – Nov 14	Second NELA Patient Report Dec 14 – Nov 15	Third NELA Patient Report Dec 15 – Nov 16	Trend over time Vertical axis: % of all patients receiving that standard of care. Dashed line: minimum standard (where applicable).	Hospital-level performance over time Horizontal axis: range of hospitals. Vertical axis: proportion of patients in each hospital who received that standard of care. Dashed line: minimum standard for acceptable care.
All high risk patients should be considered for critical care and as a minimum, patients with an estimated risk of death of >10% should be admitted to a critical care location.	Proportion of patients with a postoperative P-POSSUM risk of death >10% who were directly admitted to critical care postoperatively.	83%	85%	87%		
	Proportion of patients with a postoperative P-POSSUM risk of death ≥5% who were directly admitted to critical care postoperatively.	76%	78%	79%		Hospital level data not reported. Not currently a defined standard.
Each patent aged over the age of 70 should have multidisciplinary input that includes early involvement of Medicine for the Care of Older People.	Proportion of patients aged 70 years or over who were assessed by a care of the older person specialist.	15%	17%	19%		

3 RECOMMENDATIONS

The recommendations from the Second Patient Report remain equally relevant this year. These have been built upon in this year's Report to reflect new patient and organisational data and further opportunities to improve patient care and outcomes.

Improvements over the last two years have predominantly been seen in areas involving a change in individual clinicians' and teams' behaviour, and for this they must be congratulated. However, collaborative effort from all individuals at all organisational levels, in particular consultant surgeons and consultant anaesthetists, supported by executive teams, is still required to bring about the change necessary to prioritise emergency care.

Clinicians, hospital managers and commissioners should work together in three main areas:

1 Setting ambitions

NELA results should be reported at board level, and appropriate organisational quality improvement (QI) objectives defined and monitored. There should be a clear commitment at board level to meet published standards of care. This should be backed up with appropriate time and resources to support clinical teams in collecting contemporaneous and accurate NELA data, and for quality improvement activities based on these.

It is clear that there has been significant organisational change across the NHS since 2013. There is no 'best way' of organising emergency laparotomy services associated with achieving better standards: each hospital must tailor services to meet local challenges. NELA data allow commissioners, providers and clinicians to assess and monitor the impact of organisational change, to determine if standards of care are being met, and to plan future changes to further develop and sustain improvements.

2 Understanding and reducing variation in care quality

Process measures are sensitive indicators of performance, and serve to highlight where specific actions are required to bring about improvements in care. Clinicians, hospital managers, and commissioners should examine their local data and results, determine why standards are met for some of their patients but not others, and seek to achieve more consistent delivery of high-quality care. They should use NELA data to monitor care over time to assess the impact of any changes. Over time, the RAG-rating boundary percentages will be increased in order to encourage delivery of ever-better care. The development of a Best Practice Tariff (to be introduced in April 2019) should help deliver improved care.

3 Reducing mortality and improving outcomes

Clinicians, hospital managers, and commissioners must examine their hospital's 30-day postoperative mortality and length-of-stay figures. By reviewing variation between hospitals in how care is delivered to patients and by benchmarking against standards, hospitals can identify opportunities for improvement that may contribute to improved outcomes. The National Quality Board (NQB) has recently published the first edition of National Guidance on Learning from Deaths for Trusts. The National Mortality Case Record Review Programme[1] is also providing support to improve the capacity and capability of in-hospital mortality reviews. These guidelines and documents should be adhered to when examining patient deaths.

The following more granular recommendations are grouped by audience and aimed at addressing the key themes identified in this NELA Patient Report. Specific recommendations are also highlighted in the relevant chapters.

Commissioners

1 Commissioners should ensure that there is adequate commissioning of:

- capacity to provide consultant-delivered care, multidisciplinary specialist input, and reliable access to other services, such as CT scanning and reporting, throughout the whole patient journey, regardless of the time of the day or the day of the week (Chapters 9.2, 9.3, 9.4 and 11.1)
- theatre capacity to prevent delays for patients requiring emergency bowel surgery, particularly those requiring surgery within two hours (Chapter 10.2)
- critical-care capacity to match high-risk caseload, such that all high-risk emergency laparotomy patients can be cared for on a critical care unit after surgery (Chapter 10.3) – expected critical care capacity can be modelled from NELA data
- care of older people services to provide input for older patients (Chapter 11.2)
- formal networks to support smaller hospitals in providing acute diagnostic and interventional radiology and endoscopy services.

Hospital chief executives and medical directors

In order to deliver high-quality care that meets standards to high-risk emergency patients, attention should be directed at organisational change in the following areas, working towards

2 Ensuring that care is delivered by consultant anaesthetists and consultant surgeons for high risk emergency laparotomy patients 24 hours per day, seven days per week. Rotas, job plans and staffing levels for surgeons and anaesthetists should reflect this. (Chapters 9.2, 9.3, 9.4).

3 Ensuring that older patients undergoing emergency laparotomy receive care from geriatricians to the same extent as older patients undergoing hip-fracture repair, where it has been shown to improve outcomes. Consideration should be given to how to fund an increased input from geriatricians and care of the older person teams.

4 Developing policies and supporting training in the use of individual patient risk assessment to guide allocation of resources (e.g. critical care) appropriate to the patient's needs (Chapters 9.1, 10.3). Policies constitute a clear statement of intent to deliver care that meets standards, and are associated with delivery of better care.

5 Providing emergency theatre capacity that is sufficient to enable patients to receive emergency surgical treatment, particularly those who need surgery within two hours. Prioritisation of time-sensitive emergency surgery can be facilitated by policies for the deferral of elective activity (Chapters 10.1, 10.2).

6 Adhering to national standards for postoperative critical care admission. This may require an increase in critical care capacity so that emergency and elective care can continue in parallel (Chapter 10.3).

7 Supporting and facilitating local NELA Leads and perioperative teams to improve care, by ensuring adequate time and resources to support accurate data collection, review adverse patient outcomes and to feed this back to clinical teams and hospital management (including at Board level). Such resources include access to individuals with audit and quality improvement skills throughout the organisation, allocated (job-planned) time to support data collection and analysis, and protected time for presentation of data in departmental meetings.

8 Ensuring that clinical coding of procedures is accurate, and embedding links between clinical-coding departments and clinicians to improve this (Chapter 11.3).

Clinical directors and multidisciplinary leadership teams

These recommendations are for every specialty involved in the care of patients undergoing emergency laparotomy.

9 In order to reduce unwarranted variation in care and minimise delays, hospitals should implement appropriate pathways for the care of emergency general surgical patients, starting at the time of admission to hospital or referral by another team. Where pathways of care do already exist, multidisciplinary teams (MDTs) should examine these in the light of audit data to determine their efficacy, and identify where and why standards are still not met. Care pathways help ensure that patients are admitted under the most appropriate specialty, aid communication within the MDT, and allow prioritisation of emergency resources; they aim to ensure that all processes of care are provided for each patient. Standardised pathways of care also facilitate audit and thereby highlight key areas for improvement. Pathways should cover the following areas:

- referral of patients for general surgical review if they have been admitted under non-surgical specialties
- identification of patients with signs of sepsis, and ensuring the prompt prescription and administration of antibiotics – there may be advantages to integrating this into the wider sepsis work ongoing within the NHS
- identification and escalation of patients who would benefit from the early involvement of both consultant surgeons and consultant anaesthetists, to ensure that consistently high-quality care is delivered by expert teams, and to drive the delivery of timely care for patients
- rapid request, conduct, and reporting of CT scans
- routine documented assessment of the risk of complications and death from surgery
- presence intraoperatively of a consultant surgeon and a consultant anaesthetist for high-risk patients with a predicted mortality ≥5%
- consideration of admission to critical care for all high-risk patients with a predicted mortality ≥5%
- identification of patients who would benefit from input from geriatricians in their perioperative care.

10 Risk assessment is a useful guide to clinical decision making, and risk should be calculated for every emergency laparotomy patient. **NELA strongly advises that care must not be provided purely on the basis of a predicted risk score, but that the risk score should be utilised as part of the global assessment of a patient**. It also aids identification and communication of the required pathway of care amongst the multidisciplinary team (Chapter 9.1), and informs discussion with patients and their families.

11 Multidisciplinary teams should hold regular joint meetings to continuously review essential processes of care (for instance, using the NELA Quality Improvement Dashboard) and perioperative morbidity (including unplanned returns to theatre and admissions to critical care) and mortality following emergency laparotomy. This should include formal collaboration with hospital mortality review panels in order to bring about greater understanding of where improvement is needed (Chapters 11.3, 12). Review of mortality following emergency laparotomy should follow NHS England's guidance for trusts, National Guidance on Learning from Deaths.

12 Continuous quality improvement informed by local data should involve monitoring the impact of care-pathway and process changes with time-series data (run charts). The NELA web tool provides automated dashboards that can be used for this purpose. Multidisciplinary teams should ensure that they include members with a good understanding of quality improvement principles such as the 'Model for Improvement'.[2] Consideration should also be given to good data-feedback practices (Chapter 12).

NELA Leads

Without the commitment and enthusiasm of hospital NELA teams and Leads, NELA would not have achieved the high levels of case ascertainment, data completeness and innovative quality improvement initiatives that have improved care for patients undergoing emergency laparotomy. We are grateful to all who have worked to achieve this.

At some hospitals, data entry for many cases was started but not completed. In addition, fields relating to the timing of key points in the patient pathway (e.g. time of consultant surgeon review, decision to operate) were poorly completed by many hospitals (Chapter 5). This may reflect the difficulties associated with completing datasets while also delivering clinical care.

However, collection and feedback of high-quality data are vital to bring about improvements. There are strategies that can be used to collect NELA data so that they become a useful part of the care pathway for patients (Chapter 12). The key to achieving this is to use the NELA data to help teams deliver the high-quality care that they strive to provide, and to feed back results regularly and visually to teams to keep it relevant and useful.

13 NELA is producing a job description for NELA leads that sets out expected roles and behaviours. This job description should be used to ensure NELA work is supported locally. The job description is available here.

14 NELA Leads should review their local data to ensure case-submission and data completeness.

15 NELA Leads should consider designing care pathways that contain NELA data questions as prompts for clinicians to deliver good care to patients.

16 NELA Leads should actively promote completion of P-POSSUM data fields to ensure that risk estimation is accurate and useful. In addition to aiding discussion with patients and their families, completeness of data fields also improves accuracy of risk-adjusted hospital mortality rates (Chapter 6.1).

Professional stakeholder organisations

17 Professional stakeholders, such as Royal Colleges and specialist societies, should collaborate to:

- improve clarity and remove ambiguity in the wording of standards of care; this would be particularly welcome for standards for admission to critical care (Chapter 10.3)
- bring together standards in a single, unified document
- highlight the issues to their members to ensure appropriate engagement
- ensure that there are joint education and training programmes across specialties and disciplines to develop an equipped workforce.

Patients, families and public

This Report highlights the standards of care that patients should expect if undergoing emergency bowel surgery. Patients and public can view their local hospital's reports on MyNHS or the NELA website to understand more about the quality of care being delivered.

18 Patients and families should ask to have the 'risk' of their surgery clearly explained to them by their clinical teams to help them understand the possible outcomes of their emergency bowel surgery.

19 Patients who are identified as high risk should expect consultant-delivered intraoperative care.

20 Patients and their families should expect to receive daily reviews by their surgical teams and to have a clear explanation of the surgery, the timing of their surgery, and the rationale behind clinical decisions made.

21 Patients should expect to be cared for in an appropriately staffed area that can provide the appropriate level of expertise and monitoring after high-risk emergency laparotomy surgery.

A summary of the recommendations from each Chapter is in Appendix 15.4.

4 INTRODUCTION

What is an emergency laparotomy?

'Emergency laparotomy' and 'emergency bowel surgery' are terms used to describe a wide range of emergency operations on the bowel. These may be performed for a variety of conditions, including those arising from complications of elective (planned) surgery. In England alone, approximately 30,000 emergency laparotomies are performed annually on a heterogeneous cohort of patients.[3,4]

The majority of patients undergoing emergency laparotomy have potentially life-threatening conditions that require prompt investigation and treatment. Delays can lead to increased complications and increased risk of death. Emergency bowel surgery has one of the highest death rates of all types of surgery – almost ten times greater than for 'high-risk' elective surgery such as cardiac, vascular and cancer surgery.

Overview of the Audit

The National Emergency Laparotomy Audit (NELA) was commissioned by the Healthcare Quality Improvement Partnership (HQIP), and funded by NHS England and the Welsh Government. Its aim is to collect and publish high-quality comparative information from all hospitals in England and Wales at which emergency laparotomies are performed, in order to drive quality improvement in the care of these patients.

NELA is run by the Royal College of Anaesthetists (RCoA) with significant input from the Clinical Effectiveness Unit of the Royal College of Surgeons of England (RCS). All NHS hospitals in England and Wales that undertake emergency laparotomy participate in NELA.

What does this Third NELA Patient Report cover?

This Report covers the care received by patients who underwent an emergency laparotomy between 1 December 2015 and 30 November 2016. The Report provides information on hospital mortality and other patient outcomes, and whether standards of care are being met at each hospital.

If a hospital can meet a standard for at least 80% of patients, then this suggests that it has robust systems in place for the delivery of good quality reliable care. To describe how well hospitals are meeting standards, the following RAG-rating system (red-amber-green) is used:

Green: Standard met for at least 80% of patients

Amber: Standard met for 50–79% of patients

Red: Standard met for under 50% of patients

Some of these RAG-rating boundary percentages will be increased during the next Audit reporting period, so that quality of care continues to improve.

The Report highlights areas that have improved and areas where there are opportunities to develop care to a higher standard. It includes recommendations aimed at commissioners, providers, clinical teams, and professional bodies, and highlights what standards of care patients undergoing emergency bowel surgery should expect to receive.

How does NELA collect data?

All NHS hospitals in England and Wales that undertake emergency laparotomy are expected to participate in the NELA Patient Audit. Audit leads were identified at each hospital to coordinate collection of patient data. Specific inclusion and exclusion criteria have been developed to define exactly which patients should be included in the Audit (www.nela.org.uk/Criteria). The Audit dataset was designed by the NELA Project Team with input from clinical stakeholders, and was designed to collect data that will allow comparison of care with published standards, and facilitate quality improvement. Data were submitted to NELA via a web tool (data.nela.org.uk). At the end of the data-collection window, all data were downloaded from the web tool and analysed to provide the results. Comprehensive information is available in the Technical Documents that accompany this Report on the NELA website (www.nela.org.uk/NELADocs).

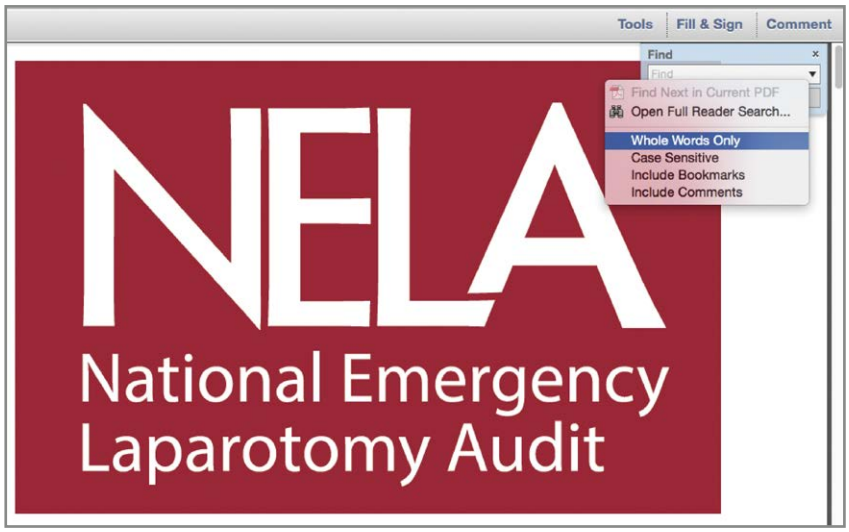
How to read this Report

The Report is divided into chapters, each covering a different part of the patient's care pathway. Each chapter shows the key questions that NELA asked, and sets out the results.

Individual reports for each hospital are provided online. An example is also shown in Figure 54.

Supplementary tables providing full results are provided in the Appendices (Section 15).

We have produced graphs that show each hospital's performance against its peers. Each hospital has been allocated an individual three-letter code. The list of hospitals and codes is shown in Table 30. In order to find each hospital within the Report, we recommend that the reader views an electronic version of the document and uses the 'find' function found in most PDF readers. This can usually be accessed by pressing 'Ctrl' + 'F' key, typing the three letter code into the box and pressing the 'Enter' key. Please also use the dropdown under the search box to select 'whole words only'. This will indicate the position of a hospital within various hospital-level graphs and tables throughout the Report. This function may only work if the Report is downloaded rather than viewed within a web browser.



5 DATA QUALITY AND CASE ASCERTAINMENT

Hospital staff and NELA Leads are commended for their role in supplying the data used in the Year 3 NELA Patient Report. The overall quality of this data was good.

Case ascertainment

Using data from Hospital Episode Statistics (HES), we have calculated the total number of emergency laparotomies that are expected to take place annually in the NHS and in each hospital in England (equivalent data were not available for Wales). This allows us to calculate the case-ascertainment rate (see Chapter 15.7 for more information about HES).

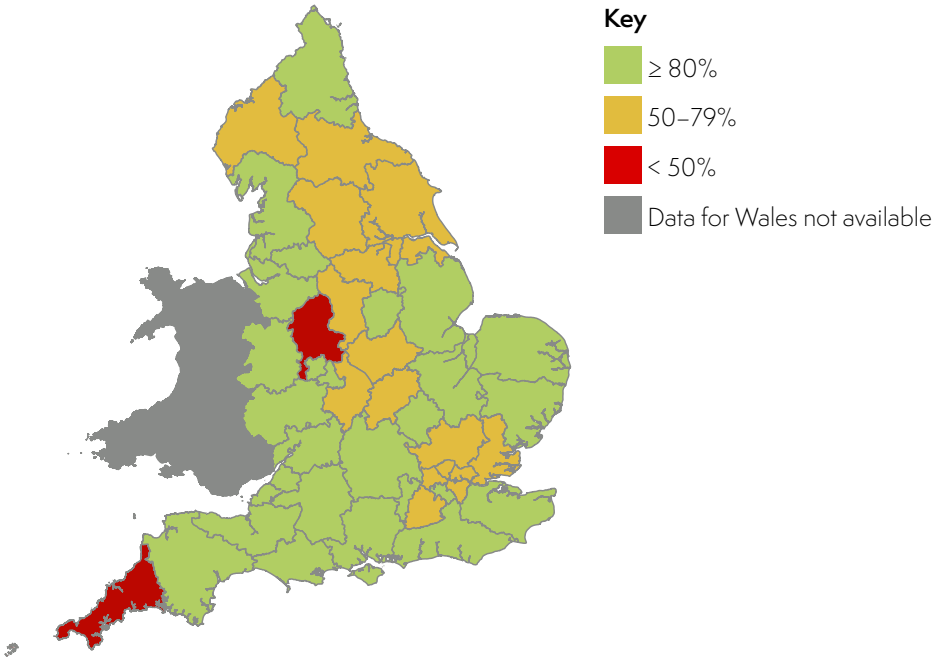
This Report includes details for 24,897 patients in total; 23,001 (92.4%) were treated in English hospitals and 1,896 (7.6%) in Welsh hospitals. The numbers of patients treated in English hospitals represents a case-ascertainment rate of 82%, an increase from the 70% seen in the Second Patient Report.

We have shown the case-ascertainment rates for each hospital in Chapter 15.2. For hospitals with a high case-ascertainment rate (greater than 80%), we can be reasonably confident that the results of the Audit provide a good indication of the quality of care in that hospital. However, hospitals with low case-ascertainment rates may not have provided information on enough patients for the Audit results to accurately reflect the quality of their patient care. Case-ascertainment targets will remain the same for the fourth year of data collection (December 2016 to November 2017), but will probably be increased in subsequent years.

Reporting at the level of Sustainability and Transformation Plan footprints

In this Report we have presented variation in performance and outcomes within Sustainability and Transformation Plan (STP) footprints. STPs are in the process of being developed to change the way in which NHS services are commissioned and funded, and consequently the boundaries of their geographical footprints may be subject to change before they are finalised. The boundaries used in this Report were published in April 2017 and are current at the time of going to print.

Figure 3
Case-ascertainment rates aggregated by STP



Locked cases

'Locking' a case on the NELA database means that all data points were completed for the patient's episode of care. This completion may include selecting 'unknown' for a variety of variables, but doing this allows the case to be locked. The proportion of cases that were locked has improved from 96% in Year 2 to 98% this year. During the period of data collection, 624 cases were started but not locked by the deadline for case submission, and were therefore not eligible for inclusion in this Report. However, this varies across hospitals, and the failure to lock cases is likely to have significant implications for case-ascertainment rates at certain hospitals.

Case exclusions based on operative-procedure inclusion criteria

The option to select 'other' and enter free text for the primary procedure was removed at the start of data collection for Year 3 in order to improve data quality. Since changes to the Audit questionnaire are based on the date of admission to hospital, it is possible for patients admitted during Year 2 to undergo surgery during Year 3. Free text for the primary procedure was entered on 25 cases included in the Year 3 dataset. Review of the free text for these cases resulted in ten patients being excluded because their procedure was ineligible. The procedure for the remaining 15 patients was recoded to one of the existing options in the Audit questionnaire.

Data completeness

The timing of certain perioperative care milestones should be documented; this documentation is necessary for departments to audit key processes of care. The Audit aims to record the date and time of the decision to operate, with the option to provide the date and time of the patient first being booked for theatre if this was unavailable.

Accurate times for the decision to operate (or the time of theatre booking if the time of decision to operate was not available) were missing in 13% of cases ('unknown' selected). This is similar to previous years.

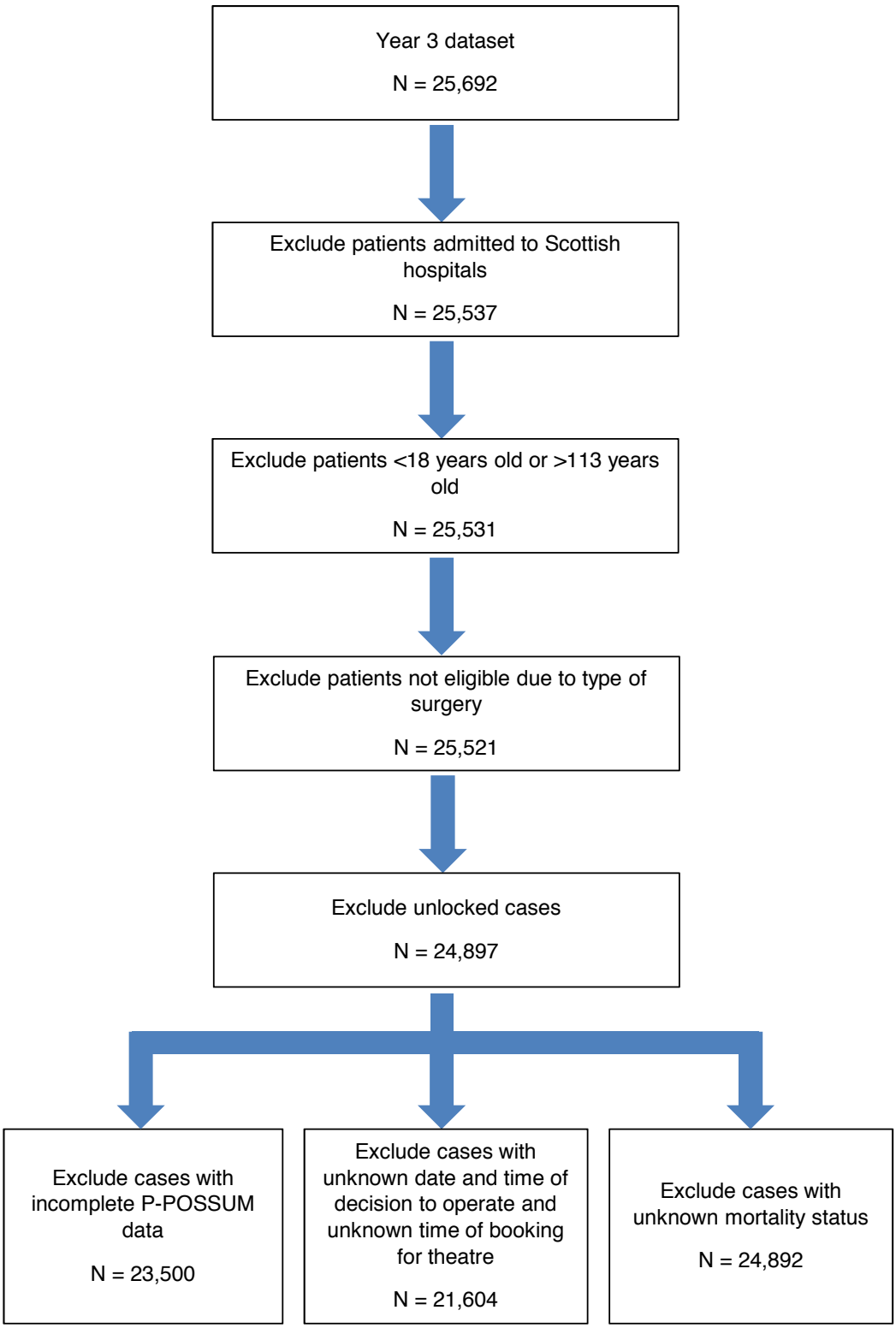
At 14% of hospitals, the time of the decision to operate or the time of theatre booking was 'unknown' for at least a quarter of submitted cases. This also remains relatively unchanged, with a rate of 14% in Year 2 and 12% in Year 1. The absence of these data effectively excludes these patients from the analysis of timely arrival in theatre. This is a missed opportunity for hospitals to assess the effectiveness of their structure and processes for emergency surgical patients.

P-POSSUM variables

The NELA web tool collects P-POSSUM[5] data to aid clinicians in providing an assessment of risk, and to support risk adjustment of hospital-level outcomes.

Complete preoperative and postoperative P-POSSUM data were included for 94% of all submitted cases (this figure was 93% in both Years 1 and 2 of NELA). Full completion of all fields for every case was achieved by 28% of hospitals.

Figure 4
Patients included in the Year 3 data analysis



How we use Data from the Office for National Statistics to support NELA

Mortality data from the Office for National Statistics (ONS) are matched to the NELA data to ensure accuracy, and so that we can report all-cause 30-day and 90-day mortality rates, as opposed to the inpatient mortality that was reported in the First Patient Report.

ONS mortality data only became available for the publication of the Second Patient Report. The data for the first two years were used to develop bespoke risk adjustment and prediction models for patients within this surgical population. Mortality data for the third year have been used to validate the performance of the risk-prediction model.

Data linkage with the Office for National Statistics

Data linkage with the Office for National Statistics (ONS) was of high quality. Five patients were excluded from the mortality analysis because the ONS data indicated a date of death before the date of the operation was entered into the NELA web tool. We were able to link 23,010 (92.4%) patients to ONS mortality data; 1,882 patients could not be linked. Patients are entitled to withhold consent for their data to be shared (known as type-2 opt-outs), and these 1,882 unlinked cases could include an unknown number of such opt-outs.

Where linkage to ONS data was not possible but NELA data indicated that a patient had died during the admission in which they underwent their emergency laparotomy, self-reported inpatient mortality data were used instead. This applied to 162 patients in the 30-day mortality analysis and 180 patients in the 90-day mortality analysis. The total number of patients included in the mortality analysis was 24,892.

Organisational Report

Organisational data were received from 184 hospitals; 170 of these were in England and 14 in Wales. Where data were inconsistent when compared to the 2013 Organisational Audit, hospitals were contacted to provide the opportunity to clarify or amend submitted data.

Case ascertainment, unlocked cases, data quality and data completeness are reported at hospital level in the individual hospital reports.

Quality improvement vignette

'We have incorporated the NELA quality improvement project into our monthly surgical audit meetings. We regularly present the NELA cases and ensure data are completed in a timely fashion. This also allows the surgical registrars and trainees to have ownership over the data, and it also makes it clear that the department believes this to be important. Our anaesthetic lead has similarly presented the project to his audit meetings and achieved similar buy-in from the Anaesthetic and ICU staff. Data submission is now much more prospective in nature and therefore of higher quality than previously. Our future aim is to present the quality metrics to a combined and multidisciplinary meeting (surgical/anaesthetic/theatre staff/trainees) and really work on how to further improve the quality of care we provide for emergency laparotomy patients'.

Mr Ewen Griffiths (Consultant Upper GI Surgeon), Queen Elizabeth Hospital, Birmingham

6 OUTCOMES

6.1 Mortality

NELA data demonstrate that mortality from emergency laparotomy surgery has reduced over the time period that we have been analysing outcomes.

NELA's cohort of almost 70,000 individuals represents the largest group of patients undergoing emergency laparotomy to have been followed prospectively. NELA is one of several audit and quality improvement projects currently running across the world with the aim of supporting and driving improvements in all areas that affect patient outcomes after emergency bowel surgery.[6–8]

Previous studies from the UK and other countries have shown mortality rates following emergency laparotomy of 13–18% at 30 days, equating to one in every five to six people who undergo these procedures dying within a month of surgery.[9–11]

Why is this important for patients?

The data provided by NELA allow clinicians to understand the variation in outcomes according to, for example, the type of surgery patients receive, in addition to demonstrating differences between hospitals and different patient groups.

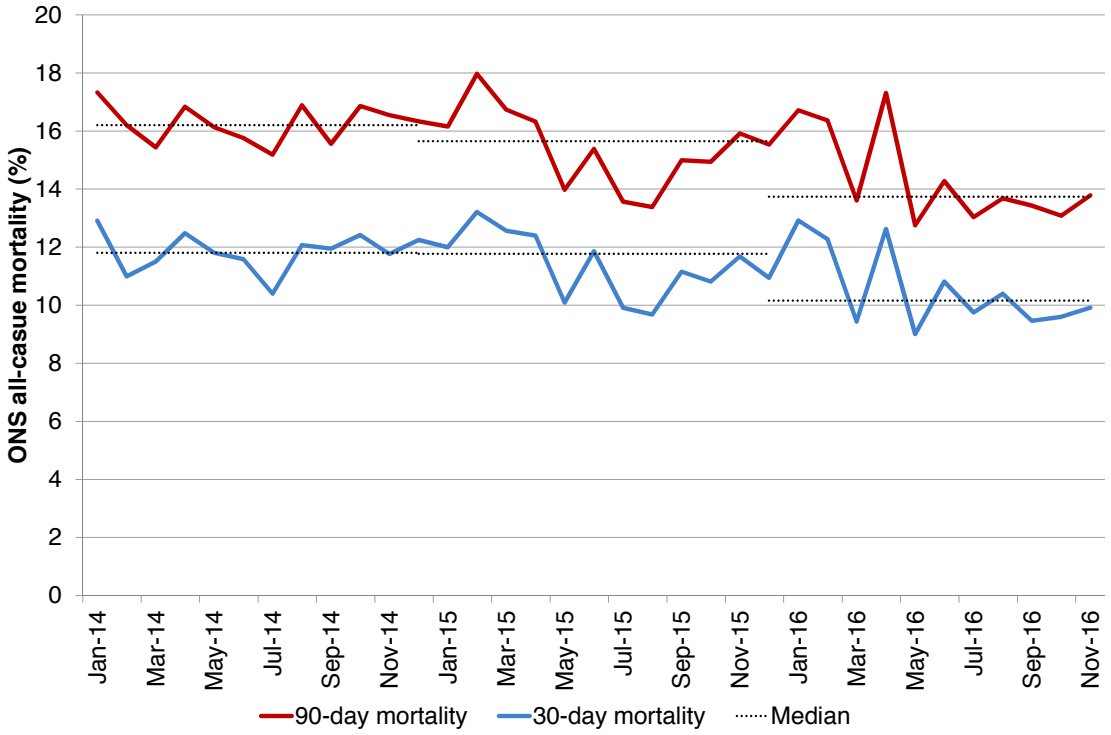
For patients, this means that NELA is enabling the clinicians looking after them to make informed decisions about their potential surgery and perioperative care.

In addition, as the NELA dataset grows more is learnt about patients' perioperative progress in hospital (e.g. optimal location for care, length of stay, potential complications) and about what happens after discharge from hospital, such as survival beyond the first month after surgery.[12] This knowledge can be used by clinicians to support meaningful, informative discussions with patients and their families.

National mortality

Overall, 30-day mortality has fallen to 10.6% (from 11.8% in Year 1) (Figure 5). However, emergency laparotomy surgery remains high risk when compared to elective surgery, and outcomes have continued to vary according to the type of surgery performed.

Figure 5
Trend in the overall 30-day and 90-day ONS mortality rate (split medians denote the change between Audit years)



Hospital-level mortality

Hospital-level mortality is presented using a funnel plot. This shows whether the mortality rates of hospitals differ from the national average by more than would be expected due to random variation. Random variation will always affect statistical information like mortality rates, and its influence is greater among hospitals that perform smaller numbers of procedures. Hospitals with risk-adjusted mortality rates above the 99.8% control limits (alarm status – three standard deviations above average) are considered outliers when compared with the national average. Hospitals with mortality between 95% and 99.8% control limits (alert status – two to three standard deviations above average) for two out of three reporting cycles are also considered outliers.

The unadjusted and adjusted mortality rates are shown in Figure 6 and Figure 7 respectively. Risk-adjusted 30-day mortality varied from zero to 24.2% between all hospitals. No hospital was an outlier based on alarm status when case mix and the number of operations performed were taken into account. One hospital (Prince Charles Hospital, Cwm Taf Health Board, Wales), was an outlier due to having alert status for the last two reporting cycles.

Figure 6
Funnel plot of unadjusted ONS 30-day mortality rates

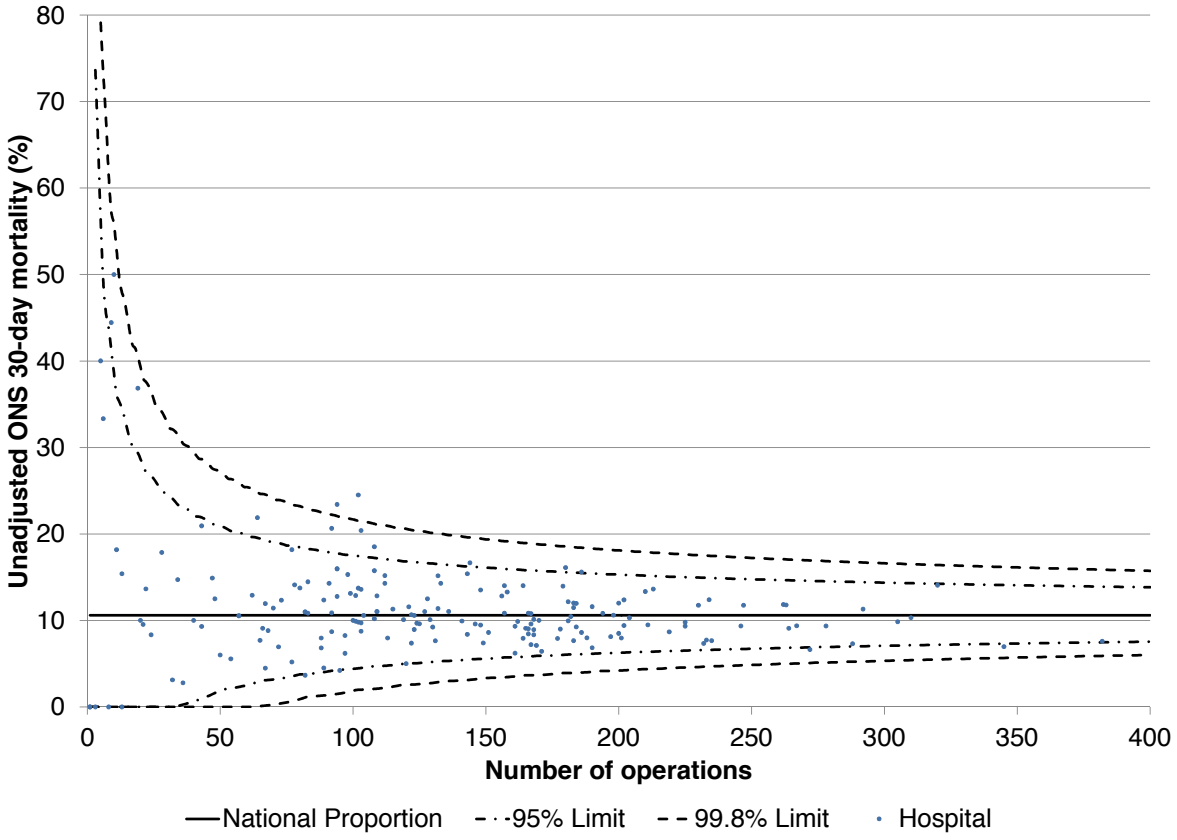
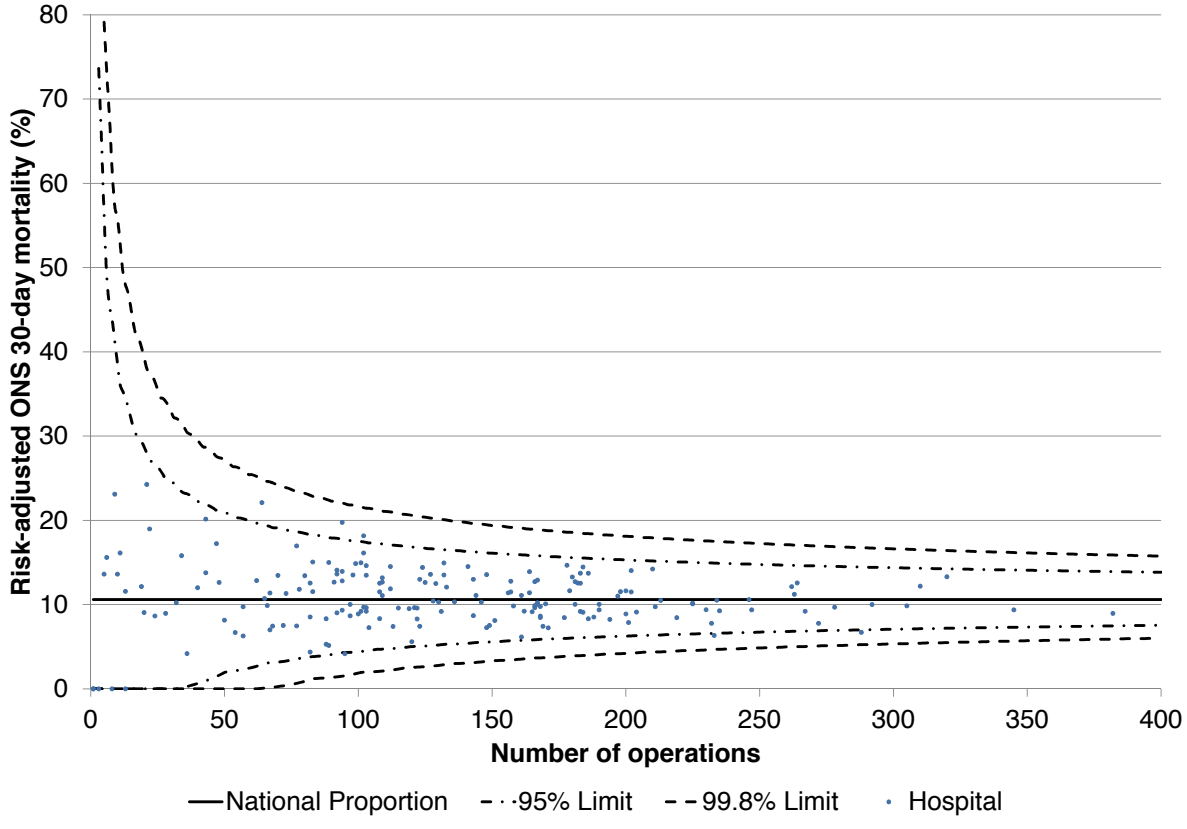


Figure 7
Funnel plot of risk-adjusted ONS 30-day mortality rates



Risk assessment

30-day mortality in patients who did not have a risk assessment documented (30% of all patients in NELA) was 7.1%, placing them into the high-risk category on average.

This is important because these patients may have missed an opportunity to be admitted to critical care postoperatively. 53% of patients who did not have their risk calculated preoperatively were admitted directly to critical care, in comparison to 74% of those who did have their risk documented as high risk.

A positive trend to note is that intraoperative consultant anaesthetist and surgeon presence for patients who did not have their risk of death documented had improved in this Report to 71% (from 66%), which is now similar to that found in the high-risk patient group.

Variation by time-of-day

Patients who had their surgery out of hours had a higher predicted and observed 30-day mortality (13.5%) than those whose surgery was performed between 8.00 am and 6.00 pm (9.2%). This rate increased further to 17.4% for surgery after midnight, which is almost twice the risk of those whose surgery was performed in daylight hours (Table 3).

There continued to be little variation in mortality rate according to the day of the week for admission or for surgery, apart from a reduced 30-day mortality if surgery was performed on a Wednesday (Table 4). Further analysis will be needed to assess this to see what contributory factors there may be.

Table 3
Median preoperative P-POSSUM risk of death and observed ONS 30-day mortality for all patients – by time-of-day of arrival in operating theatre

Time-of-day	Number of patients (frequency (%))	Median P-POSSUM predicted risk of death (%)	ONS 30-day mortality (frequency (%))	ONS 90-day mortality (frequency (%))
08.00–11.59	5,844 (24.5)	5.6	493 (8.4)	727 (12.4)
12.00–17.59	10,094 (42.3)	5.7	967 (9.6)	1,364 (13.5)
18.00–23.59	5,837 (24.5)	8.7	711 (12.2)	931 (15.9)
00.00–07.59	2,060 (8.6)	15.0	359 (17.4)	419 (20.3)

Table 4
ONS 30-day mortality – by day-of-week of hospital admission, and day-of-week of surgery for patients admitted as an emergency and with a surgical urgency category <18 hours

Day-of-week	Day of admission			Day of surgery		
	Number of patients admitted (frequency (%))	ONS 30-day mortality (frequency (%))	ONS 90-day mortality (frequency (%))	Number of patients undergoing surgery (frequency (%))	ONS 30-day mortality (frequency (%))	ONS 90-day mortality (frequency (%))
Monday	3,068 (16.0)	355 (11.6)	458 (14.9)	2,379 (12.4)	293 (12.3)	385 (16.2)
Tuesday	2,910 (15.2)	329 (11.3)	428 (14.7)	2,913 (15.2)	375 (12.9)	467 (16.0)
Wednesday	2,836 (14.8)	302 (10.6)	411 (14.5)	3,027 (15.8)	300 (9.9)	400 (13.2)
Thursday	2,705 (14.1)	327 (12.1)	429 (15.9)	2,972 (15.5)	329 (11.1)	434 (14.6)
Friday	2,849 (14.9)	345 (12.1)	453 (15.9)	2,903 (15.1)	332 (11.4)	461 (15.9)
Saturday	2,413 (12.6)	269 (11.1)	360 (14.9)	2,512 (13.1)	295 (11.7)	379 (15.1)
Sunday	2,383 (12.4)	276 (11.6)	362 (15.2)	2,458 (12.8)	279 (11.4)	375 (15.3)

Procedure-specific mortality

As in previous NELA reports, outcome varied substantially depending on the type of surgery performed (Table 12 and Table 45). Laparostomy formation (30-day mortality 36.8%) continued to carry the highest primary-procedure risk. Relook laparotomies demonstrated a mortality at 30 days of 28.1%, highlighting the importance of recognising that these patients require consultant-delivered care and admission to critical care. Procedure-specific mortality otherwise ranged from 2.1% to 21.7%. More detail is provided in Chapter 8.

High-risk groups

Mortality rates increased with high American Society of Anesthesiologists Physical Status classification score (ASA score – a reflection of a patient's comorbidity at the time of surgery), increased urgency of surgery, and older age (Figure 8, Figure 9 and Figure 46). This is important because older patients comprised a significant proportion of the total number of emergency laparotomy patients, highlighting the need to develop services to address the specific requirements of this high-risk group.

Table 5
Median P-POSSUM risk of death, observed ONS 30-day and 90-day mortality – by risk category based on calculated preoperative P-POSSUM risk of death

Risk category by calculated preoperative P-POSSUM risk of death	Proportion of patients in each risk category (frequency (%))	Median P-POSSUM predicted risk of death within 30 days of surgery (%)	Observed 30-day mortality based on ONS data (frequency (%))	Observed 90-day mortality based on ONS data (frequency (%))
Lower (<5%)	10,646 (42.8)	2.3	229 (2.2)	417 (3.9)
High (5–10%)	4,343 (17.4)	7.1	269 (6.2)	476 (11.0)
Highest (>10%)	9,903 (39.8)	28.0	2,139 (21.6)	2,708 (27.3)
Overall	24,892 (100.0)	6.7	2,637 (10.6)	3,601 (14.5)

Figure 8
ONS 30-day and 90-day mortality – by American Society of Anesthesiologists (ASA) Physical Status classification

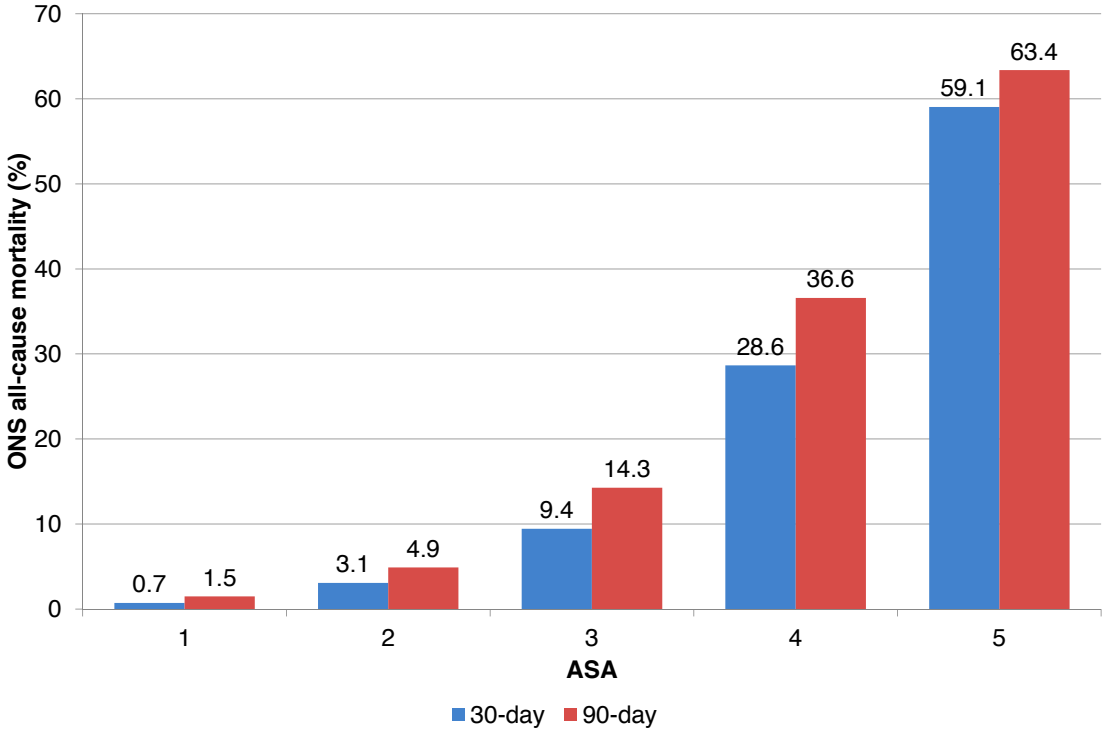
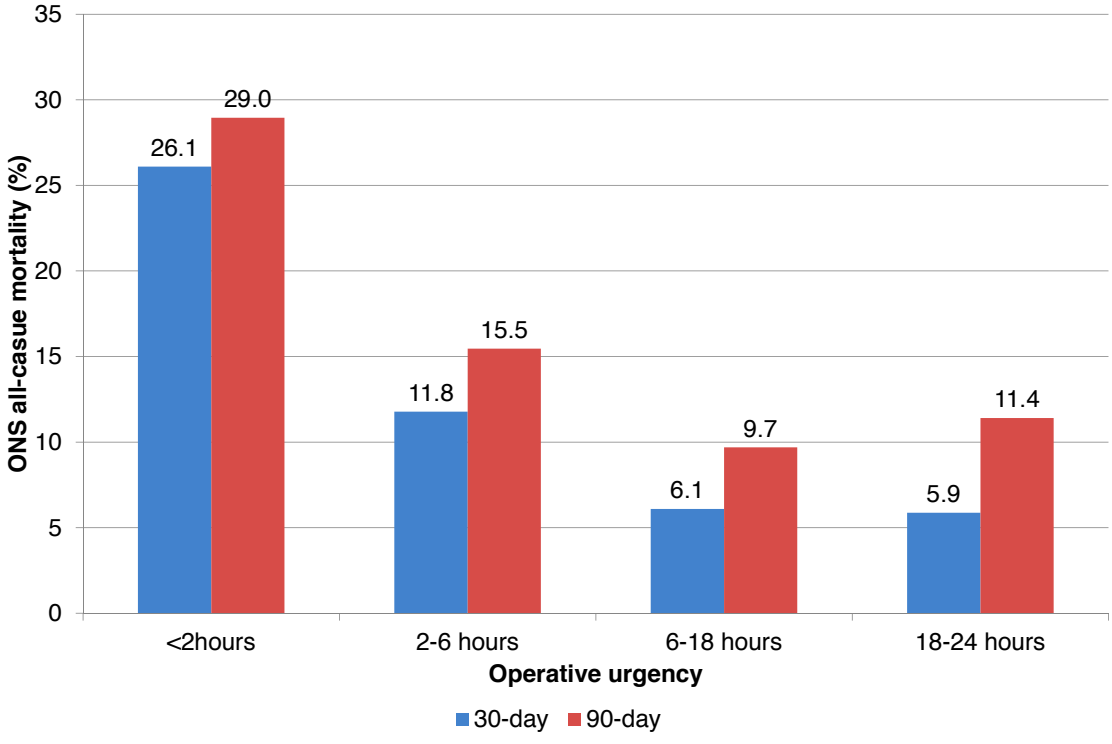


Figure 9
ONS 30-day and 90-day mortality – by urgency of surgery



Supplementary data tables are in the Appendix.

6.2 Length of stay

Why is this important for patients?

Prolonged length of stay after an emergency laparotomy is a substantial burden on patients, who are removed from their normal home environments and exposed to hospital-related risks. It also places strain on health service resources, both for elective and emergency work, due to finite numbers of inpatient hospital beds.

While each patient's social circumstances will differ, a short hospital stay before discharge may be an indication of low rates of postoperative complications and efficient care pathways, both in hospital and in the community.

Has there been any change in postoperative length of stay?

We analysed the length of stay for patients surviving to discharge. Mean length of stay has continued to fall from 19.2 days in Year 1 to 16.6 days in Year 3 (Figure 10). Assuming 30,000 emergency laparotomies per year, this improvement represents a saving of over 76,000 bed-days and almost £30.5 million in the costs associated with inpatient care. However, earlier discharge from hospital may have resource and cost implications for care providers in the community setting but the overall impact is likely to be a cost saving.[13,14] The proportion of patients surviving to discharge with postoperative hospital stays of 20 days or more has fallen across the years (Figure 11).

Figure 10
Trend in the average (mean) postoperative length of stay in patients surviving to hospital discharge

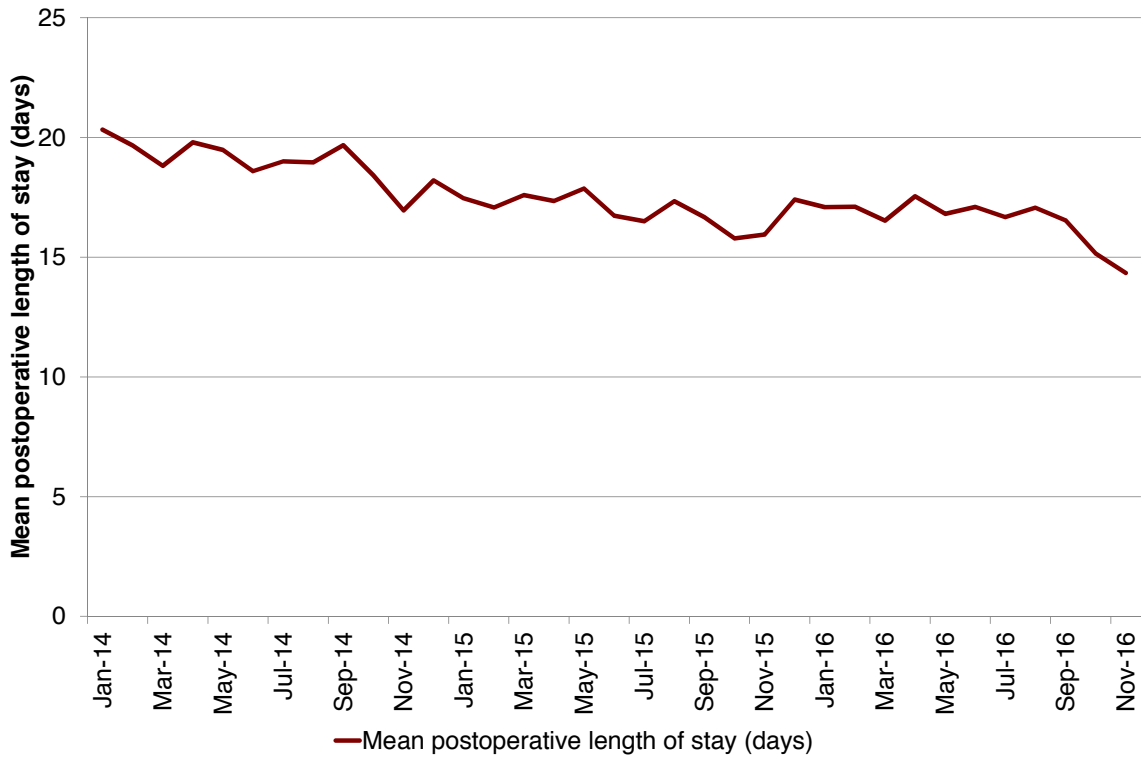
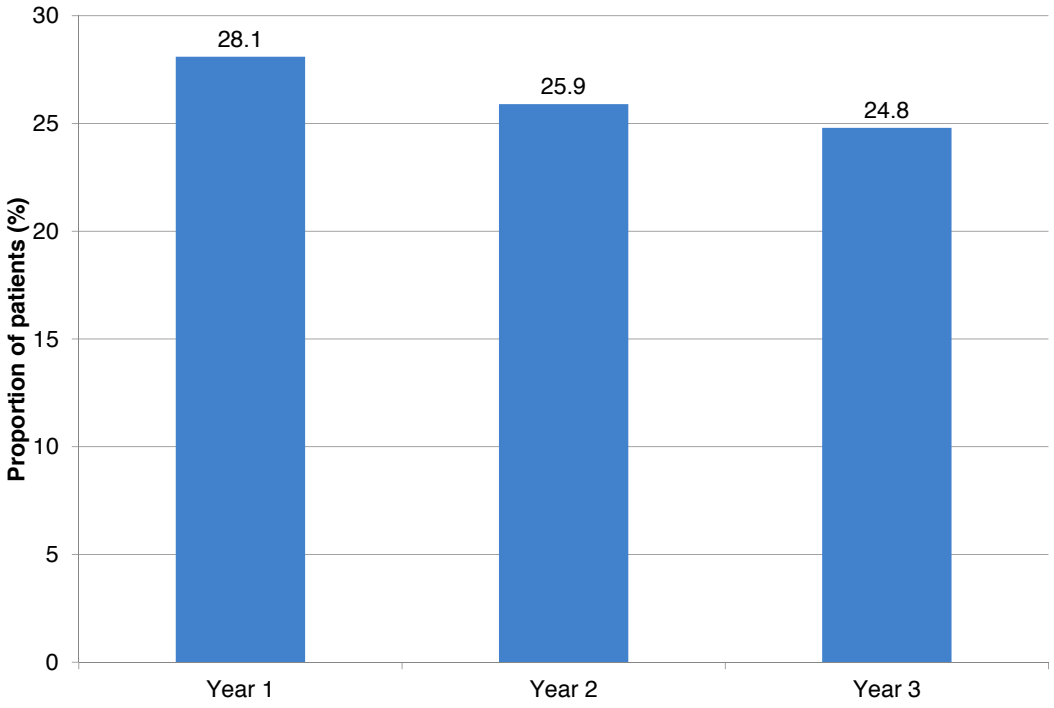
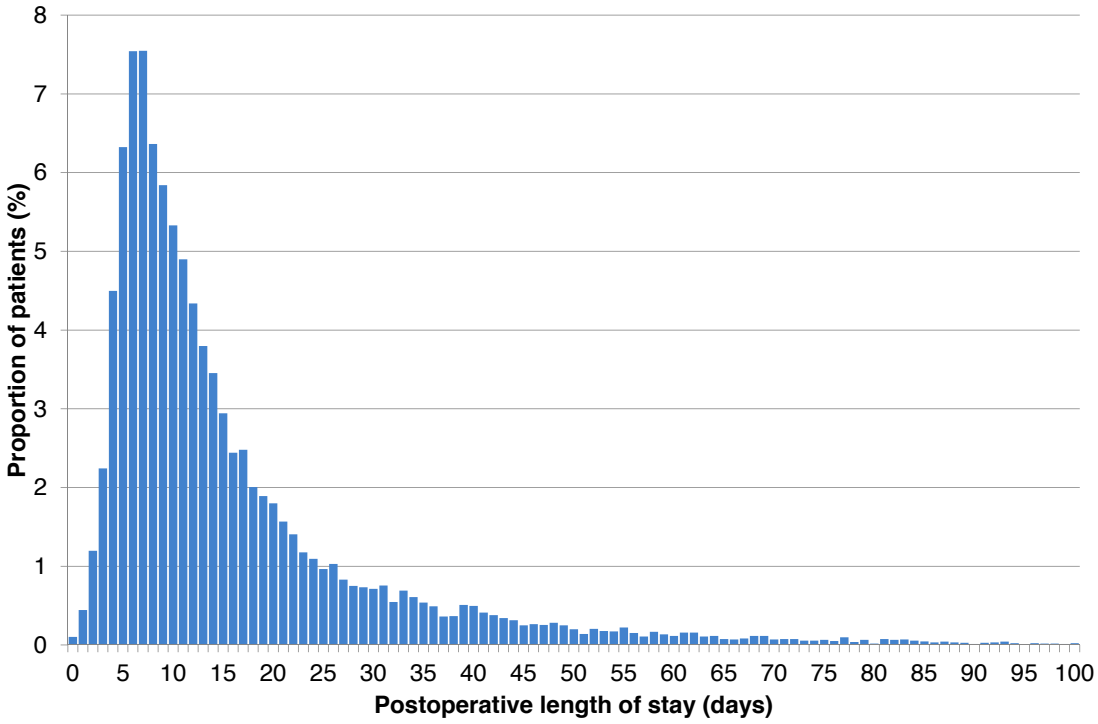


Figure 11
Proportion of patients surviving to discharge with a postoperative hospital stay of 20 days or more



While the mean postoperative length of stay has reduced, the median postoperative length of stay has remained constant at 11 days across the three years of data collection. The distribution of length of stay is shown in Figure 12. Most patients stayed in hospital for around one week after surgery, but it was still common for a large number of patients to stay in hospital considerably longer.

Figure 12
Postoperative length of stay for patients surviving to hospital discharge (curtailed at 100 days)

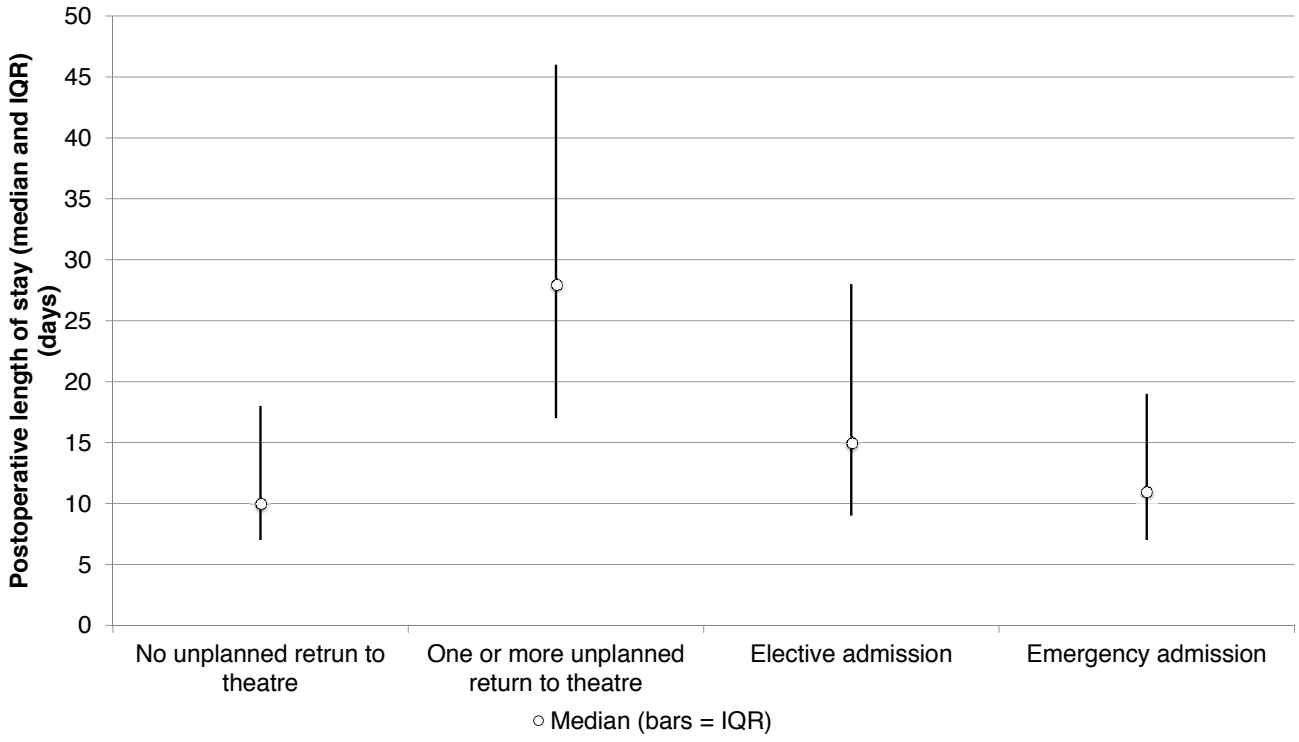


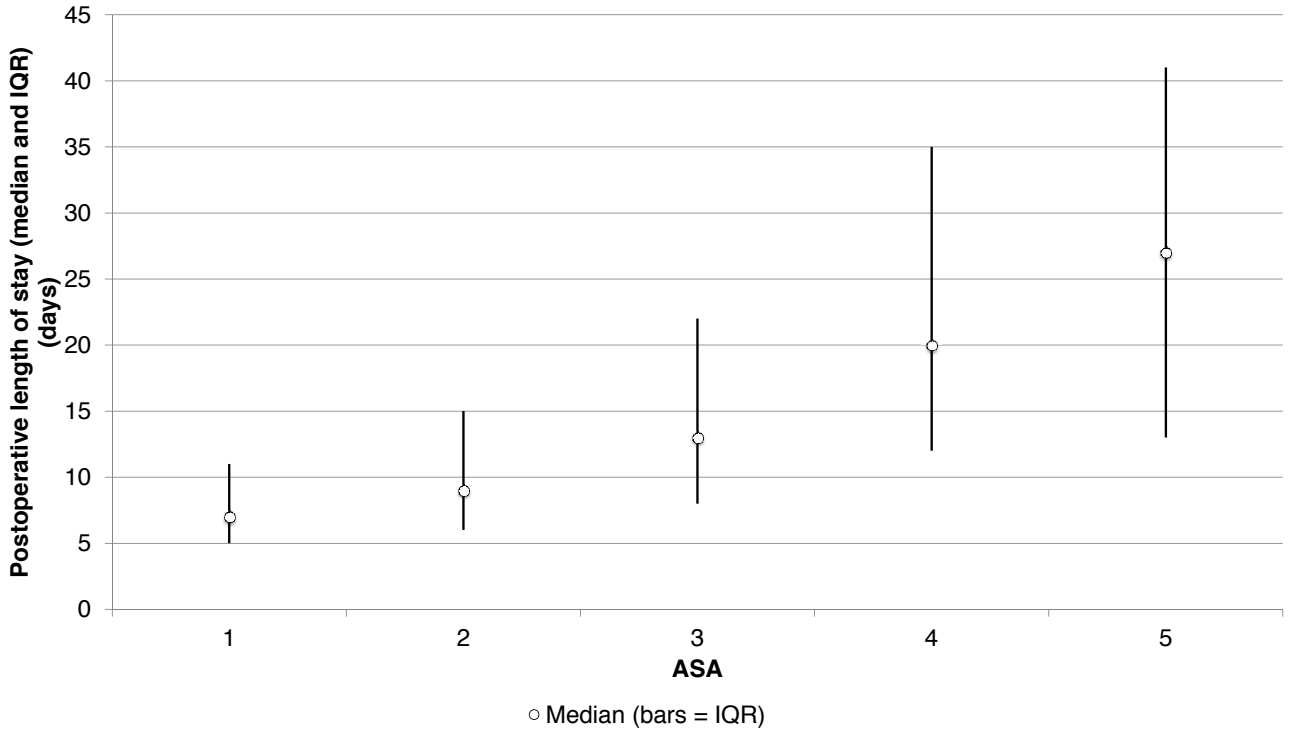
What patient factors influence their length of stay?

Length of stay increased with markers of sickness such as ASA grade and urgency of surgery (Figure 13, Table 37 and Table 38). These patients are more likely to suffer postoperative complications that will prolong their hospital stay.

It is notable that the higher postoperative length of stay was for patients whose emergency laparotomy was a consequence of prior elective surgery and for patients who had an unplanned return to theatre after their emergency laparotomy, confirming that complications of surgery are associated with increased healthcare burden (Figure 13).

Figure 13
Postoperative length of stay in relation to patient and surgical factors (Median (IQR))





What is the influence of ongoing consultant input during the postoperative period?

Hospitals with twice-daily ward rounds by consultant surgeons had a slightly lower proportion of patients with postoperative lengths of stay of 20 days or more (24.3% compared to 25.6%).

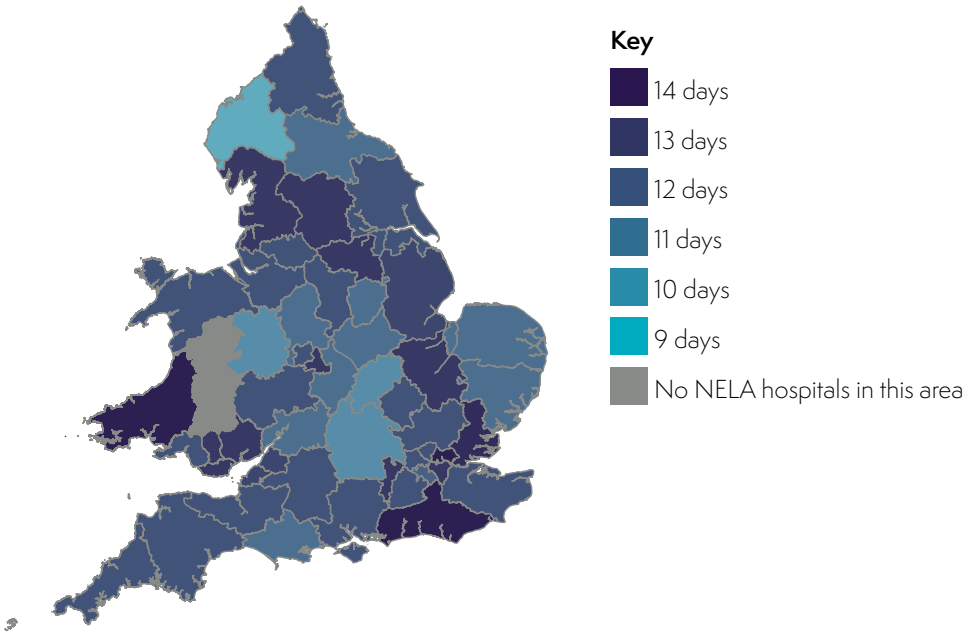
The typical (median) length of stay for all patients was the same in both groups, however the average (mean) length of stay of all patients was almost a day lower in the hospitals with twice-daily ward rounds (16.3 days compared to 17.2).

This difference suggests that some of the patients with longer lengths of stay have been able to leave hospital sooner when seen twice daily by a consultant. It is therefore possible that regular consultant input in the postoperative period may be associated with a reduction in the number of patients having prolonged hospital stays.

Is there variation between hospitals?

There remained significant variation in postoperative length of stay between hospitals, with medians ranging from approximately 7 to 20 days (Figure 66). Length of stay is an outcome that represents the culmination of many processes. It will be influenced by rates of postoperative complications whilst in hospital. However it will also depend significantly on the needs of the local population in terms of support during the recuperation and rehabilitation phase, and will be influenced by variations in the availability of step-down units or the provision of local social services. This may be outside the direct influence of hospital teams, but it is of importance to commissioners of local community services.

Figure 14
Variation between STPs and Health Boards in median postoperative length of stay in patients surviving to hospital discharge



Supplementary data tables are in the Appendix.

6.3 Unplanned return to theatre

Why is this important for patients?

A planned return to theatre can be part of optimal patient management. For example in more unwell patients it may be the case that 'damage limitation' is the most appropriate initial surgical option, with definitive surgery deferred until the patient's condition improves. However it is the unplanned returns to theatre that are likely to have a more significant impact on patients' experiences and outcomes.

Unplanned returns to theatre for more surgery following emergency laparotomy may be an indicator of an initial procedure that has not succeeded in resolving the problem as intended, or that some other form of complication has occurred.

The analysis within this section includes all patients who had an unplanned return to theatre after their emergency laparotomy, including those whose initial emergency laparotomy was itself performed for a complication of elective surgery earlier in the same hospital admission.

Has there been any change in the rate of unplanned returns to theatre?

There has been a statistically significant reduction in the number of patients having an unplanned return to theatre following their initial emergency laparotomy, from 10.2% in Year 1, to 9.4% in Year 2, and 9.0% in Year 3.

The rate of patients needing an unplanned return to theatre varied according to surgical urgency and level of risk (Table 6 and Table 7).

Table 6
Proportion of patients who returned to theatre following their initial emergency laparotomy – by documented urgency of surgery

Urgency of surgery	Total number of patients	Proportion of patients who returned to theatre following initial emergency laparotomy (%)
<2 hours	2,793	16.0
2–6 hours	9,503	9.9
6–18 hours	8,040	6.6
18–24 hours	4,167	6.8
Overall	24,503	9.0

Table 7
Proportion of patients who returned to theatre following their initial emergency laparotomy – by postoperative P-POSSUM risk category

Postoperative P-POSSUM risk of death	Total number of patients	Proportion of patients who returned to theatre following initial emergency laparotomy (%)
Lower (<5%)	10,319	4.8
High (5–10%)	4,424	8.1
Highest (>10%)	9,845	13.8
Overall	24,588	9.0

Was there a difference in unadjusted mortality for patients who had repeat emergency operations?

9.4% of emergency laparotomies (2,334 cases) were performed following a complication from previous elective abdominal surgery in the same admission. These patients had a significantly higher 30-day mortality rate than those undergoing an emergency laparotomy as their first procedure of the admission (Table 8).

Table 8
Unadjusted ONS 30-day mortality according to number of procedures

	Number of patients	Frequency (%)	Number of deaths	ONS 30-day mortality rate (%)
Primary procedure	22,558	90.6	2,351	10.4
Surgery for a complication of a recent procedure within same admission	2,334	9.4	286	12.3
Overall	24,892	100.0	2,637	10.6

Mortality difference: p = 0.006

Overall, those patients with a subsequent unplanned return to theatre after their emergency laparotomy had a higher 30-day mortality rate compared to those who did not need to return to theatre (Table 9).

Table 9
Unadjusted ONS 30-day mortality according to unplanned return to theatre

	Number of patients	Frequency (%)	Number of deaths	ONS 30-day mortality rate (%)
No unplanned return to theatre	22,371	91.0	2,162	9.7
Unplanned return to theatre	2,213	9.0	368	16.6
Overall	24,584	100.0	2,530	10.3

Mortality difference: p < 0.001

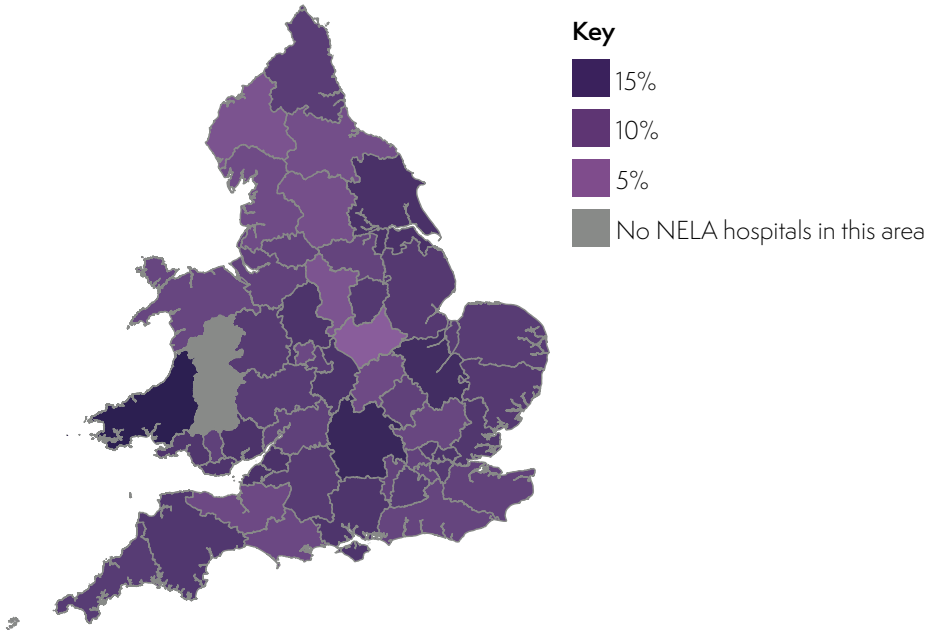
Variation by time-of-day and by hospital

There was no significant variation in the rate of unplanned return to theatre according to the day on which the initial emergency laparotomy took place. However, those patients requiring an emergency laparotomy overnight had higher rates of subsequent unplanned returns to theatre.

Patients needing emergency surgery after midnight that cannot wait until the next morning are known to be at higher risk, and could therefore be at higher risk of needing to return to theatre on that basis alone.

There was variation across the country in the rates of patients having an unplanned return to theatre after an emergency laparotomy (Figure 15 and Figure 67). This has not been risk adjusted according to the case mix, and may have been due to variation in patient characteristics. Individual hospitals should, as a routine part of clinical governance meetings, regularly audit their own outcomes and review the care of patients who return to theatre.

Figure 15
Variation between STPs and Health Boards in rates of unplanned returns to theatre



Recommendations

Clinical teams

Consultant-level care is required for postoperative emergency surgical patients who require a return to theatre, because they are at increased risk of dying. Quality improvement work should focus upon the rapid recognition, escalation and access to theatre of these patients.

Supplementary data tables are in the Appendix.

6.4 Unplanned admission to critical care

Please note

Due to an error identified in the local data entry process, all data regarding unplanned critical care admissions for patients treated at University Hospital Coventry (UHC) in Year 3 have been recoded to 'unknown'. Therefore this hospital's data are excluded from this analysis to ensure overall national data are not erroneously skewed.

Why is this important for patients?

Standards state that high-risk patients should be admitted to critical care following surgery. High-risk patients transferred directly to a ward rather than to critical care after surgery may deteriorate because they do not receive the required level of postoperative care from the outset. Data from other literature suggest that these patients have a higher mortality than if they had been admitted directly to critical care postoperatively.[10,15,16]

Has there been any change in the proportion of patients who have an unplanned admission to critical care?

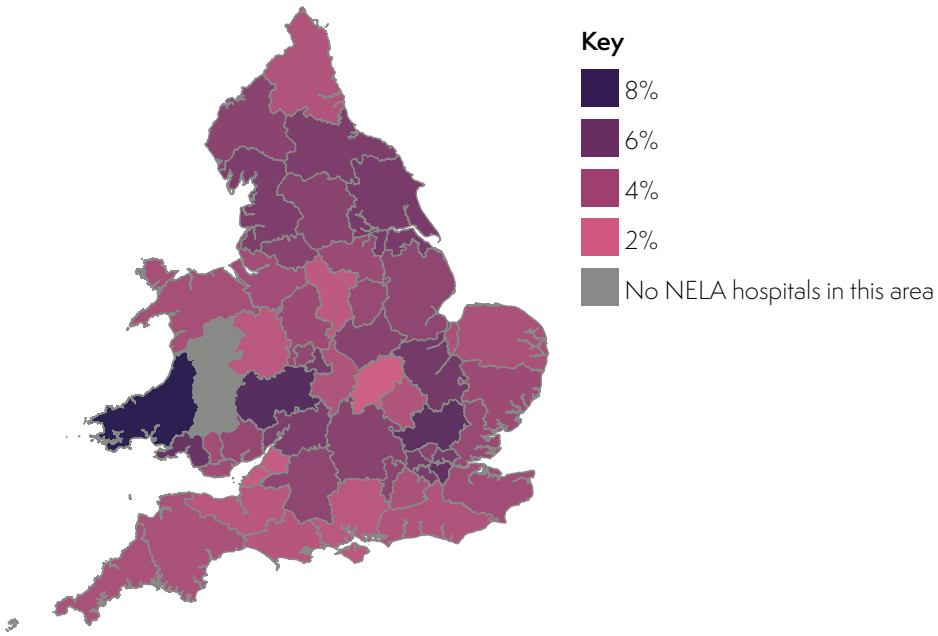
Overall, 885 patients (3.6%) required an unplanned escalation of care and were admitted from a ward to critical care in the seven days following surgery. This is relatively unchanged from Year 2 (3.9%).

659 patients (2.7%) had been admitted to critical care directly from theatres, but subsequently had an unplanned return to critical care after being discharged to a ward.

Was there variation in unplanned critical care admission between hospitals?

Hospitals varied in the proportion of their patients who had an unplanned admission to critical care (Figure 16). While the median rate was 3.1%, this ranged from zero to 22.2% (Figure 68).

Figure 16
Variation between STPs and Health Boards in rates of unplanned critical care admission



What was the effect of unplanned critical care admission on mortality?

The numbers of patients in this cohort were too small to undertake any meaningful analysis of mortality, and the data were not risk adjusted. However, unadjusted ONS 30-day mortality was significantly higher for patients who had an unplanned critical care admission within seven days of surgery than for those who did not (18.4% vs. 10.0%). This illustrates that teams need to be alert to the potential for poor outcomes in those patients who have an unplanned admission to critical care, and the fact that these patients may require extra support.

Why do some hospitals have high rates of unplanned critical care admission?

High rates of unplanned admissions to critical care may be due to insufficient critical care capacity or may reflect inadequate assessment of risk before surgery, leading to inappropriate allocation of beds.

Hospitals with high rates of unplanned admissions should review their local policies and procedures to determine whether they have sufficient critical care capacity. If they are unable to increase critical care capacity these hospitals should develop strategies to mitigate the risk this creates.

Despite the relatively small numbers within this cohort, hospitals can still use these cases as an opportunity to review how care is delivered at patient level. Hospital teams should review unplanned admission to critical care to determine if any are due to unrecognised deterioration on the ward, premature discharge from critical care, or if patients were inappropriately sent to wards from theatres.

7 HOSPITAL CHARACTERISTICS

Why is this important for patients?

There are a variety of different hospitals that carry out emergency laparotomy, ranging from small district general hospitals to large university teaching hospitals and tertiary referral centres. Regardless of the size and type of hospital, the same standards of care should apply to all patients undergoing emergency laparotomy wherever they present.

To help understand how different hospital types organise their care, NELA categorised them according to the number of beds in each hospital and the number of emergency laparotomies carried out in each category.

How does hospital size and workload vary across hospitals in England and Wales?

Data on hospital bed numbers were available for all hospitals, but the data required to estimate the workload in Welsh hospitals were not available. Estimates for the number of emergency laparotomies performed is therefore limited to English hospitals only (Table 10).

The larger hospitals had more beds available for adult general surgery, but these beds represented a smaller proportion of the total hospital beds. Hence, there may be more competition for resources in these large hospitals (Table 10).

Most hospitals carry out emergency bowel surgery on two to three patients a week regardless of hospital size. The largest operate on almost ten patients a week (Table 10). 62 hospitals (36%) are tertiary (specialist) referral centres for gastrointestinal surgery.

Table 10
Number of hospital beds and numbers of emergency laparotomies carried out each year – according to hospital size (data for hospitals accepting acute surgical admissions).

Quartile, based on total hospital bed numbers	Total number of hospital beds (Hospitals in England and Wales)			Number of emergency laparotomies performed each year (Data only available for English hospitals)		
	Number of hospitals	Median number of beds (IQR)	Range	Number of hospitals	Median number of cases (IQR)	Range
Small (Quartile 1)	43	307 (232–347)	49–360	37	112 (89–136)	56–267
Medium (Quartile 2)	43	430 (404–460)	362–502	39	150 (109–176)	55–346
Large (Quartile 3)	43	564 (527–600)	506–653	42	180 (147–203)	78–293
Very large (Quartile 4)	43	825 (745–967)	666–1,183	41	217 (179–267)	120–450
All hospitals	172	504 (361–660)	49–1,183	159	162 (121–203)	55–450

How do hospitals organise their emergency surgical intake?

Of the 184 hospitals in England and Wales that carry out emergency laparotomy and submitted data to the 2016 Organisational Audit, 171 (93%) admit acute general surgical patients 24/7.

Many patients requiring an emergency laparotomy present via emergency departments. Resident emergency department consultant cover (which means that a consultant is available to see patients at all times) was provided in 40% of the very large hospitals but only 12–16% of the smaller hospitals (20% of emergency departments overall) (Table 41).

Hospitals also admit acute general surgical patients into other areas of the hospital, such as dedicated acute surgical admissions units (Table 11). The structure and function of an acute surgical unit will vary depending on hospital size and available resources. A 'front-of–house' unit would ordinarily accept direct referrals for review, initial assessment and/or admission from the emergency department or from primary care, before transferring the patient to an inpatient general surgical ward for ongoing care. An inpatient emergency surgical unit enables the ongoing evaluation and treatment of the patient throughout the entire admission. Surgical ambulatory care units are rapidly evolving. They allow for assessment of the acute surgical patient, and subsequent investigation and management of less unwell surgical patients, to take place in the outpatient setting.

Acute surgical assessment units aim to provide better care by:

- separating elective from emergency workload
- providing short-stay assessment areas and rapid-discharge pathways for ambulatory patients
- providing staffing by consultant surgeons
- providing daily 'hot' clinics and dedicated radiology slots.

Table 11
Acute surgical units

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
Front-of-house acute surgical assessment unit					
	22 (51%)	28 (65%)	28 (65%)	37 (86%)	115 (67%)
Emergency general surgery ambulatory care					
	19 (44%)	19 (44%)	29 (67%)	32 (74%)	99 (58%)
Inpatient emergency surgical unit					
	10 (23%)	15 (35%)	18 (42%)	18 (42%)	61 (35%)

Is there a best way of organising emergency surgical care?

NELA was established to examine care delivered to patients undergoing emergency bowel surgery, which represents around 10% of all emergency general surgical admissions. Analysis of the NELA data therefore cannot shed light on whether different set-ups are associated with better care, as these data only reflect a relatively small proportion of all emergency general surgical admissions.

Seventy-seven hospitals (45%) reported that their emergency general surgery service has been reorganised since the last Organisational Audit in 2013. It is likely that hospitals tend to organise their service according to the needs and pressures facing each hospital and to best utilise the resources available. Collection of NELA data will allow hospitals to determine if this reorganisation delivers effective care that meets standards for those patients requiring emergency bowel surgery.

Recommendations

Commissioners and providers

Organisational and structural changes to the acute surgical admissions service, including staffing and care pathways, should be tailored to reflect the demands upon individual hospitals. The effects of any changes should be monitored by robust collection and assessment of hospital-level NELA data, to ensure that standards of care are met.

Supplementary data tables are in the Appendix.

8 PATIENT AND SURGICAL CHARACTERISTICS

Why is this important for patients?

Understanding patient and surgical characteristics allows NELA to investigate processes of care and outcomes after surgery in different types of patient, and to highlight if there is variation in particular patient populations (e.g. older patients) or for different operations. For patients, this means they can be assured that providers are continually assessing whether processes are in place to provide them with the best possible care.

NELA routinely collects data on age, gender, urgency of surgery, and American Society of Anesthesiologists (ASA) Physical Status classification. The latter is a reflection of a patient's co-morbidity at the time of surgery.

What types of patients undergo emergency bowel surgery?

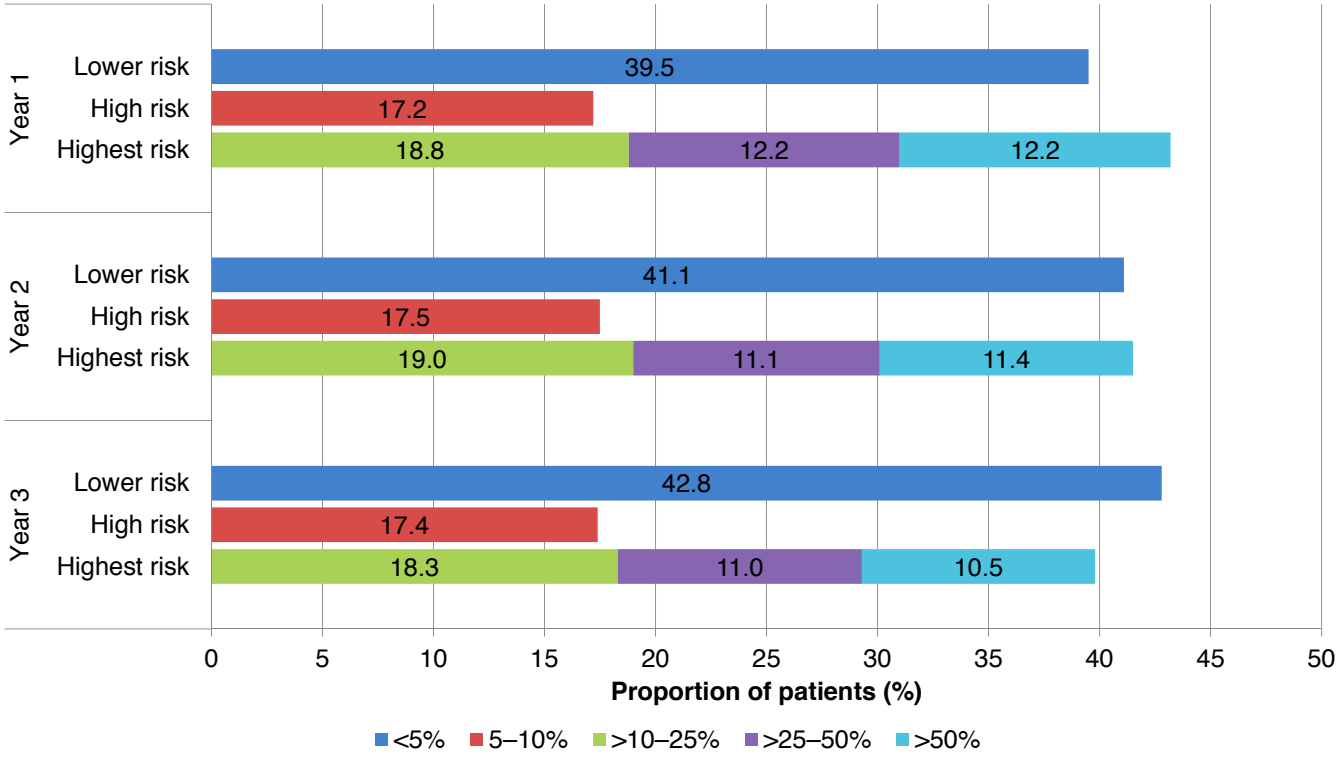
The characteristics of patients undergoing surgery have remained similar over the last three years:

- almost half were over the age of 70 years (median age 67 years)
- their physical health tended to be poor: over half were rated as suffering from a severe health condition
- more than half required surgery within six hours of the decision being made to operate
- 9% of patients needed emergency bowel surgery as a complication of previous surgery, and 9% returned to theatre for repeat surgery after their initial emergency bowel surgery.

Almost 60% of patients were high risk (predicted mortality ≥5%) (Figure 17). The proportion of highest-risk (>10% predicted mortality) patients has fallen from 43% in Year 1 to 40% in Year 3, although the absolute numbers have remained similar (≈10,000 patients per year).

There has been a fall in the median P-POSSUM score from 7.6% in Year 1 to 6.7% in Year 3. The reason for this reduction is unclear. Some of this may be due to a greater number of lower-risk patients entered into NELA as overall case ascertainment has risen (increased from 65% in the first Report to 82% in this Report) (Figure 17). It may reflect a situation where very-high-risk patients are being offered different treatment options. It may also reflect improvements in care, such that patients are less unwell by the time they need surgery. Further research is required to answer these questions.

Figure 17
Patient risk profiles according to preoperative P-POSSUM score



What types of operations are carried out?

The indications for emergency laparotomy have remained unchanged, broadly dividing into intestinal obstruction or abdominal sepsis due to intestinal perforation, peritonitis or abdominal abscess.

Adhesiolysis and small bowel resection remained the most commonly performed procedures. Colorectal resections comprised the majority of the remainder of emergency laparotomies (Table 12, see Table 45 for the complete list of surgical procedures).

Table 12
Top ten most frequently recorded primary surgical procedures at emergency laparotomy and ONS 30-day mortality

Primary operative procedure	Number of patients (frequency (%))	ONS 30-day mortality (frequency (%))
Adhesiolysis	4,182 (16.8)	212 (5.1)
Small bowel resection	4,040 (16.2)	440 (10.9)
Colectomy: right (including ileocaecal resection)	3,307 (13.3)	290 (8.8)
Hartmann's procedure	2,956 (11.9)	316 (10.7)
Stoma formation	1,353 (5.4)	155 (11.5)
Peptic ulcer suture or repair of perforation	1,350 (5.4)	154 (11.4)
Colectomy: subtotal or panproctocolectomy	1,309 (5.3)	187 (14.3)
Colectomy: left (including anterior resection)	929 (3.7)	104 (11.2)
Drainage of abscess/collection	670 (2.7)	59 (8.8)
Washout only	566 (2.3)	70 (12.4)

What is the main mode of surgery?

Emergency laparotomy predominantly remained an open procedure. There was a small increase in the number of cases commenced laparoscopically, but the number completed laparoscopically is unchanged at only 8% (Table 13).

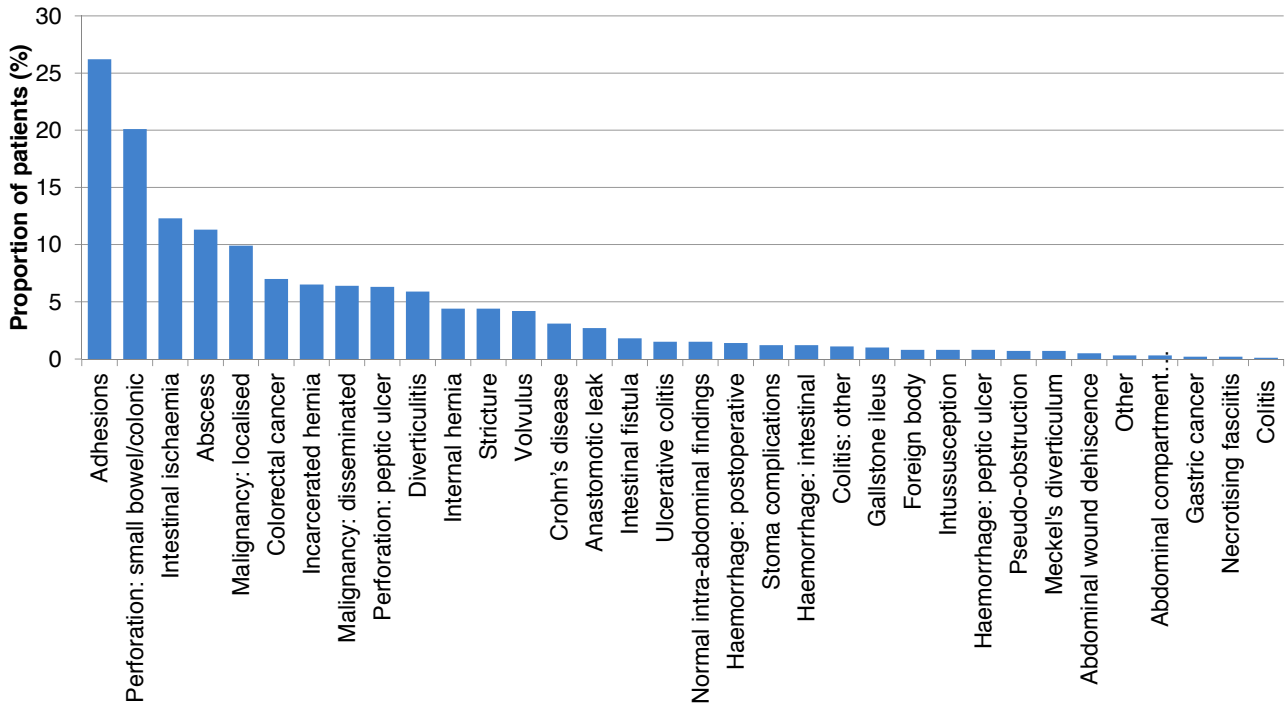
Table 13
Operative approach at emergency laparotomy

Operative approach	Number of patients	Frequency (%)
Open	21,032	84.5
Laparoscopic	1,920	7.7
Laparoscopic converted to open	1,629	6.5
Laparoscopic-assisted	316	1.3

What were the main surgical findings?

The frequency of surgical findings remained largely unchanged between the three years of the Audit (Figure 18). The full figures are shown in Table 36.

Figure 18
Rates of intraoperative findings (more than one may be selected for each patient)



Supplementary data tables are in the Appendix.

9 CLINICIAN-BASED FACTORS

9.1 Documentation of risk

Why is this important for patients?

All patients should have an assessment of their individual risk of death and complications. This supports shared decision making, helping guide doctors, patients, and their relatives in deciding which course of treatment is most appropriate. Risk assessment allows clinicians to tailor care to the needs of each person requiring surgery.

Risk prediction is not perfect at the level of an individual patient, and can only help guide decision making. It should not be used as the sole means of deciding on suitability for surgery or the allocation of resources such as critical care.

P-POSSUM overestimates the risk of death above 15%, and so any patient with a score higher than this should only be considered highest risk.

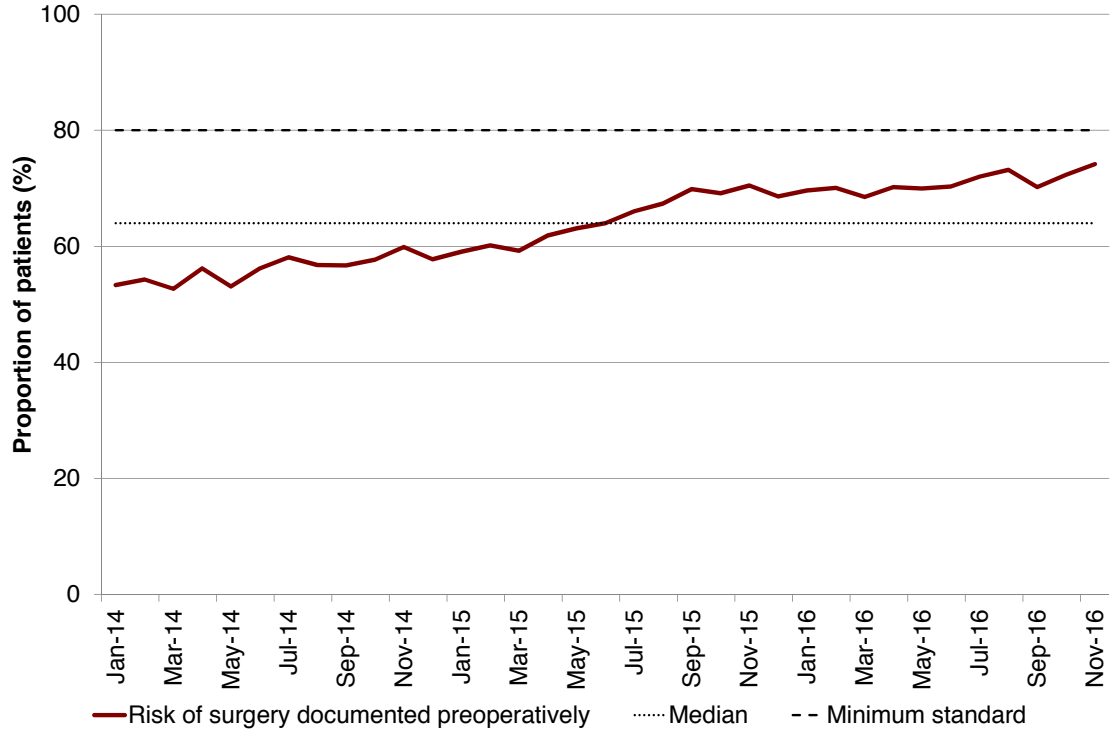
Particular care should be taken to consider all the individual factors when the patient is in the highest risk category, as there are some conditions, such as GI perforation where rapid surgery may be life saving.

High-risk patients are those with a ≥5% (1 in 20) risk of dying after surgery. Two-thirds of patients were high risk. Many of the standards against which NELA measures delivery of care are based on the patient's risk of death following surgery. For instance, high-risk patients need consultant-delivered care, so it is important that these patients are identified before surgery to ensure that this happens.

What proportion of patients had an assessment of risk documented before surgery? (Minimum standard 80%)

Documentation of risk has improved since 2014, and was recorded for more than two-thirds of all patients (71%) in Year 3 (Figure 19). There was no time-of-day or day-of-week variation. However, this means that 7,290 patients did not have their risk documented before surgery. NELA data still allow us to calculate the risk profile of all these patients who did not have their risk assessed prior to surgery, and this showed that half of them were high risk (Table 48). Failure to recognise high-risk patients may represent missed opportunities to provide appropriate levels of care for these patients. This metric is under consideration for inclusion in the proposed Best Practice Tariff.

Figure 19
Trend in the overall proportion of patients whose risk was documented preoperatively



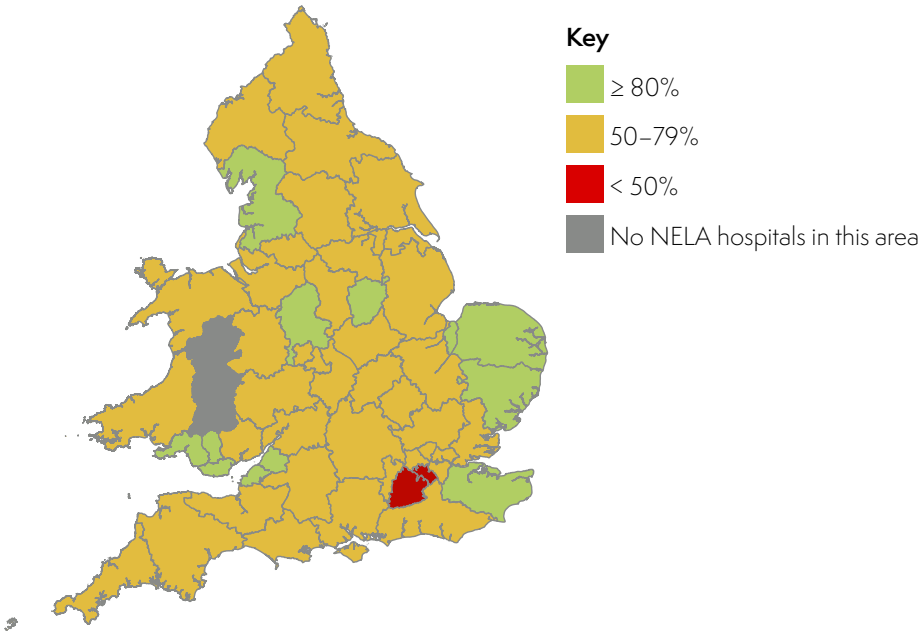
What organisational structures are in place to influence this process?

Having a policy requiring documentation of preoperative risk assessment was associated with improved preoperative documentation of risk (76% of patients vs. 59%), so it is reassuring to see that more hospitals now have a policy for risk documentation (134 out of 172 hospitals).

What variation existed in the proportion of patients who had a risk of death documented before surgery?

Only 57 out of 187 hospitals reliably assessed risk in more than 80% of their patients. This varied throughout the country (shown in Figure 20), and detailed results for individual hospitals are shown in Appendix 15.2.

Figure 20
Variation between STPs and Health Boards in the proportion of patients whose risk was documented preoperatively



We also found

Patients having surgery after midnight were at higher risk than those having surgery during the daytime. They had a higher median P-POSSUM risk of death and higher observed mortality rates (Table 3).

Risk was more likely to be documented in those patients perceived to be at higher risk, e.g. greater urgency, higher ASA status, older patients.

How accurate are the P-POSSUM and NELA Risk tools at predicting a patient's risk of death?

Through the large amount of data collected by NELA in Years 1 and 2, we have now been able to develop a bespoke risk-prediction tool that is specific to patients having emergency bowel surgery.

The NELA model was primarily developed to allow the outcome statistics of organisations to be risk adjusted, but a strength of the new model is that it has been developed using recent data from many different hospitals, which helps to ensure that the patients on which it was developed are representative of the individuals having emergency laparotomy. We have found that it more consistently predicts the risk of high-risk patients when compared to P-POSSUM, which tends to overestimate risk (almost two-fold) above approximately 15% predicted mortality (Figure 21).

There can be considerable variation between risk figures provided by P-POSSUM and the NELA risk tool. Some patients identified as high risk by one risk prediction tool, may be identified as low risk by another (Figure 22). Risk models predict outcomes of populations better than the outcome of an individual within that population. **The risk assessment tool may be used to assess the individual risk of a patient, but this must be done with caution and should only be used to support clinical judgement and aid discussions relating to appropriate care, and not used in isolation**.

Inherently high risk situations may exist such as upper GI perforation – where the patient's current condition is critical and risk score is very high, but where surgery may be lifesaving and therefore appropriate. Surgery must not be denied solely on the basis of a risk score.

NELA continues to promote the use of risk scores to help guide patient management, but only as an adjunct to clinical decision making.

The NELA and P-POSSUM risk calculators can both be accessed within the NELA data collection website (https://data.nela.org.uk), and also on a dedicated standalone website (http://data.nela.org.uk/riskcalculator) and smartphone app. Both of these have achieved the necessary CE marking for medical devices. Further work is currently underway to validate the NELA risk predictor.

Figure 21
Calibration plots comparing the observed ONS 30-day mortality against that predicted by P-POSSUM and the NELA models, in deciles of predicted risk

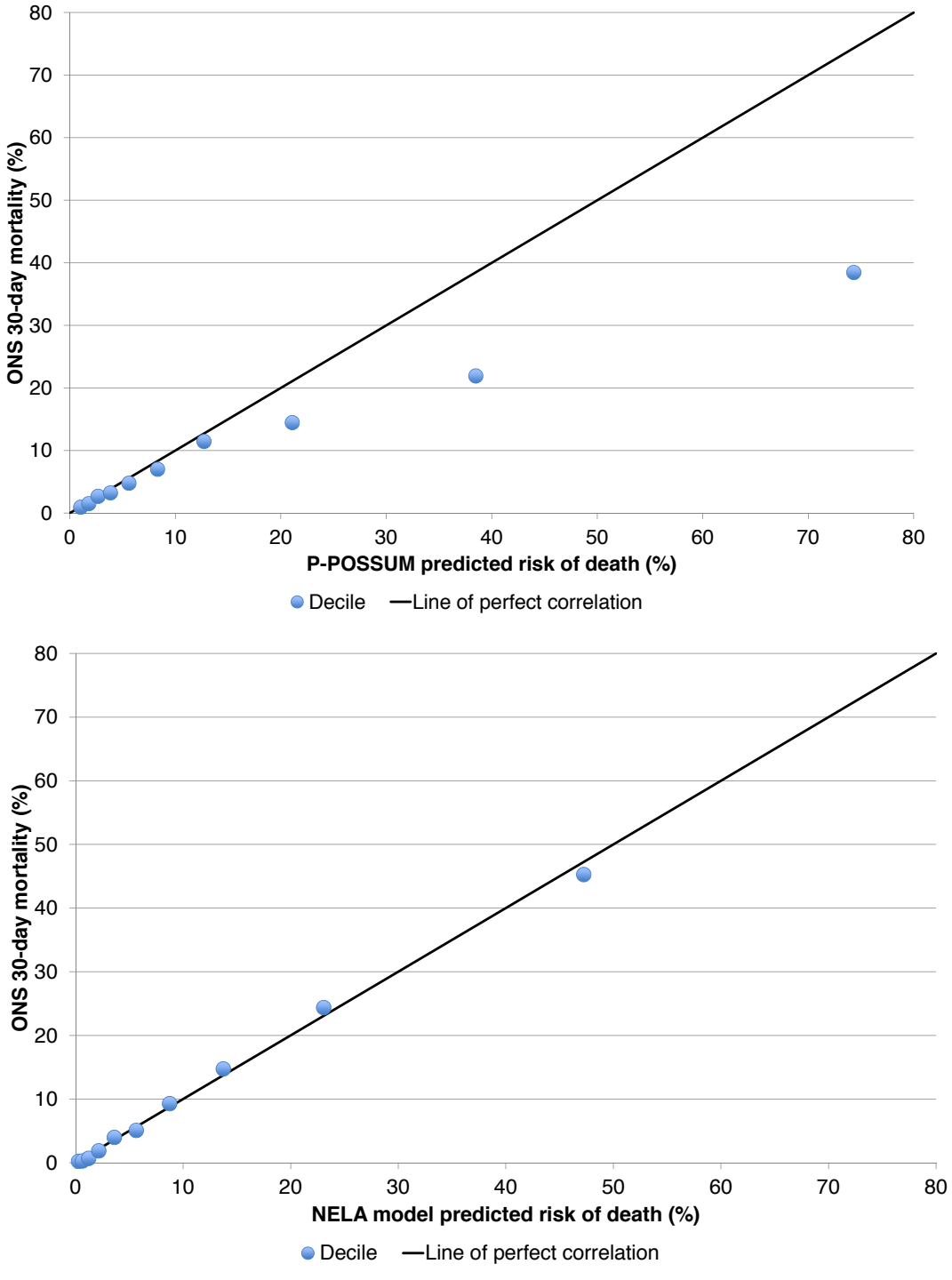
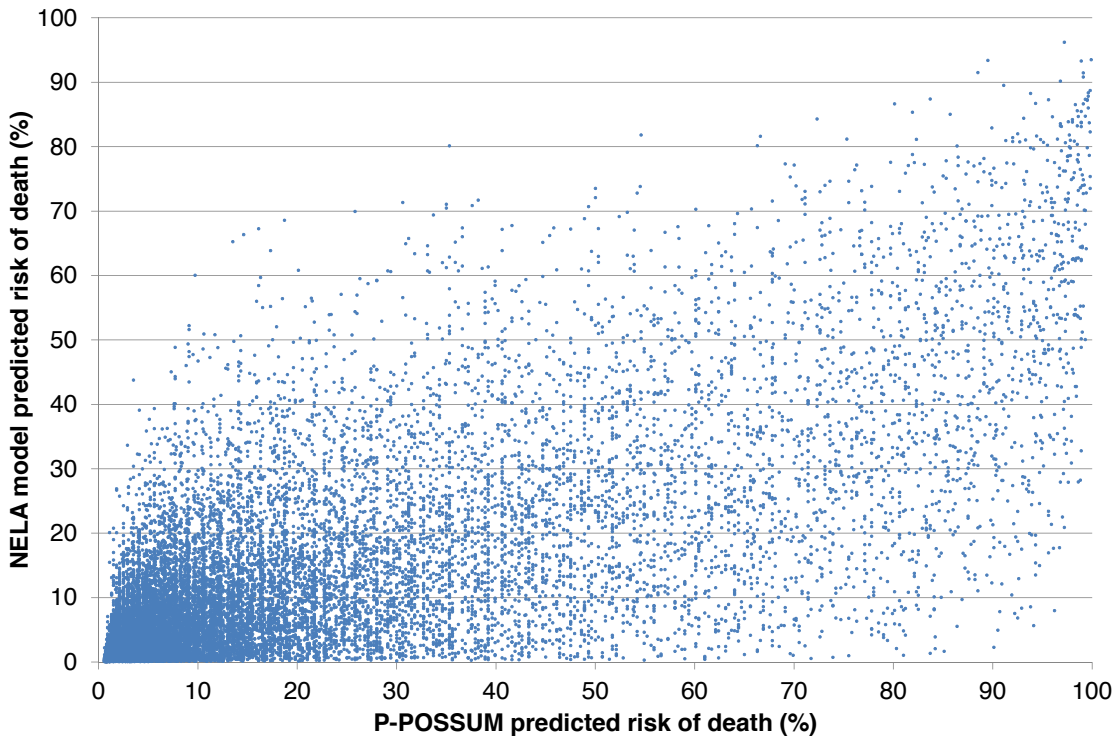


Figure 22
Scatter plot comparing predicted risk score generated by P-POSSUM and the NELA risk prediction tool



Recommendations

Clinical teams

All patients should receive an assessment of risk, not just those perceived to be at high risk. All members of the clinical team should be encouraged to use risk assessment when communicating with colleagues, between disciplines and with patients.

Risk-prediction tools must not be used in isolation to decide on a patients care, and should be used to guide and support clinical judgement and other information.

Supplementary data tables are in the Appendix.

9.2 Consultant anaesthetist and surgeon working patterns

Why is this important for patients?

Patients undergoing high-risk surgery should want and expect their care to be directly supervised by experts. Hence the management of patients requiring emergency bowel surgery should be directed by consultant surgeons and consultant anaesthetists. Where patients are assessed as needing postoperative critical care, the critical care team should be involved as early as possible. These principles are reflected in the standards of care that NELA audits against. Considerable improvement has been seen in consultant presence during the actual surgery. It is important that consultant input is delivered throughout the whole perioperative period, and opportunities exist to improve further in these areas.

Consultant expertise is required for the complex and individualised management of patients, both before, during and after their surgery. The management of patients during emergency bowel surgery can be challenging, and experience is required for the complex decision making required to identify and deliver the next steps in care.

One of the key areas is the understanding and consideration of patients' and carers' wishes, and balancing these with the risks and benefits of different treatment options, especially if certain options may be inappropriate or likely to be futile. These decisions require multidisciplinary consultant input before surgery. Expertise is also required during surgery, as patients may be unstable and potentially deteriorate very quickly.

Consultant presence also provides an opportunity for training junior doctors in the management of high-risk patients.[17]

Consultant anaesthetists
How is anaesthetic consultant cover organised?

The majority of hospitals had daytime emergency theatres staffed by consultant anaesthetists (Table 14). However, there may be other demands on these consultants' time outside of the emergency operating theatre (e.g. obstetric theatre, trauma calls). The out-of-hours service was largely delivered as an on-call service by non-resident consultant anaesthetists. There was no relationship between the way the rota was organised and consultant presence during surgery.

Being free of elective commitments following a night on-call did not seem to increase the likelihood of care being provided by a consultant anaesthetist for out-of-hours emergency laparotomies.

Table 14
Consultant anaesthetists' working patterns

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
Are daytime, weekday emergency general theatres covered by dedicated and job-planned consultant anaesthetic sessions?					
All	28 (65%)	40 (93%)	33 (77%)	40 (93%)	141 (82%)
Some	11 (26%)	3 (7%)	8 (19%)	3 (7%)	25 (15%)
None	4 (9%)	0 (0%)	2 (5%)	0 (0%)	6 (3%)
At least one consultant anaesthetist available to be present in emergency theatre 24/7					
	39 (91%)	43 (100%)	43 (100%)	43 (100%)	168 (98%)
At least one consultant anaesthetist available to be present in emergency theatre 24/7, free from other on-call commitments (e.g. critical care or obstetrics)					
	8 (19%)	4 (9%)	3 (7%)	10 (23%)	25 (15%)
Resident consultant anaesthetist					
Weekday – evening	9 (21%)	14 (33%)	21 (49%)	22 (51%)	66 (38%)
Weekday – night	4 (9%)	0 (0%)	1 (2%)	2 (5%)	7 (4%)
Weekend – daytime	15 (35%)	16 (37%)	20 (47%)	24 (56%)	75 (44%)
Weekend – evening	8 (19%)	8 (19%)	10 (23%)	11 (26%)	37 (22%)
Weekend – night	4 (9%)	2 (5%)	2 (5%)	3 (7%)	11 (6%)
Consultant anaesthetist free from planned elective care the day after a night on-call					
	13 (30%)	10 (23%)	13 (30%)	16 (37%)	52 (30%)

Consultant surgeons

What is the sub-specialty of the consultant surgeon providing emergency/on-call cover? Is this dependent on hospital size?

All consultants in the general surgical specialties will have been trained in emergency gastrointestinal (GI) surgery. However, it is recognised that surgeons with regular elective GI practice or dedicated emergency surgeons are best placed to maintain their skills if they are exposed to difficult laparotomies on a more frequent basis. Compared with non-GI surgeons, many GI specialists will utilise advanced laparoscopic techniques in their elective practice, which they are able to transfer to the acute setting.

Colorectal surgeons participated in the emergency general surgery rota at almost all hospitals (Table 15 and Table 16). Only 26 hospitals (15%) had a separate colorectal and Upper GI on-call system. In smaller hospitals, there was still a greater reliance on breast surgeons to provide emergency cover. However, since the last Organisational Audit, there was an almost 50% reduction in the number of smaller hospitals whose on-call emergency general surgery rotas included vascular surgeons. There is an emerging specialty of Emergency General Surgery (EGS). Consultants in this specialty have had specific training in emergency general surgery, and are specifically employed to cover unscheduled general surgical admissions. Emergency general surgeons participated in the on-call rota in 37% of units.

Table 15
Surgical subspecialties participating in the consultant surgeon on-call rota

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
Surgical specialties represented by one member or more on the EGS on-call rota					
Colorectal	42 (98%)	43 (100%)	43 (100%)	43 (100%)	171 (99%)
Upper GI	31 (72%)	37 (86%)	39 (91%)	41 (95%)	148 (86%)
General surgery	36 (84%)	38 (88%)	33 (77%)	32 (74%)	139 (81%)
Emergency general surgery	11 (26%)	19 (44%)	16 (37%)	17 (40%)	63 (37%)
Breast	26 (60%)	18 (42%)	9 (21%)	8 (19%)	61 (35%)
Hepatobiliary	7 (16%)	9 (21%)	10 (24%)	19 (44%)	45 (26%)
Endocrine	6 (14%)	7 (16%)	6 (14%)	12 (28%)	31 (18%)
Vascular	3 (7%)	7 (16%)	9 (21%)	6 (14%)	25 (15%)
Separate sub-specialty on-call system (e.g. colorectal and upper GI)					
	3 (7%)	5 (12%)	3 (7%)	15 (35%)	26 (15%)

Table 16
Emergency laparotomies performed according to the sub-specialty of the operating consultant surgeon

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
Colorectal	2,061 (56%)	2,452 (52%)	3,172 (55%)	3,956 (55%)	11,641 (54%)
Upper GI	567 (15%)	618 (13%)	1,074 (19%)	1,656 (23%)	3,915 (18%)
General surgery	635 (17%)	803 (17%)	692 (12%)	506 (7%)	2,636 (12%)
Emergency general surgery	109 (3%)	371 (8%)	379 (7%)	547 (8%)	1,406 (7%)
Hepatobiliary	52 (1%)	117 (3%)	173 (3%)	300 (4%)	642 (3%)
Breast	195 (5%)	181 (4%)	60 (1%)	31 (<1%)	467 (2%)
Vascular	17 (1%)	74 (2%)	158 (3%)	59 (1%)	308 (1%)
Other	26 (1%)	55 (1%)	30 (1%)	110 (2%)	221 (1%)

Are consultant surgeons free from elective activity when providing emergency cover?

Standards state that consultants should be free from elective responsibilities in order to provide experience, senior decision making, and leadership for patients requiring emergency bowel surgery.

- In 91% of hospitals, the consultant surgeon was free from all non-acute commitments when covering the emergency workload.
- In 51% of hospitals, surgeons were free from planned/elective activity the day after a night on-call, enabling review on the post-take ward round and ensuring availability to perform emergency operations.

How is consultant surgical on-call provision provided?

There remained a considerable variation in how the consultant surgical on-call service was provided. Different types of rota will have different implications for fatigue and availability, depending on the workload. Continuous periods of duty may allow for better continuity of care, but they also bring the risk of greater fatigue. It is essential that there is job-planned opportunity for handover between consultant surgeons.

- A 1-in-8 on-call rota was the most frequently reported.
- Over 90% of hospitals' consultant surgeons were on-call for two or more consecutive days.
- The most common form of rota (45%) had the surgeon on-call for 24-hour periods lasting two to four consecutive days (i.e. 48–96 hours as a continuous period), but less than a full week.
- Only 15% of units expected consultants to cover across more than one site.
- Of the 62 hospitals where the care of acute patients was handed over to the next on-call surgeon (such that the incoming on-call surgeon became the 'named consultant' responsible for the patients' care), 84% had a policy for formal handover between consultants.

In one-fifth of all hospitals, there was more than one consultant surgeon on-call during daytime hours; this was more likely in the largest hospitals.

In only two hospitals (1%) was there more than one consultant surgeon on-call overnight.

Overall, approximately half of the hospitals performing emergency laparotomy had four or more tiers to their EGS rotas. Provision was less comprehensive at smaller hospitals. This has remained largely unchanged from the previous Organisational Audit.

We also found

There has been a 20% increase in the use of surgical care practitioners (SCPs) and advanced nurse practitioners (ANPs) as part of the acute surgical rota since the previous Organisational Audit, regardless of hospital size.

Recommendations

Clinical directors and multidisciplinary teams

Rotas, job plans, and staffing levels for surgeons and anaesthetists should allow an uninterrupted consultant-delivered service 24 hours a day, seven days per week.

Supplementary data tables are in the Appendix.

9.3 Consultant surgeon review within 14 hours of admission

Why is this important for patients?

Prompt senior review of emergency general surgical patients is vital because complex decision making and treatment planning may be required on admission to hospital. Only one in every ten patients who are admitted with acute abdominal pain ultimately undergoes an emergency laparotomy, and it is not always immediately apparent at the time of admission which patients will require surgery. Early senior involvement will reduce delays in decision making and is associated with improved patient outcomes. Many patients will require consultant review much earlier than 14 hours after admission. The generic standard set for consultant review within 14 hours[18] is not an appropriate metric for ensuring high-quality consultant-delivered care for patients who require emergency laparotomy, as more-unwell patients will not be able to wait until the next scheduled ward round. It does however ensure that standards are met for the 90% of patients who are admitted acutely but do not require an emergency laparotomy.

What proportion of patients were reviewed by a consultant surgeon within 14 hours of emergency presentation at hospital?

Only 55% of patients who were admitted as an emergency and subsequently underwent an emergency laparotomy were reviewed by a consultant surgeon within 14 hours of admission to hospital. This included all patients, including those admitted under different specialties. Of those patients admitted under the care of the general surgeons, 78% were reviewed within 14 hours. This highlights the importance of admitting patients under the appropriate team at the time of admission and of other specialties seeking early surgical review in those suspected of having surgical pathology.

How did this vary around the country and according to the time-of-day or day-of-week of admission?

Variation across England and Wales is shown in Figure 23. There was no difference according to day-of-week. However patients admitted in the late morning or afternoon were more likely to wait longer before being first seen by a consultant surgeon (Figure 24).

Figure 23
Variation between STPs and Health Boards in review by consultant surgeon within 14 hours of admission

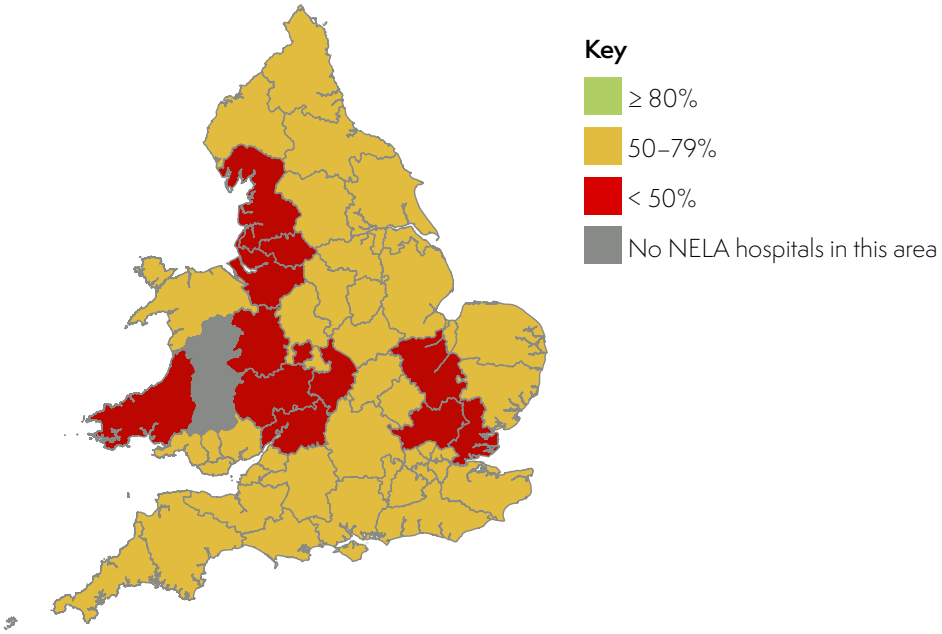
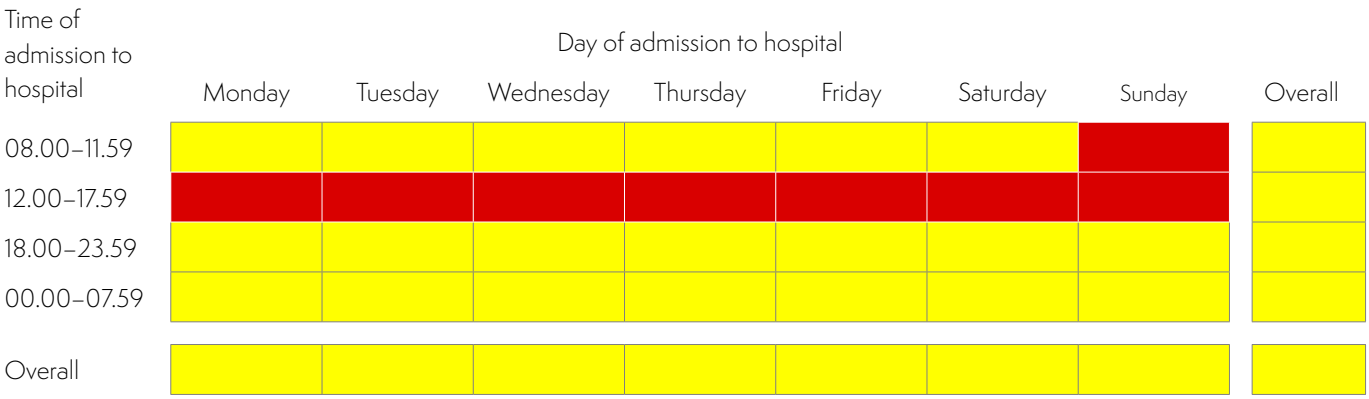


Figure 24
Variation in review by consultant surgeon within 14 hours of admission – by day and time of admission to hospital



Key

≥ 80%

50–79%

< 50%

Why might this variation by time of the day exist?

While the majority of consultants were free from elective activity during their on-call duties, the emergency surgical workload is not limited to patients who require emergency laparotomy, and consequently consultant surgeons are busy throughout the day. Emergency surgical work also includes (but is not limited to) operating on patients who require other emergency surgical procedures, performing acute endoscopy, training and supervising juniors, meeting family and relatives, performing ward rounds to facilitate patient flow and discharge (thereby increasing hospital capacity), and also the review of patients admitted under other specialties.

The 62% of surgical departments that had two scheduled ward rounds every day were more likely to achieve the following standards:

- patients being reviewed within 14 hours by a consultant surgeon
- decision to operate made by the consultant surgeon in person.

What variation existed in the proportion of patients reviewed by a consultant surgeon within 14 hours of emergency presentation? – by urgency of surgery

Patients with the greatest level of operative urgency were more likely to receive consultant surgeon review within 14 hours of admission (Table 17). This suggests that higher-risk patients are being identified by other team members and escalated to consultants.

Table 17
Proportion of patients reviewed by a consultant surgeon within 14 hours of admission to hospital – by operative urgency

Operative urgency	Total number of patients	Proportion reviewed by a consultant surgeon within 14 hours of emergency admission (%)
<2 hours	1,856	68.1
2–6 hours	6,782	60.9
6–18 hours	6,267	51.6
18–24 hours	3,204	42.9
Overall	**18,109**	**55.3**
(Data missing)	*31*	*54.8*

Quality improvement vignette

'We have improved our time to first consultant surgeon review by focusing on communication and education. We strongly felt that we should use our local data to drive improvement initiatives in our institution. Our surgical consultant lead has regularly presented our local data to our surgeons with a real emphasis on improving consultant engagement throughout the perioperative pathway. Our surgeons have been presented with opportunities to review and participate in the design of our new pathway of care for patients undergoing emergency laparotomy, and we believe that engaging at this level has raised awareness of the areas in which we needed to improve, with pleasing results. Similarly, local data are analysed by our anaesthetic consultant lead and fed back to the anaesthetics department monthly, with the aim of further driving improvement.'

Dr Sam Bampoe (Consultant in Anaesthesia and Perioperative Medicine), University College Hospital, London

Recommendations

Clinical directors and multidisciplinary teams

Patients should be seen in a time frame dictated by their clinical urgency seven days per week. Rota patterns and job plans should be reviewed to ensure that a consultant surgeon of the appropriate specialty is free from routine commitments, and therefore always available to see all acute surgical patients, particularly those who require emergency laparotomy, in a timely fashion. A scheduled twice-daily ward round ensures that the care standards are met for all acute surgical patients, including those who do not require emergency laparotomy.

Quality improvement work should be undertaken, which looks at the implementation of pathways for the identification and escalation of care of patients who would benefit from an urgent opinion from a consultant surgeon.

Supplementary data tables are in the Appendix.

9.4 Consultant preoperative assessment, decision making and presence in theatre for high-risk patients

Why is this important for patients?

Patients should expect to receive consultant-delivered care when they are undergoing high-risk surgery. This principle is generally adhered to in the provision of elective care, and is equally applicable to emergency surgery.[19,20]

What proportion of high-risk patients (P-POSSUM risk of death ≥5%) were reviewed before surgery by a consultant surgeon (in person when making the decision to operate) and a consultant anaesthetist? (Minimum standard 80%)

There has been little change in the proportion of all patients seen by a consultant surgeon, and a small fall in the proportion seen by a consultant anaesthetist (Figure 25). NELA does not collect data that might explain this observation. Greater numbers of the highest-risk patients were seen, especially by anaesthetists, and this may reflect greater use of risk assessment to highlight high-risk patients (Figure 26). The questions asked within NELA have subsequently been improved to provide greater information about the nature of preoperative input and this will be reported in future years.

Figure 25
Trends in the proportions of high-risk patients (preoperative P-POSSUM risk of death ≥5%) who were reviewed preoperatively by a consultant surgeon, by a consultant anaesthetist, and by both these consultants

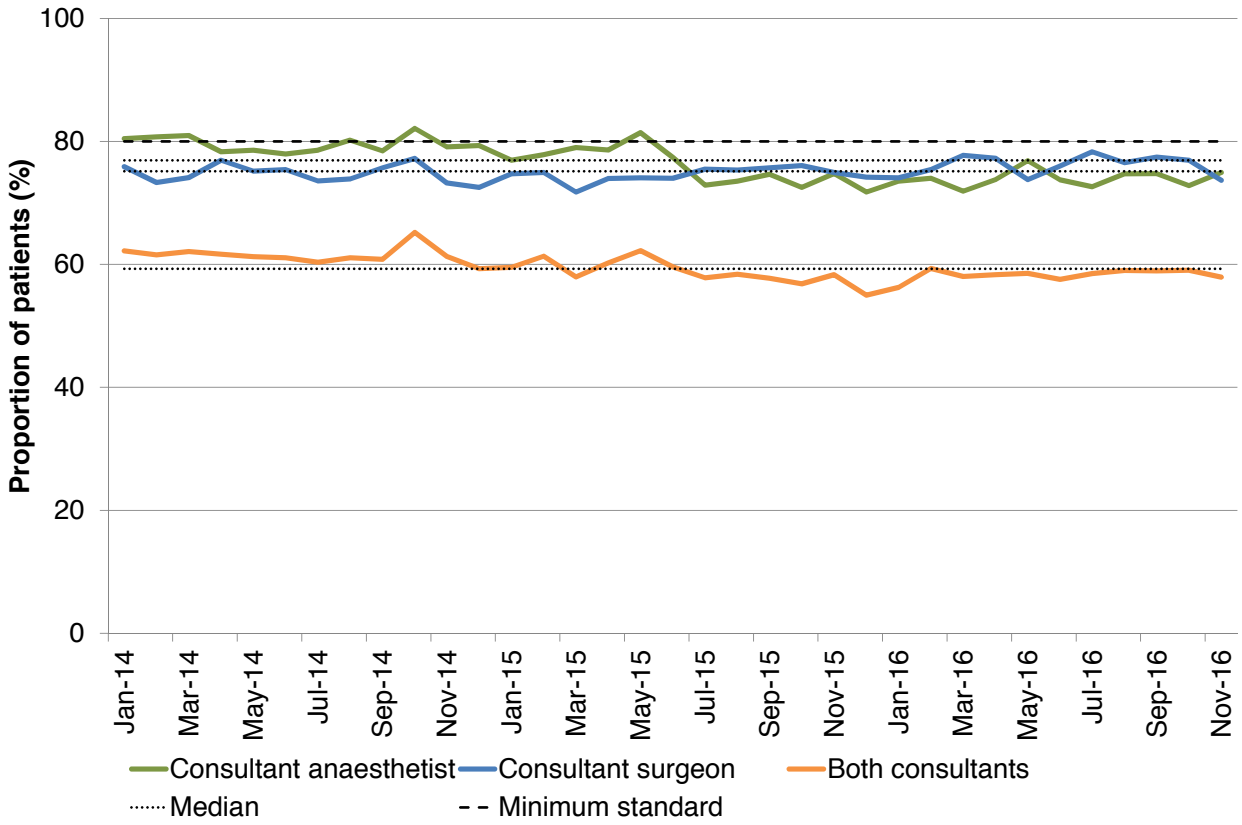
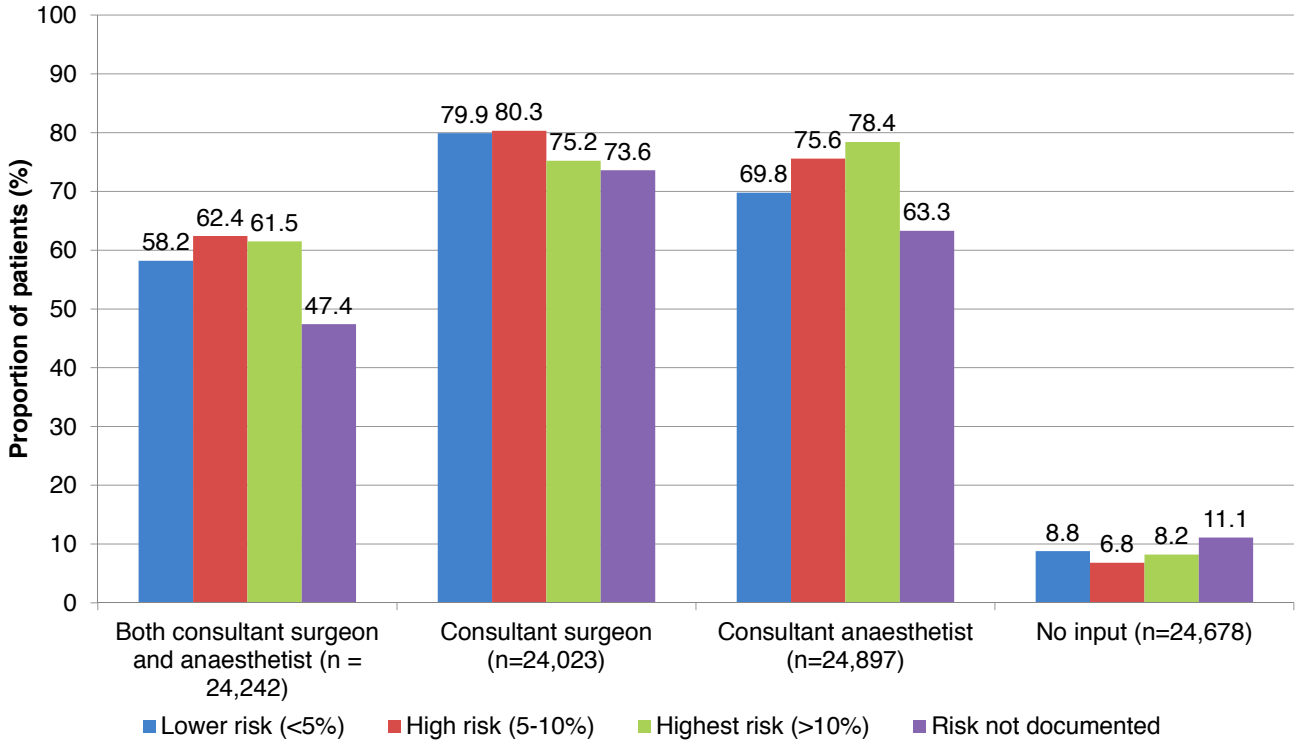


Figure 26
Proportion of patients receiving input before surgery by consultant surgeons and consultant anaesthetists – by documented preoperative risk category



What proportion of high-risk patients (preoperative P-POSSUM risk of death ≥5%) had a consultant surgeon and a consultant anaesthetist directly supervising care during surgery? (Minimum standard 80%)

Consultant surgeon and consultant anaesthetist presence during surgery has improved over the last three years, although anaesthetic presence remained lower than surgical presence (Figure 27). It should now be considered unusual to have high-risk emergency laparotomy surgery without both consultants present in theatre. This metric is under consideration for inclusion in the proposed Best Practice Tariff.

Figure 27
Trends in the proportions of high-risk patients (preoperative P-POSSUM risk of death ≥5%) for whom a consultant surgeon, consultant anaesthetist and both consultants, were present in theatre

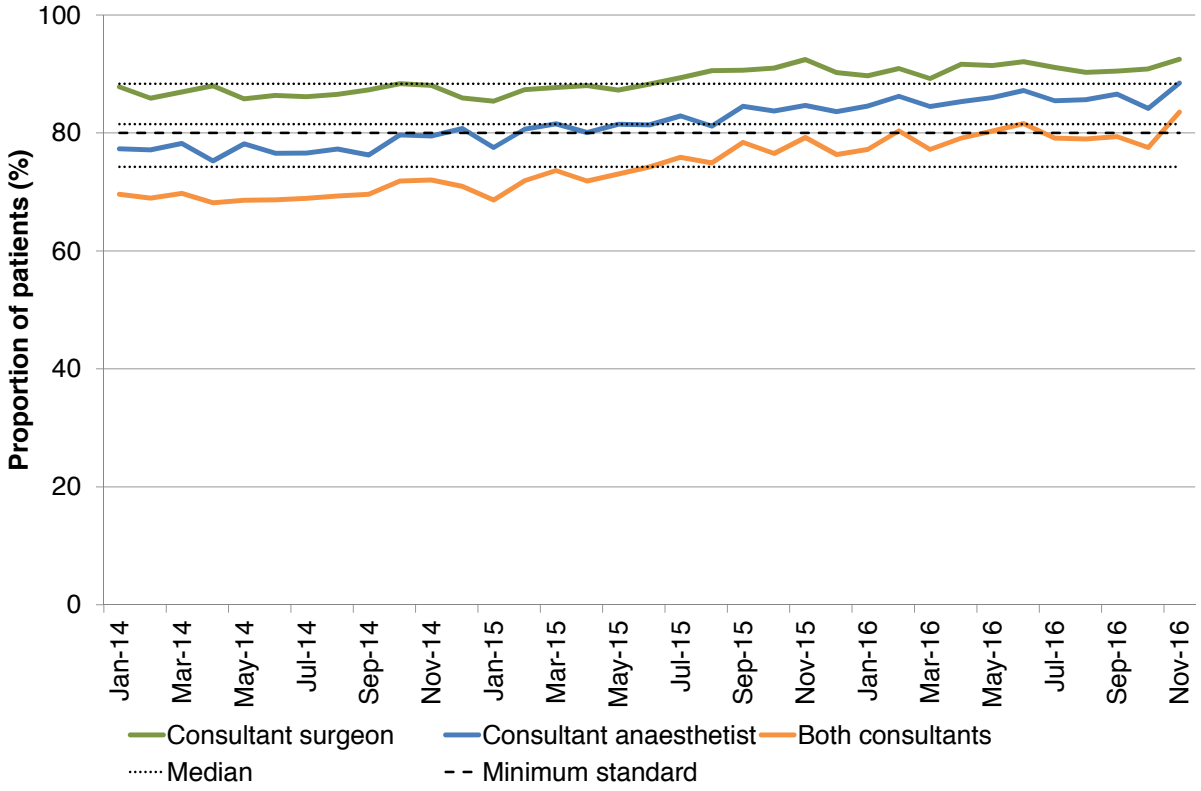
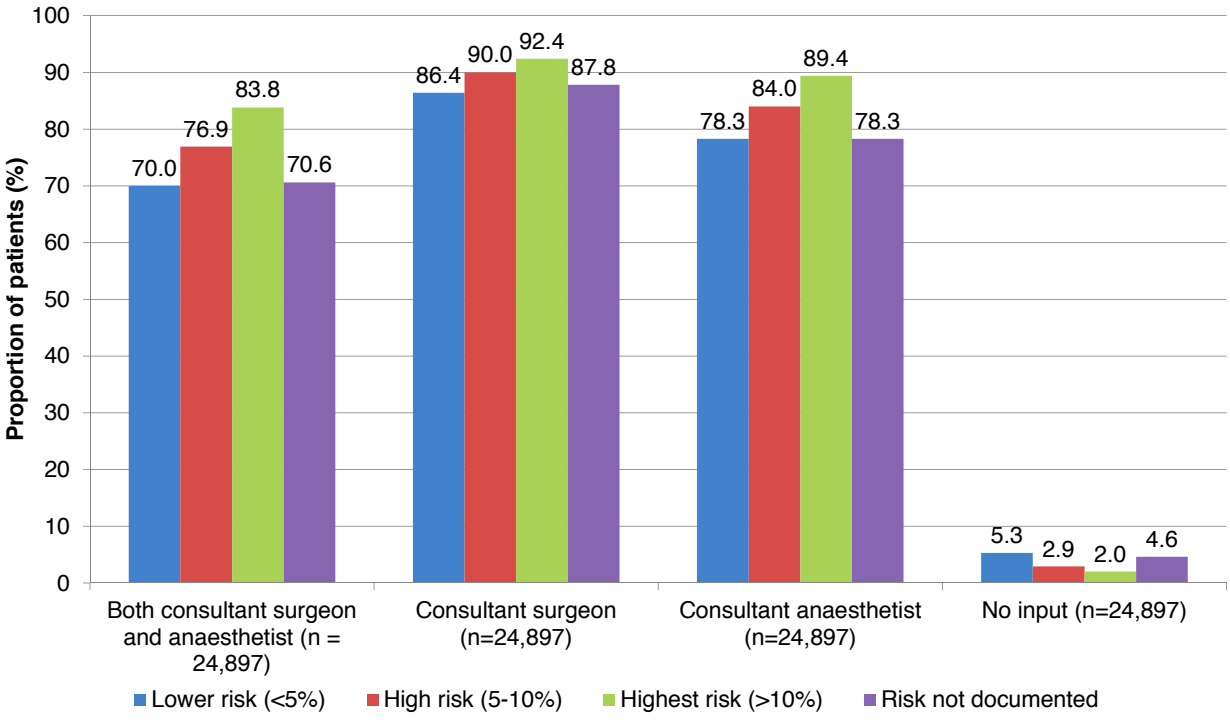


Figure 28
Proportion of patients whose care during surgery was directly supervised by consultant surgeons and consultant anaesthetists – by documented preoperative risk category



What variation was seen in consultant input preoperatively and intraoperatively when measured against patient characteristics such as risk?

Patients were more likely to have a consultant review if risk of death had been calculated (60% compared to 47%).

The decision to operate was made in person by a consultant surgeon for 76% of high- and highest-risk patients, and 74% of high- and highest-risk patients were reviewed by a consultant anaesthetist before surgery (Table 65).

How has consultant-delivered care varied around the country and according to day-of-week and time-of-day of surgery?

The increase in consultant presence has been seen at all times of day, with most improvement in out-of-hours (after 6.00 pm and at weekends) attendance; in particular consultant anaesthetist attendance has improved from 60 to 70% (Table 18).

Consultant attendance was less at weekends than during the week; however, weekends and other out-of-hours periods have seen the greatest improvements.

Table 18
Proportion of all patients whose care during surgery was directly supervised by consultant surgeons and consultant anaesthetists – by time-of-day and day-of-week of arrival in operating theatre

Time of arrival in operating theatre	Monday–Friday (%)			Saturday–Sunday (%)		
	Both consultants	Consultant surgeon	Consultant anaesthetist	Both consultants	Consultant surgeon	Consultant anaesthetist
08.00–11.59	83.0	90.7	90.8	72.7	91.8	78.2
12.00–17.59	82.8	91.4	89.8	72.0	89.8	78.8
18.00–23.59	69.5	87.1	76.7	66.5	86.5	73.9
00.00–07.59	55.9	77.7	66.0	55.3	77.0	63.5
Overall	**77.4**	**89.1**	**84.9**	**69.2**	**88.2**	**75.9**

Figure 31 shows that hospitals met standards for consultant presence during weekday daytime hours. This is when most hospitals had emergency lists staffed by consultants so that consultant presence was likely to be automatic. For out-of-hours surgery, consultant presence is reliant on appropriate communication about high-risk patients between all members of the multidisciplinary team. The increase in consultant-delivered care suggests a greater awareness of the high-risk nature of emergency bowel surgery, and may be a result of the improvements found in the proportion of patients who received a documented risk assessment. However, there is still the need for continued improvement, especially for surgery after 6.00 pm and at weekends.

Figure 29
Variation between STPs and Health Boards in preoperative review by a consultant surgeon and a consultant anaesthetist when P-POSSUM risk of death ≥ 5%

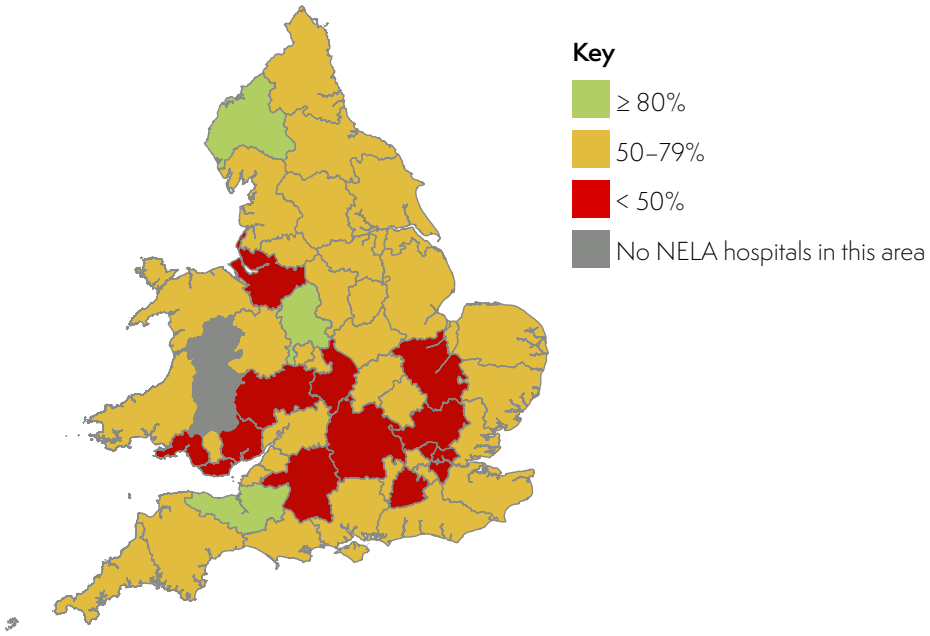


Figure 30
Variation between STPs and Health Boards in the proportion of patients for whom both consultants were present in theatre when P-POSSUM risk of death ≥ 5%

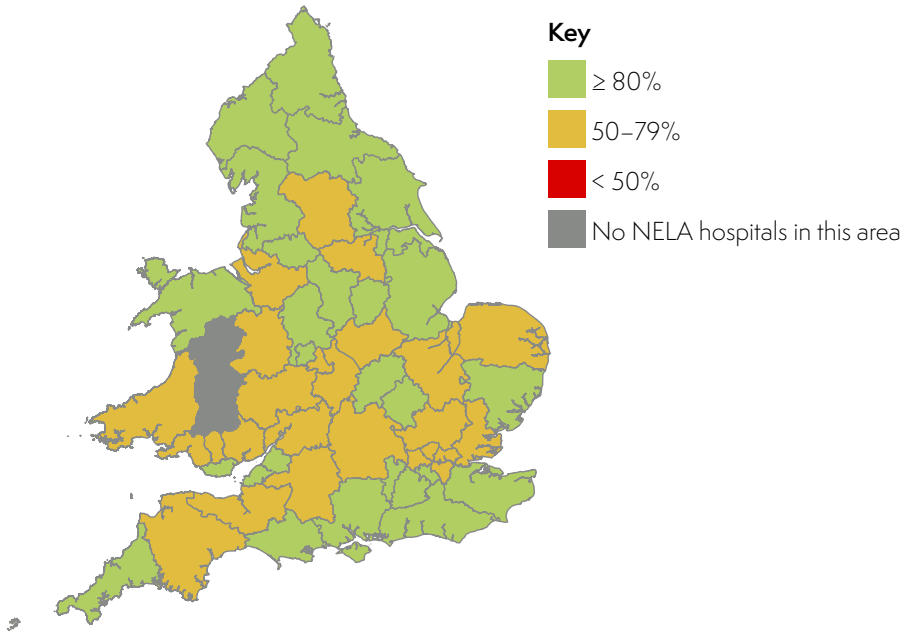
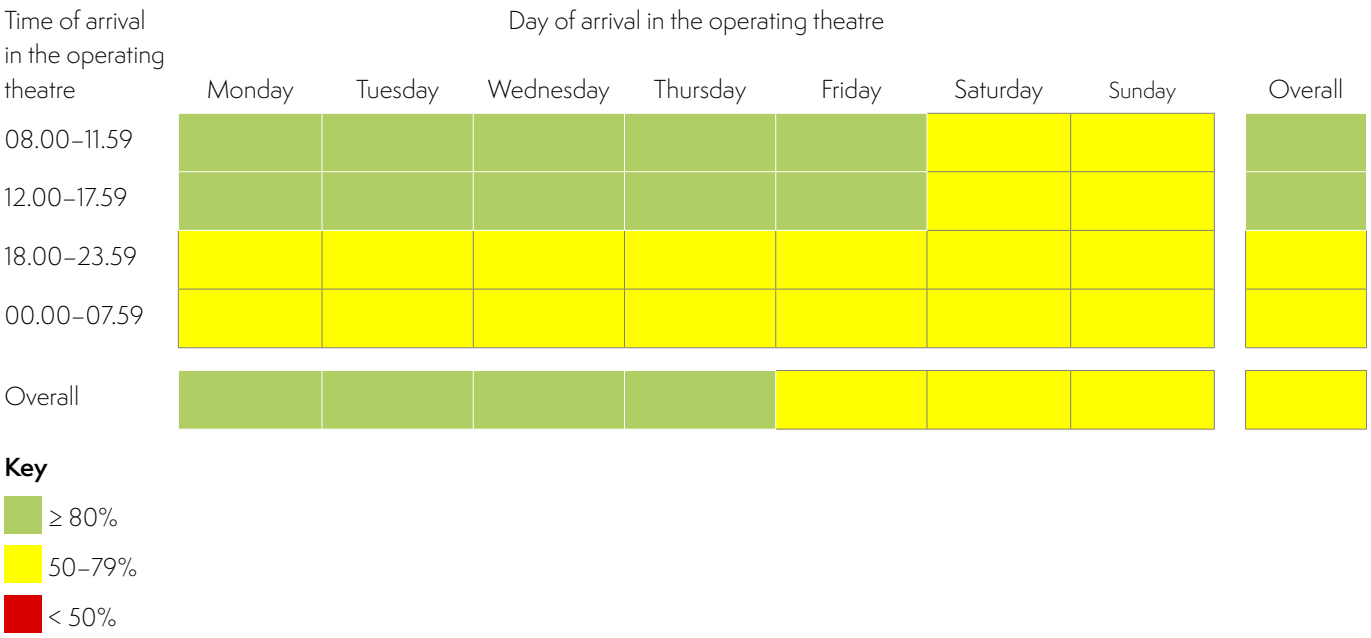


Figure 31
Variation in the proportion of patients for whom both consultants were present in theatre when P-POSSUM risk of death ≥ 5% – by day and time of surgery



We also found

Policies for intraoperative consultant presence were associated with slight improvements in performance.

A formal policy for the seniority of surgeons present in theatre based on the patient's preoperative risk was associated with a consultant surgeon being present during surgery for 92% of high- and highest-risk patients, compared to 88% of high- and highest-risk patients in hospitals without such a policy.

There was a similar association for hospitals with a formal policy for the seniority of the anaesthetist. In hospitals with such a policy a consultant anaesthetist was present in theatre for 87% of high- and highest-risk patients, compared to 83% of high- and highest-risk patients in hospitals without a policy.

Quality improvement vignette

'From the changes we have made from the previous year, the greatest effect was having an on-call/emergency consultant surgeon with no other commitments, who is available on site, with a consultant anaesthetist running the emergency theatre from 8.00 am 8.00 pm. We think this has improved both efficiency and the response by the various departments i.e. radiology, theatres etc.'

Dr Jaffer Maqbool, Salisbury District Hospital

Quality improvement vignette

'From the outset, the main issue that required improvement was consultant anaesthetist presence in theatre. Pre-NELA, there was already a high consultant surgeon presence.

Actions taken were:

- increased awareness and cultural embedding of estimated perioperative risk scoring
- request by clinical director to all consultants to prioritise/ensure preoperative review prior to arrival in theatre, and attendance in theatre for patients >4% mortality risk
- use of posters and regular reminders to on-call trainees/middle grades to request review by on-call consultants of any patients with an estimated risk score of >4%.'

Dr Stephan Clements (Consultant in Anaesthesia and Pre-Hospital Emergency Medicine), Ysbyty Gwynedd Hospital

Recommendations

Clinical directors and multidisciplinary teams

There should be robust escalation processes and pathways in place to identify patients requiring emergency bowel surgery who will require early care from a consultant surgeon and anaesthetist.

Particular effort should be directed at improving consultant presence for surgery after 6.00pm and at weekends.

Supplementary data tables are in the Appendix.

10 PRIORITISING EMERGENCY CARE

10.1 Timeliness of care for peritonitis

Why is this important for patients?

Many patients requiring emergency bowel surgery have signs of sepsis which may be life threatening. Two aspects of care have been shown to improve the likelihood of survival:

- early administration of antibiotics before surgery
- urgent surgery to remove the source of the sepsis.

What did we study?

We studied a subgroup of 1,844 patients who were scheduled for emergency bowel surgery for suspected peritonitis within six hours of a decision to operate and who underwent surgery within 24 hours of admission to hospital. The treatment of peritonitis is clinically important in its own right, but this group of patients is relatively well defined and can serve as a useful model for examining the delivery of care. The figures are too small to provide hospital-level data.

How quickly did we give antibiotics?

Antibiotics were given within 3.5 hours of admission in most cases (Table 71). This represents a slight improvement from Year 1 (median 3.6 hours (IQR: 1.8–6.9)), but no further improvement has been seen compared to Year 2. It is recommended that the first dose of antibiotics should be administered within one hour of the diagnosis of sepsis.[21] Less than one-quarter of our patients received their first dose of antibiotics within one hour following admission to hospital, and one-quarter of this group of patients waited more than six hours for antibiotics from the time of admission.

How quickly did we treat the source of sepsis with surgery?

On average, patients with peritonitis took eight hours to get to theatre after admission to hospital. Typically, six hours was taken up by admission and decision making, and a further two hours was needed to get to theatre once the decision to operate had been made (Table 71). These time periods have not changed over the three years of the Audit and there seems to be greater room for improvement in the admission and decision-making process.

What variation is there with time-of-day?

Patients were admitted with peritonitis fairly evenly throughout the 24 hours of the day. However, compared to the rest of the day, patients in this group admitted between 6.00 pm and midnight received antibiotics later (median 3.6 vs. 3.3 hours after admission) and got to theatre significantly more slowly (median 9.7 vs. 7.6 hours after admission) (Figure 74). These patients will often have been seen by the surgical team in the late evening or in the early hours of the morning. NELA does not collect data that might explain why this discrepancy arises, and hence hospitals should examine the medical records of their patients to determine underlying reasons for time-of-day differences.

Has the adoption of protocols for sepsis been associated with quicker antibiotic administration and arrival in theatre?

In the last three years, 28 hospitals have introduced policies in relation to sepsis and 46 have introduced policies relating to the timing of emergency surgery with respect to urgency. The introduction of policies has been associated with improved results in both the timing of antibiotic administration and the time taken for patients presenting with peritonitis to arrive in theatre following hospital admission (Table 19 and Table 20).

Table 19
Time from admission to first dose of antibiotics

Presence of policy in a hospital	2013		2016		P value
	Number of patients	Median time (hours) (IQR)	Number of patients	Median time (hours) (IQR)	
New sepsis policy between 2013 and 2016	189	4.3 (1.9–8.4)	297	3.3 (1.5–6.3)	0.0293
Sepsis policy in both 2013 and 2016	816	3.5 (1.7–6.6)	1,468	3.3 (1.5–6.4)	0.1566

Table 20
Time from admission to arrival in theatre

Presence of policy in a hospital	2013		2016		P value
	Number of patients	Median time (hours) (IQR)	Number of patients	Median time (hours) (IQR)	
New sepsis policy between 2013 and 2016	189	9.5 (5.6–14.6)	297	7.5 (5.0–13.0)	0.0396
Sepsis policy in both 2013 and 2016	816	7.8 (5.0–13.1)	1,468	8.0 (5.4–12.9)	0.3731

What about other patients who may have sepsis?

We also looked at timing of administration of antibiotics in a larger group of patients requiring emergency bowel surgery for conditions associated with abdominal sepsis. All of these patients should have received antibiotics at the latest around the time the decision was made for surgery. There has been some improvement over time (Table 21), but 20% of patients may still be waiting too long for antibiotics. 13% of patients only received their antibiotics once they had arrived in theatre.

Table 21
Proportion of patients receiving antibiotics no later than 30 minutes after the decision to operate

	Total number of patients	Proportion of patients receiving antibiotics no later than 30 minutes after the decision to operate (%)
Year 1	3,350	74.2
Year 2	4,106	76.7
Year 3	4,545	79.2
Overall	**12,001**	**76.9**

Recommendations

Clinical directors and multidisciplinary teams

Hospitals should audit and review their cases of peritonitis to assess their own performance and pathways, benchmarking their processes and structures against recognised standards for administration of antibiotics for sepsis, and for timely access to theatres.

Teams should review their own admission and referral pathways to prioritise unwell patients and, in particular, the management of out-of-hours admissions.

The few hospitals still without policies for identification of sepsis and for antibiotic administration should address this promptly.

Hospitals should utilise induction of new staff, both senior and junior, to publicise sepsis and antibiotic pathways.

Supplementary data tables are in the Appendix.

10.2 Timeliness of arrival in theatre

Why is this important for patients?

A delay to a patient undergoing their emergency surgery has been associated with lower rates of survival. The urgency with which surgery is required varies between patients, and is based on an evaluation of their clinical condition, surgical disease, and individual risk.

We categorise surgical urgency as being:

- Immediate (<2 hours)
- Urgent (2–6 hours)
- Urgent (6–18 hours)
- Expedited (>18 hours).

Patients falling into the Expedited category are more likely to be able to safely wait for surgery, and therefore this analysis concentrates on only the three Immediate and Urgent categories.

What proportion of patients arrived in theatre within a timescale appropriate to their operative urgency? (Minimum standard 80%)

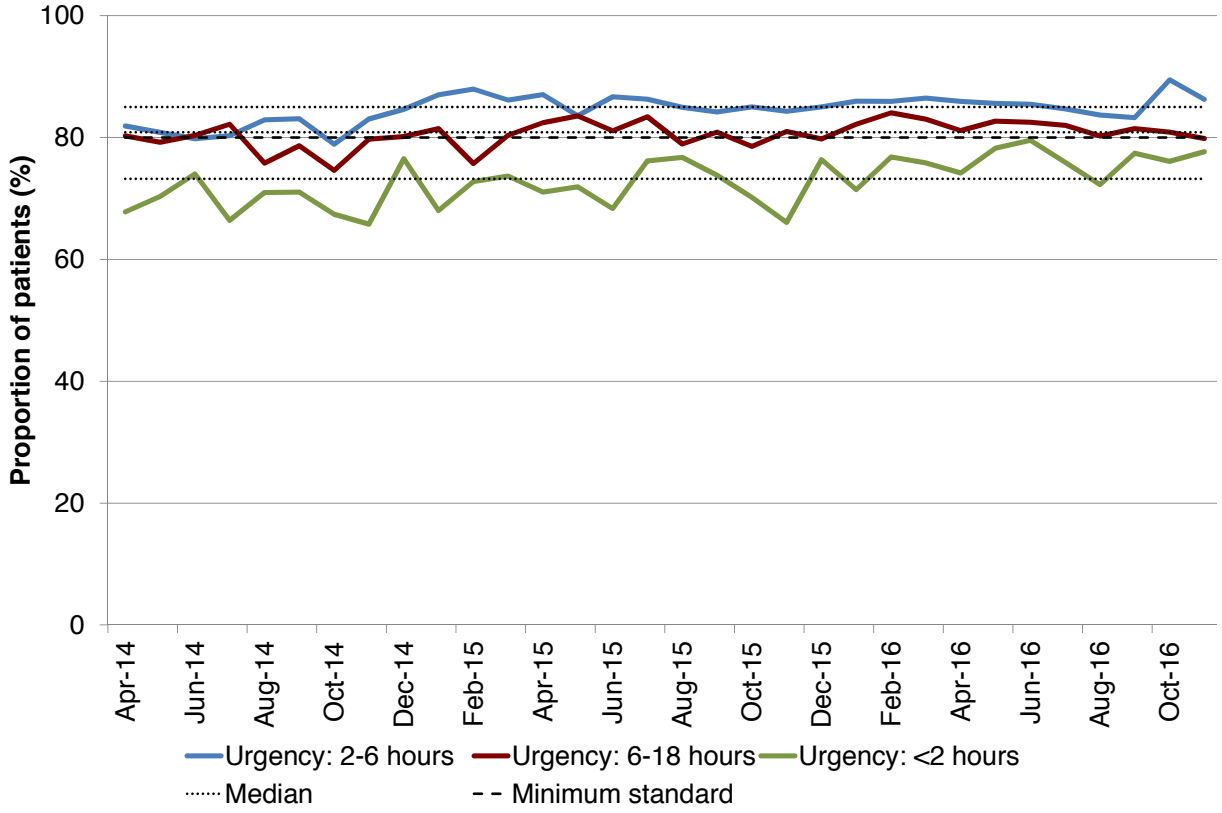
We found that the overall proportion of patients arriving in theatre in an appropriate timeframe improved from 78% to 83%. We also found that the group of patients classified as requiring surgery within two hours (the most urgent category) were the least likely to arrive in theatre within their stated timeframe (Figure 32). These most urgent patients present the greatest logistical challenge in arriving in theatre in an appropriate timeframe, especially if they present through the emergency department or via general medical specialties. A series of small delays may be inconsequential in less urgent cases, however these delays may add up to have a more significant impact in more urgent cases. This emphasises the need for robust, local pathways aimed specifically at identifying the most urgent patients, and ensuring they have access to theatre within two hours.

Of patients classified as requiring surgery within two hours, younger patients (aged less than 60 years) were more likely to reach theatre within this timeframe than those aged over 80 (79% vs. 71%) (Table 22). This difference was far less pronounced in the other time scales. NELA does not collect data to explain this observation. However, it may reflect the fact that older patients are more likely to have medical co-morbidities that need investigating, may require more resuscitation prior to surgery, or may require discussions with extended family before proceeding to surgery.

Table 22
Proportion of patients who arrived in theatre in a timescale appropriate to their operative urgency after the decision was made to perform surgery (or from time of booking if time of decision unavailable). Expedited surgery has been excluded from this analysis

Age (years)	Surgery required within 2hours		Surgery required within 2–6 hours		Surgery required within 6–18 hours		All patients assessed	
	n=	%	n=	%	n=	%	n=	%
18–59	896	79.2	2,863	86.7	2,333	81.4	6,092	83.5
60–79	1,283	75.3	3,770	85.2	3,066	81.4	8,119	82.2
≥80	415	70.6	1,707	84.8	1,344	82.7	3,466	82.3

Figure 32
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)



Was there variation around the country, or according to time of day or day-of-week?

Patients who were admitted to hospital at the weekends and who were classified as requiring surgery within 2–6 hours or 6–18 hours were more likely to arrive in theatre within their stated timeframe compared to those admitted to hospital during the week. While the rate of arrival in theatre within an appropriate timeframe was lower in patients classified as requiring surgery within two hours, there was no difference for this classification between those admitted to hospital during the week and those admitted at the weekend. When examined according to the day on which the operation was carried out, there was no difference in any urgency category between those having surgery during the week or at weekends.

Figure 33
Variation between STPs and Health Boards in the proportion of patients arriving in theatre within a timeframe appropriate to urgency

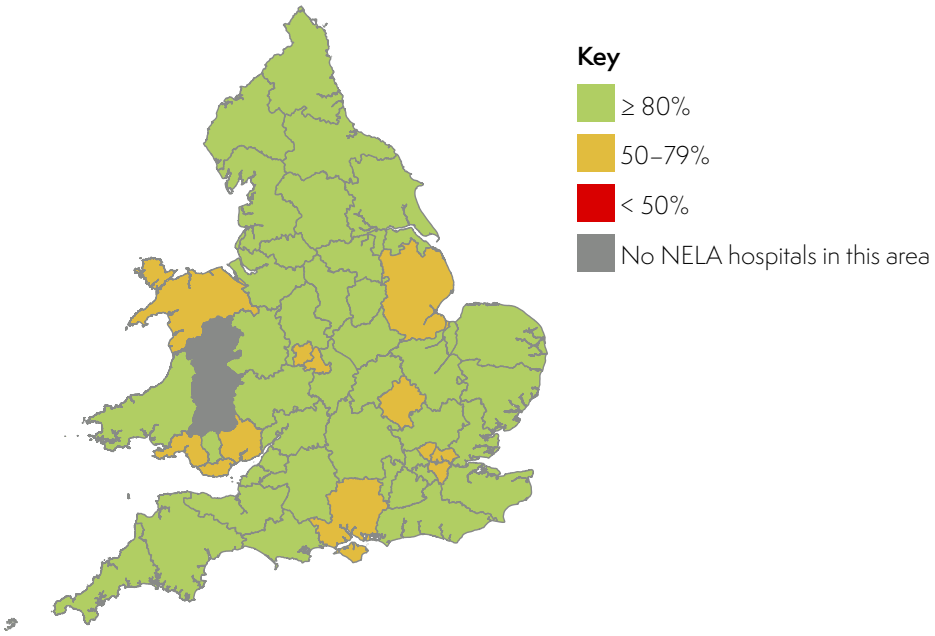
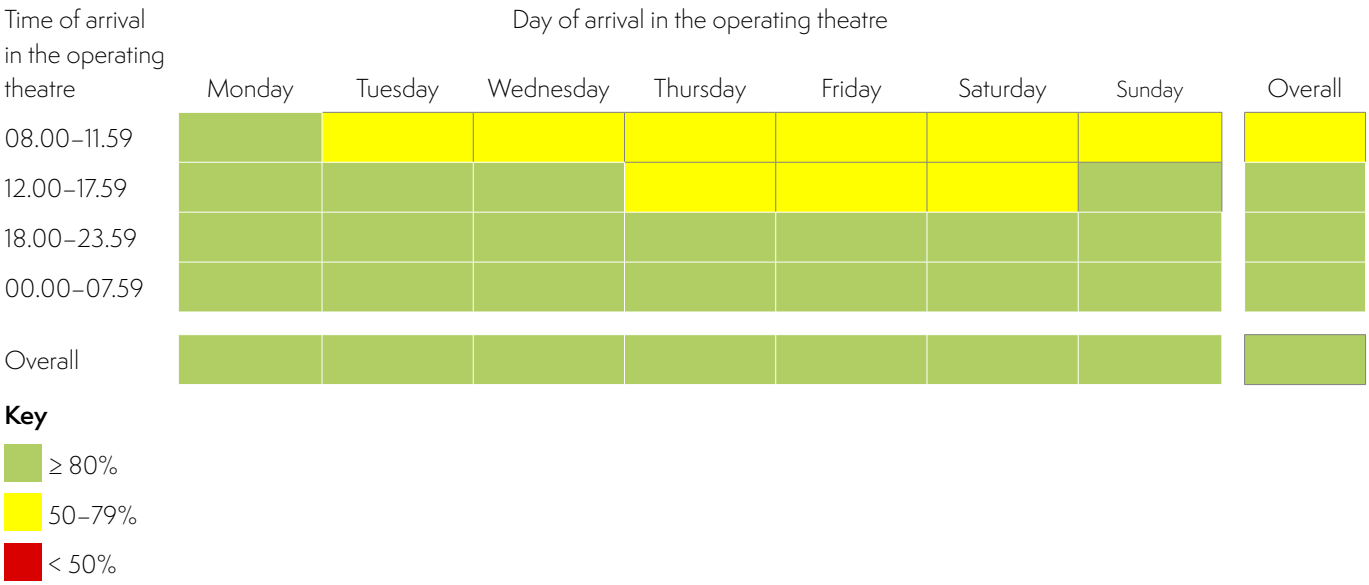


Figure 34
Variation in arrival in theatre within a timeframe appropriate to urgency by day and time of operation



NELA
National Emergency Laparotomy Audit

Was there any association between how hospitals organise their emergency theatres, and whether they met standards for timeliness of arrival in theatre?

Hospitals provided emergency theatre space in a variety of different ways. These included:

- emergency theatre available 24/7: 142 out of 172 hospitals
- dedicated theatre just for emergency general surgical cases 24/7: 44 out of 172 hospitals
- no dedicated emergency theatre: 30 out of 172 hospitals – these hospitals would need to 'break into' an elective list if a patient requires emergency surgery.

There was no clear relationship between the number of emergency theatres and the likelihood of meeting the standards for timeliness of arrival in theatre. In hospitals that reported 24/7 access to dedicated theatres just for emergency general surgical cases, patients were more likely to reach theatre in time (85% vs. 83%). Provision of these operating theatres was unrelated to hospital size.

Some smaller hospitals may only undertake 12 emergency cases from all specialties per 24-hour period, whereas larger hospitals may have 30–40 emergency cases. 24/7 access to emergency theatres was more common in the larger hospitals, however there is more likely to be greater competition for theatre space from other surgical specialties at these larger hospitals. Hence sufficient theatre space is needed to accommodate the total emergency workload of all specialties. It is therefore important that hospitals have an appropriate way of prioritising their emergency cases, or for deferring elective work in the event of high emergency workload.

Since the first NELA Organisational Audit in 2013, 30% of hospitals have increased their emergency operating theatre capacity, and 19% are planning to reconfigure their services in the next two years. 70% of hospitals reported that they had needed to stop their emergency theatres working within the three months preceding the Second Organisational Audit due to pressures elsewhere (e.g. over-running elective lists, or other demands on staff such as trauma calls and obstetric emergencies). This was unrelated to hospital size or number of emergency theatres available.

These findings highlight the value of NELA data in monitoring timeliness of access to theatres. This metric is under consideration for inclusion in the proposed Best Practice Tariff.

We also found

Without fully staffed operating theatres delays will occur. It is important that all staff members, including theatre nurses and ODPs, are trained in the specific care and needs of emergency laparotomy patients alongside anaesthetists and surgeons, because education and engagement across multidisciplinary teams enables better, more timely care to be delivered. If all staff members understand their roles, fewer delays may occur.

Quality improvement vignette

'Following a 15-year-long campaign since the first CEPOD report, we finally got access to a dedicated emergency theatre 24/7/365 for general surgery, urology and gynae emergencies during autumn 2015! I'm glad that I will be able to show the lessons of national audits pay off!'

Dr James Eccersley, Queen's Hospital, Burton on Trent

Recommendations

Commissioners and providers

Commissioners and providers should work together to ensure that adequate theatre capacity is available to meet emergency surgical workload. This can be modelled from estimated caseload provided to individual hospitals by NELA.

Policies should be developed for:

- defining the timeline to surgery and prioritisation of emergency cases according to risk and surgical urgency
- deferral of elective work if theatre space is unavailable to meet surgical urgency.

Clinical directors and multidisciplinary teams

Unified pathways should be designed and implemented to standardise care for unscheduled general surgical admissions requiring emergency laparotomy.

Supplementary data tables are in the Appendix.

10.3 Critical care

Why is this important for patients?

Critical care provides patients with advanced treatments and organ support that are not possible on ordinary wards. These treatments are frequently required by patients having emergency bowel surgery. Evidence shows that more patients die if they are initially cared for on a general ward and then subsequently require treatment in a critical care unit than if they are transferred directly to a critical care unit.[4,7,26]

Standards state that clinicians should assess risk for all patients prior to surgery to identify high-risk individuals who need to be cared for on a critical care unit, and to ensure that they are transferred there directly after surgery.

What is the provision of critical care across hospitals?

We found that the absolute numbers of critical care beds generally increased with the size of hospital; however, this does not necessarily ensure better critical care availability for patients, as there may be greater competition for beds from other surgical and medical patients (Table 84). There were 14 hospitals that did not meet the standard set for provision of critical care consultant cover.

53% of hospitals provided a 24-hour critical care outreach team. Since both postoperative complications and failure to rescue deteriorating patients are associated with poor outcomes, it is important to have robust escalation systems in place to detect and promptly manage deterioration of patients on all hospital wards. Critical care outreach teams are valuable in facilitating this.

We found that 44% of hospitals had an enhanced care area, such as a post-anaesthesia care unit (PACU) (Table 86). While these are not critical care units, they do offer enhanced levels of treatment compared to surgical wards.

What proportions of high- and highest-risk patients were admitted directly to a critical care unit following surgery?

Nationally, 87% of patients with a predicted P-POSSUM 30-day mortality risk of >10% (highest risk) and who were receiving active treatment at the end of surgery were admitted directly to critical care postoperatively.

We also found that 79% of all patients with predicted P-POSSUM 30-day mortality risk ≥5% (high risk) were admitted directly to critical care after surgery.

The overall rate of direct postoperative critical care admission has risen across all hospitals, with the greatest improvement demonstrated in the 5–10% risk category (from 58% in Year 1 to 63% in Year 3) (Figure 35).

The increase in critical care admission rates across all risk categories, particularly for the 5–10% group, suggests that there is greater recognition in the clinical community that best practice for all emergency laparotomy patients is to provide direct postoperative critical care admission.

NELA continues to acknowledge that there remains a requirement for greater clarity in the wording of standards surrounding admission of high-risk emergency laparotomy patients to critical care units, which is currently inconsistent when compared with generally accepted practice for patients undergoing elective surgery.

Other standards which are based on risk stratification (such as consultant-delivered care) are based on defining a high-risk patient as one having ≥5% predicted 30-day mortality. However mandatory critical care admission is based on >10% predicted mortality risk, with a recommendation that critical care is *considered* for patients with predicted mortality risk ≥5%.

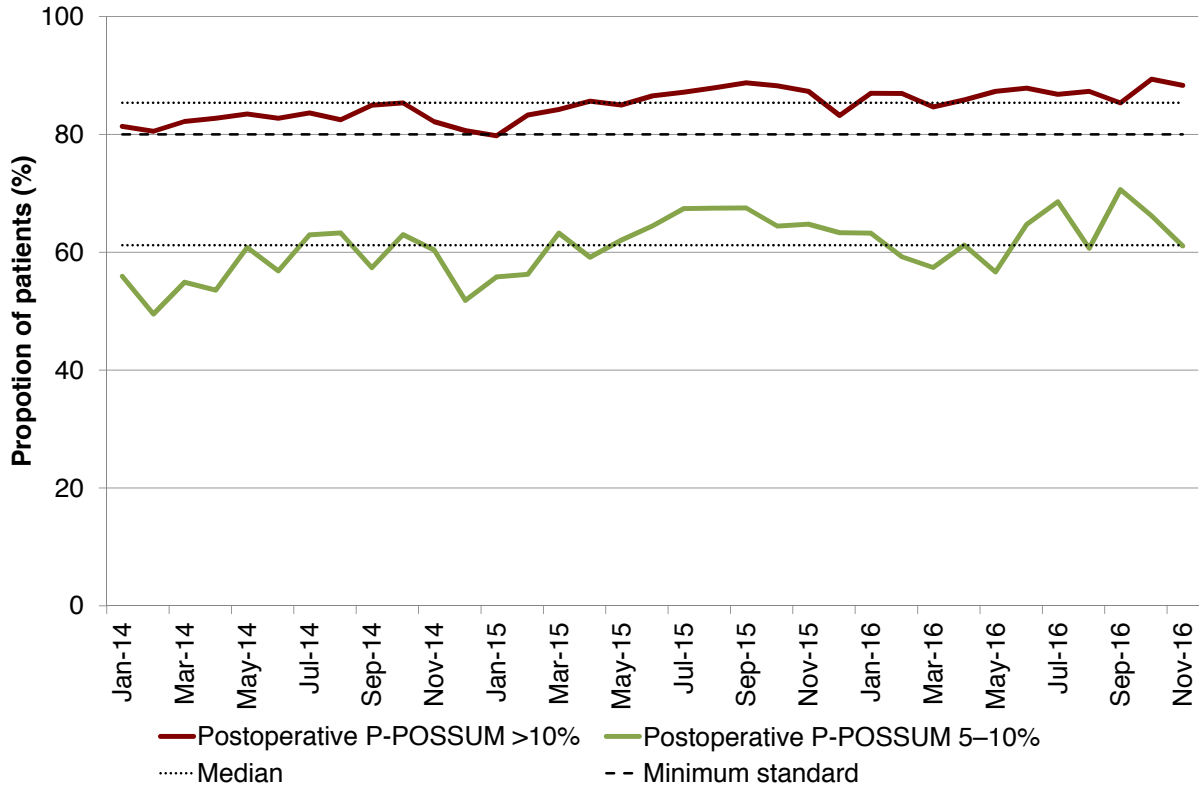
Around 22% of hospitals did not meet standards of critical care admission for their highest risk (>10% mortality) patients (Table 23). NELA does not currently RAG-rate hospitals for admission rates to critical care for the 5–10% group, although this may change for future reports. Had this been implemented for this Report, over 40% of hospitals would have failed to meet standards for critical care admission for high-risk patients.

Critical Care admission is under consideration for inclusion in the proposed Best Practice Tariff.

Table 23
Hospital RAG-ratings for rates of direct postoperative admission to critical care according to calculated postoperative P-POSSUM category

RAG-rating	All patients (number of hospitals (%))	P-POSSUM ≥5% (number of hospitals (%))	P-POSSUM >10% (number of hospitals (%))
Green (Direct postoperative critical care admission for ≥80% of patients)	35 (19%)	96 (51%)	135 (72%)
Amber (Direct postoperative critical care admission for ≥50 to <80% of patients)	105 (56%)	77 (41%)	37 (20%)
Red (Direct postoperative critical care admission for <50% of patients)	39 (21%)	3 (2%)	0 (0%)
Not rated (Insufficient data available at hospital level)	8 (4%)	11 (6%)	15 (8%)

Figure 35
Trends in the proportions of patients with a calculated postoperative P-POSSUM risk of death 5–10% and >10% admitted directly to critical care after surgery (excluding 79 patients who died intraoperatively and 504 patients with an active decision not to admit to critical care)



What was the length of stay in critical care?

The median length of stay in critical care for those admitted directly from theatres was 3 days (IQR 2–6 days). There was some slight variation in the length of stay according to the P-POSSUM score calculated at the end of surgery. The highest-risk patients tended to stay longer, with a median length of stay of 4 days (IQR 2–8 days), whereas patients in the lower- and high-risk groups both had a median length of stay of 3 days (IQR 2–4 and 2–5 days respectively).

What variation existed in the proportion of patients admitted directly to a critical care unit following surgery?

Patients who fell into the highest predicted-risk category demonstrated no variation over the week in the rate of admission to critical care. There was a difference in the proportion of patients admitted depending on the time of emergency surgery. 75% of patients undergoing surgery that started between midnight and 8.00 am were admitted to critical care, compared to 60% of patients whose operations started between 8.00 am and midnight. This is likely to be due to the higher risk profile of patients who are operated on at night (Figure 36).

Figure 36
Calculated postoperative P-POSSUM mortality risk by time of arrival in theatre

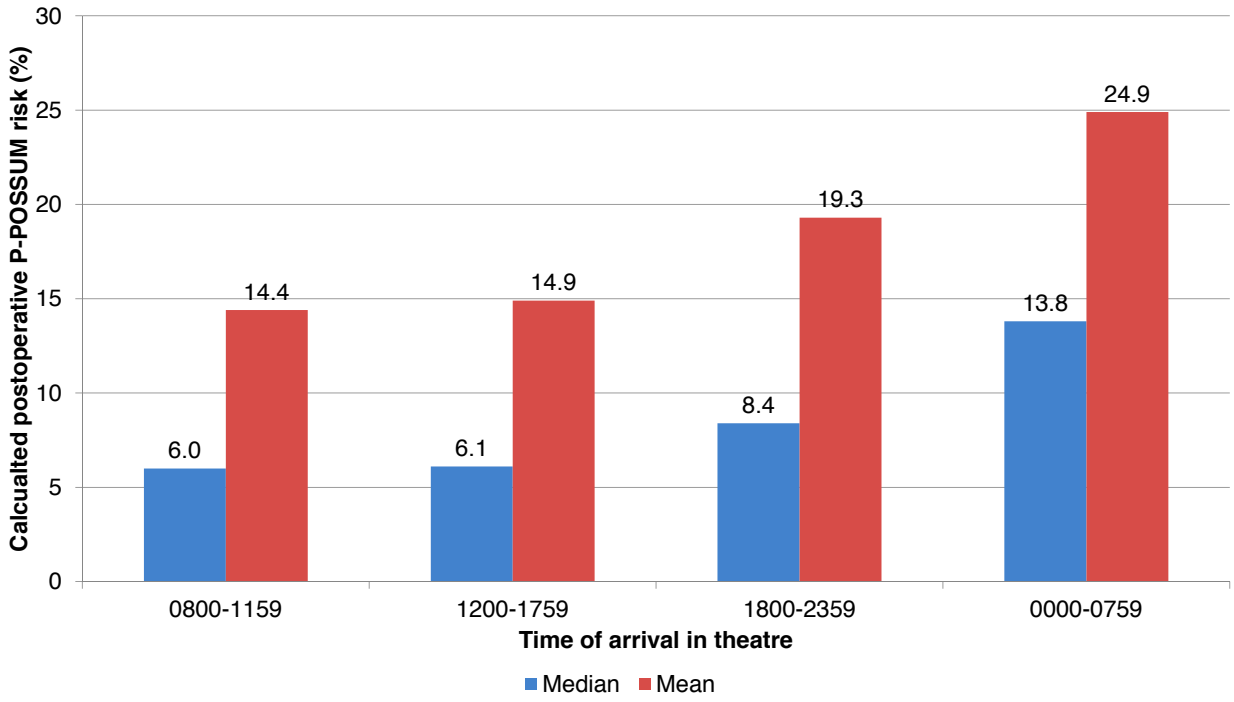


Figure 37
Variation between STPs and Health Boards in the proportion of patients with a calculated postoperative P-POSSUM risk of death >10% admitted directly to critical care after surgery (excluding 79 patients who died intraoperatively and 504 patients with an active decision not to admit to critical care)

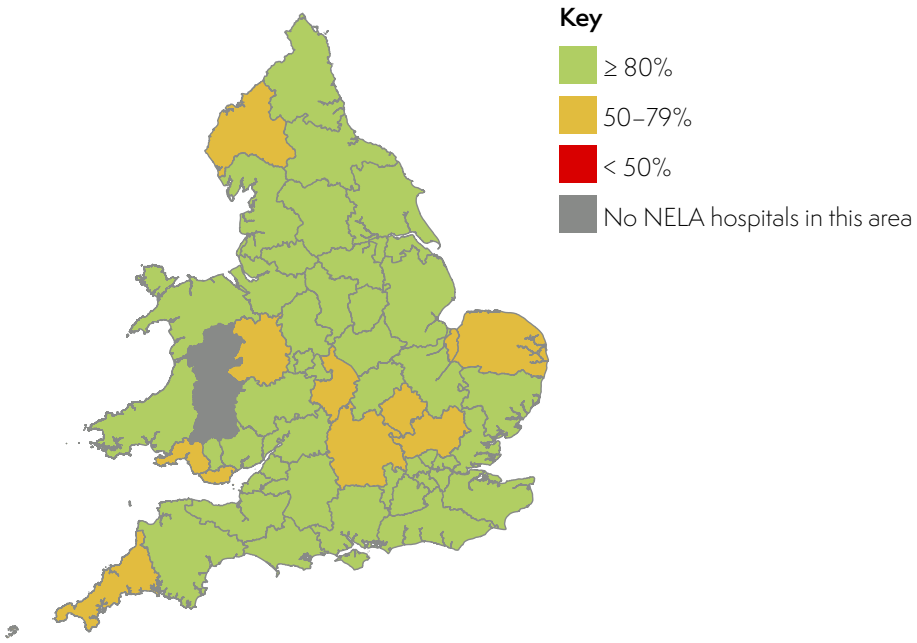
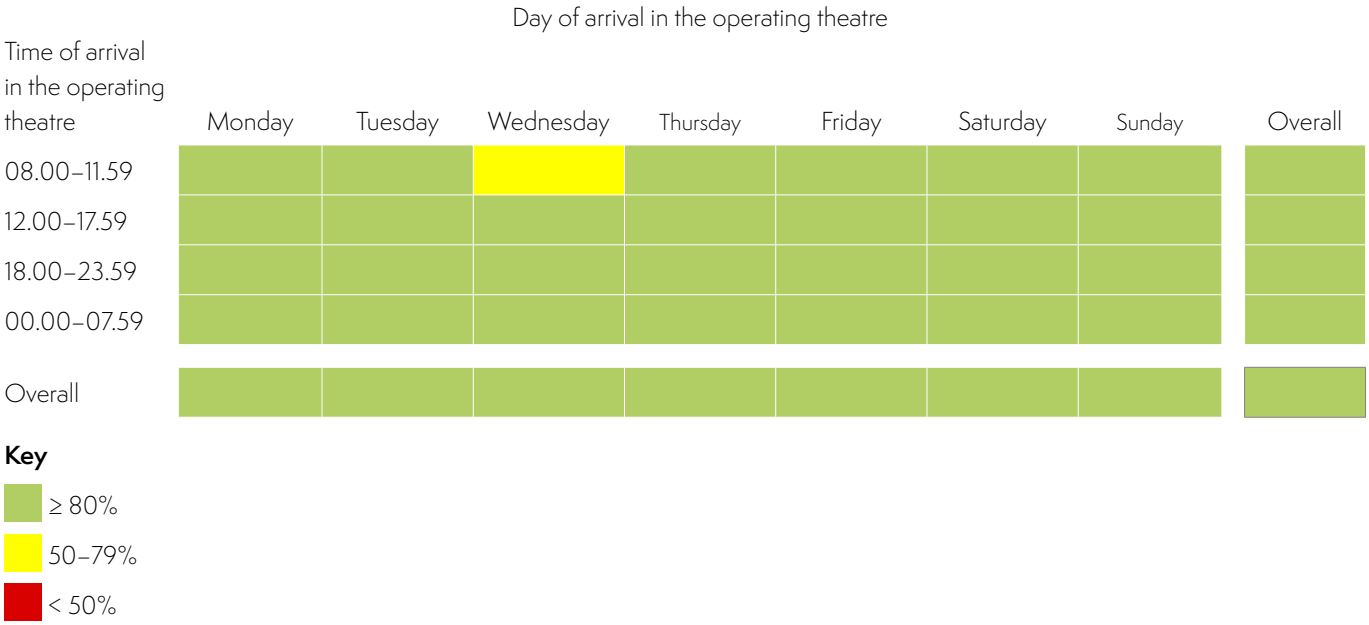


Figure 38
Variation in the proportion of patients with a calculated postoperative P-POSSUM risk of death >10% admitted directly to critical care after surgery, by day and time of operation



What organisational structures are in place to influence this process?

NELA data demonstrate that hospitals with a policy for postoperative destination based on risk admitted significantly more patients to critical care (approximately 10–15% increase at all levels of predicted risk) compared to hospitals without such a policy.

Quality improvement vignette

'I have presented the NELA results regularly and hammered home the message regarding the risk associated with emergency laparotomy vs. elective surgery. Everyone now knows that if the patient needs an emergency laparotomy, they go to ITU post-op.'

Dr Philip Dodd (Consultant Anaesthetist), Royal Hampshire County Hospital

Recommendations

Professional stakeholder organisations

Current recommendations are that all emergency laparotomy patients with an estimated risk of death greater than 10% **must** be admitted to a critical care bed postoperatively, and that those with a risk ≥5% **should** be considered for critical care. Royal Colleges and specialist societies should review their guidance to consider how to bring these recommendations into line with those regarding other aspects of emergency laparotomy care, and changes in the evidence base.

Commissioners and providers

Provision of critical care beds should be audited to determine whether there is sufficient capacity to provide critical care after surgery, and take appropriate steps to ensure its delivery.

Hospitals that are unable to deliver consultant-led care by clinicians with appropriate experience and competences in critical care must explore how to provide this service.

The NELA Organisational Report highlighted variation in the provision of critical care outreach teams and critical care consultant support. Clinical teams and managers should examine their local structures and service provision to ensure that emergency laparotomy patients receive the level of care appropriate to their risk of deterioration or death.

Clinical teams

All patients undergoing emergency laparotomy surgery should have a formal risk assessment performed, discussed and documented. This should be used to identify patients who will need postoperative care on a critical care unit.

NELA Leads

We encourage hospitals to examine their own data to check local compliance and, if applicable, to understand the reasons why some of the highest-risk patients may not be admitted to critical care after surgery. This is particularly important in the 25% of hospitals that did not meet standards for highest-risk patients and the 45% of hospitals that did not achieve 80% compliance for patients with predicted 30-day mortality risk ≥5%.

Supplementary data tables are in the Appendix.

11 SUPPORTING SERVICES AND SPECIALTIES

11.1 Diagnostics: radiology, endoscopy and laboratory services

Why is this important for patients?

Timely diagnosis, resuscitation and prioritisation of patients requiring emergency surgery is reliant upon prompt access to diagnostic information, including imaging, endoscopy and laboratory facilities. Delays in these areas can adversely affect patient outcomes and the quality of care delivered.

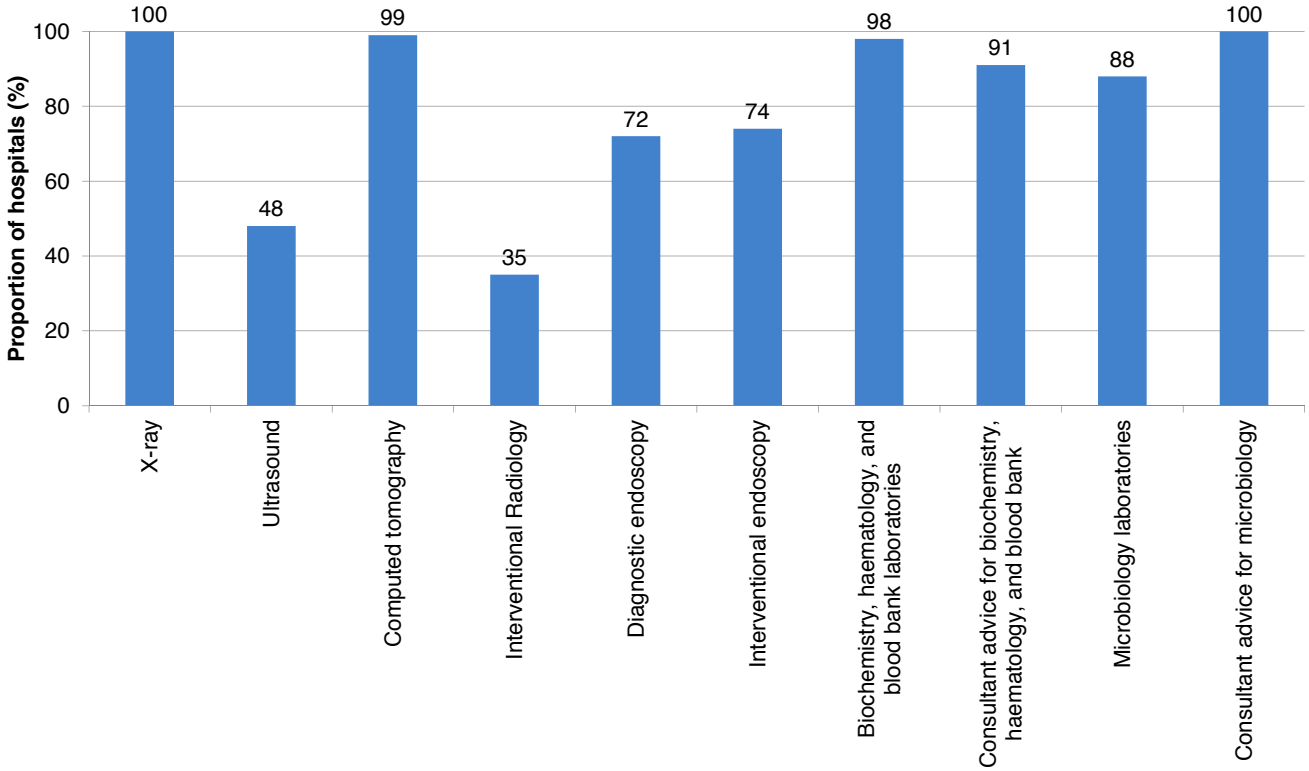
CT scanning is a fundamental component in the management of the acute surgical patient, as it helps clinicians to make diagnoses and formulate treatment plans. Timely reporting by a consultant radiologist may avoid delayed or inappropriate treatment, for instance by identifying patients who have pathology that is not amenable to surgery, and may prevent an unnecessary operation. The quality of the information provided by CT scanning can be enhanced by discussion between surgical and radiology colleagues in order to better understand the clinical context.

Is there variation in the availability of on-site 24/7 diagnostic services, including X-ray, CT scanning, interventional radiology, diagnostic and interventional endoscopy, and laboratory services?

We found significant variability in the availability of all the interventional elements of the diagnostic services (Figure 39), which was dependent on hospital size (Table 94). Provision was least comprehensive at the smallest hospitals. It is reassuring that there has been a 9% increase in availability of interventional endoscopy since the last Organisational Audit, and that all hospitals have 24-hour consultant microbiology advice available (Table 95).

The lack of a comprehensive interventional radiology (IR) service remains a real threat to patient safety. IR is the treatment of choice for certain types of abdominal bleeding and for drainage of some abdominal collections in patients with sepsis, coming ahead of laparotomy in modern treatment algorithms for certain conditions. An IR service should be available 24/7 on site or by network but matters have improved too slowly and the authors remain aware of occasional but continuing major adverse outcomes as a consequence.

Figure 39
Proportion of hospitals providing 24-hour availability of diagnostic services



There was variation in the availability of services based on hospital size. Comparing small hospitals with very large hospitals demonstrated the following differences in the rates of provision of certain services:

- interventional radiology: 9% vs. 70%
- diagnostic endoscopy: 65% vs. 86%
- interventional endoscopy: 60% vs. 81%
- biochemistry/haematology laboratory services: 95% vs. 100%
- microbiology laboratory services: 84% vs. 93%.

What proportion of patients had a CT scan reported by a consultant radiologist before surgery? (Minimum standard 80%)

More patients (86%) had a CT scan before surgery when compared to previous years (Figure 40). There has also been sustained improvement in the proportion of patients having a consultant reported preoperative CT scan from 73% in Year 1, 77% in Year 2 to 79% in Year 3.

Those requiring immediate surgery were less likely to have a CT scan that was reported before surgery, with reporting carried out for only 64%, despite 76% of these patients being scanned before surgery (Table 91). There was little pattern to the variation according to time-of-day or day-of-week (Figure 42 and Table 92). For those patients where the need for rapid intervention is beyond doubt, the surgical team should not wait inappropriately for a CT report. However, it is noteworthy that a reported CT scan (within 30 minutes of arrival in hospital) is a standard of care achievable for trauma patients to avoid delay in definitive treatment: it is therefore potentially achievable for emergency laparotomy patients.

Figure 40
Trend in the overall proportion of patients receiving a CT scan preoperatively, and CT scans being reported by a consultant radiologist preoperatively

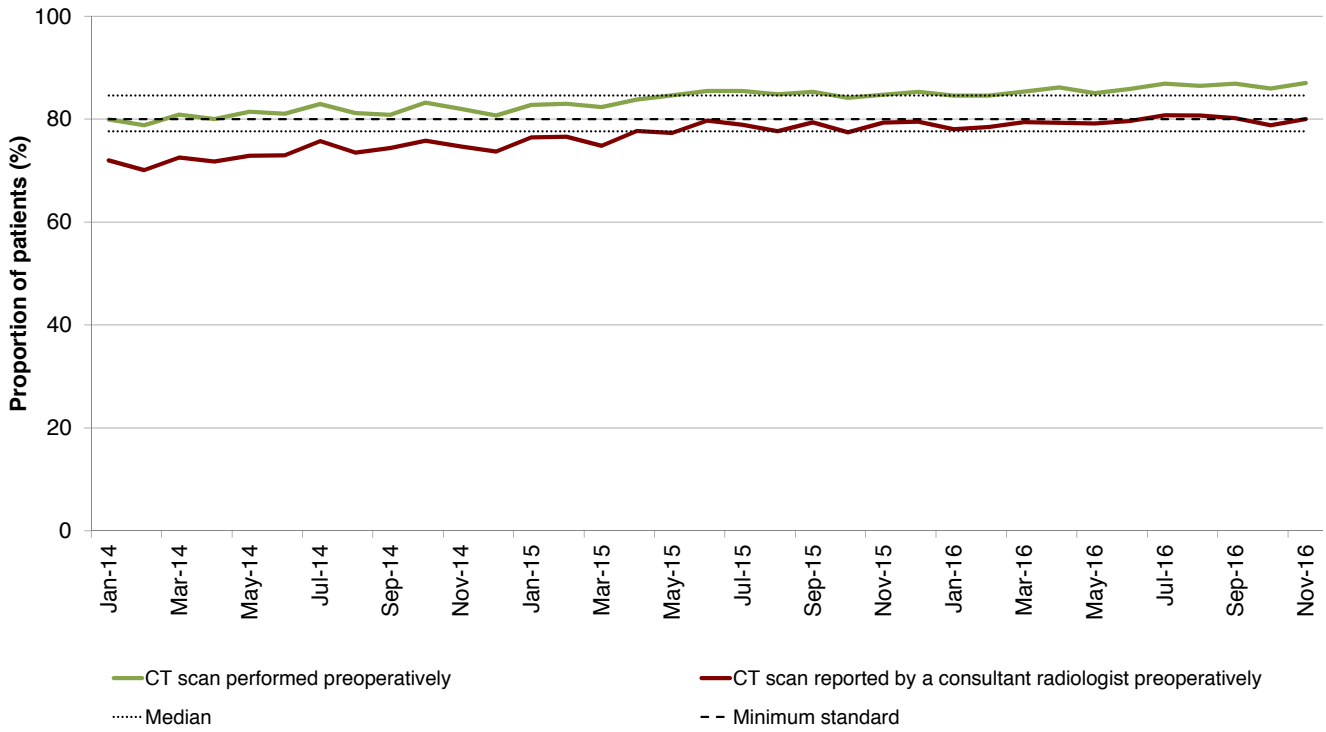


Figure 41
Variation between STPs and Health Boards in the proportion of patients that had a CT scan reported by a consultant radiologist before surgery

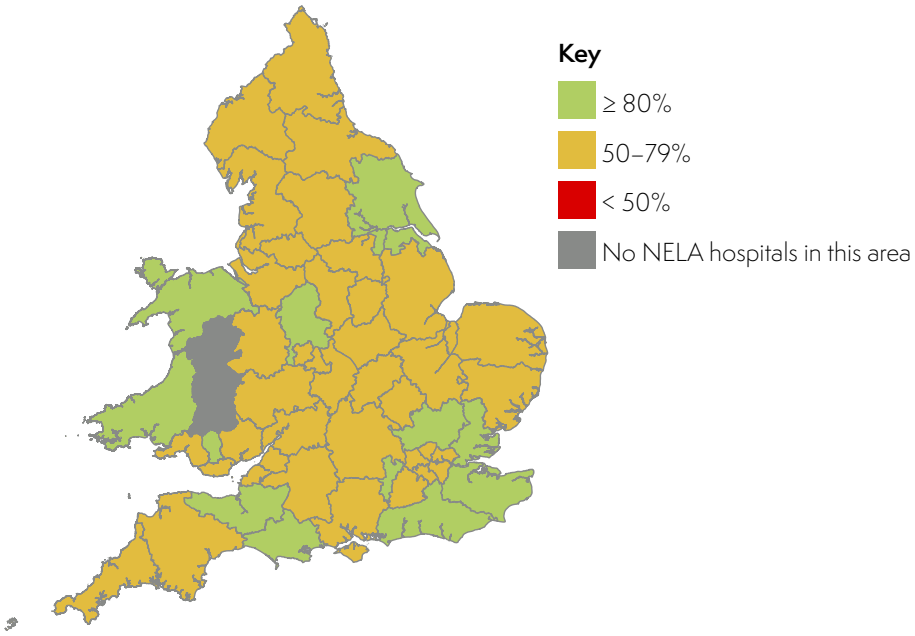
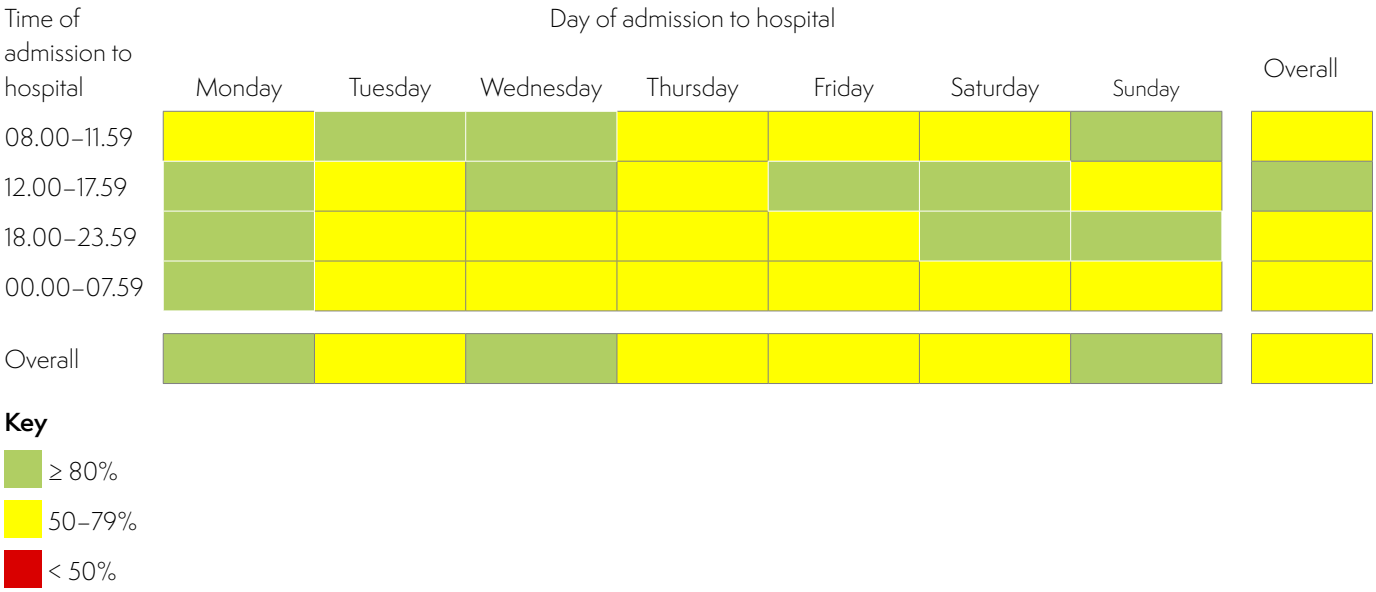


Figure 42
Variation in the proportion of patients that had a CT scan reported by a consultant radiologist by day and time of admission to hospital



Does having a specific organisational policy or pathway influence availability of or access to CT?

We found that having a policy for requesting and reporting CT scans for patients that may require an emergency laparotomy was associated with a slightly higher number of patients meeting this standard. In hospitals with a formal policy, 80% of patients had a CT reported by a consultant radiologist before surgery, compared to 77% of patients in hospitals without a policy.

Recommendations

Commissioners and providers

Hospitals should ensure that they have a comprehensive interventional radiology service on site or available through a defined network arrangement.

Clinical directors and multidisciplinary teams

Pathways should be implemented to facilitate rapid access to CT scanning with reporting by a consultant radiologist for patients who may require emergency laparotomy.

Supplementary data tables are in the Appendix.

11.2 Emergency laparotomy and the care of older patients

Why is this important for patients?

Patients aged 70 years and over accounted for 45% of all emergency laparotomy cases and had the highest mortality of any age group. These patients can present with complex medical, nursing, and social issues that need to be actively considered in order to tailor perioperative care appropriately. Specialist input by geriatricians and expert teams in the perioperative period is likely to bring about considerable improvements in their care.

What proportion of patients aged 70 years or older were assessed by a care of the older person specialist following surgery? (Minimum standard 80%)

We found that only 19% of patients aged 70 years or older had input from geriatricians or other specialists in the care of older people. This increased to 32% for those aged 90 and over (Table 97). Despite most hospitals (97%) having access to specialists in the care of older people on site (Table 24), the proportion of older patients having specialist input into their postoperative care has not increased over the three years of reporting (Figure 43).

Overall, only five hospitals (3%) met the standard for postoperative review of patients aged 70 years and over.

Figure 43
Trend in the overall proportion of patients aged 70 years or older assessed after surgery by a care of the older person specialist

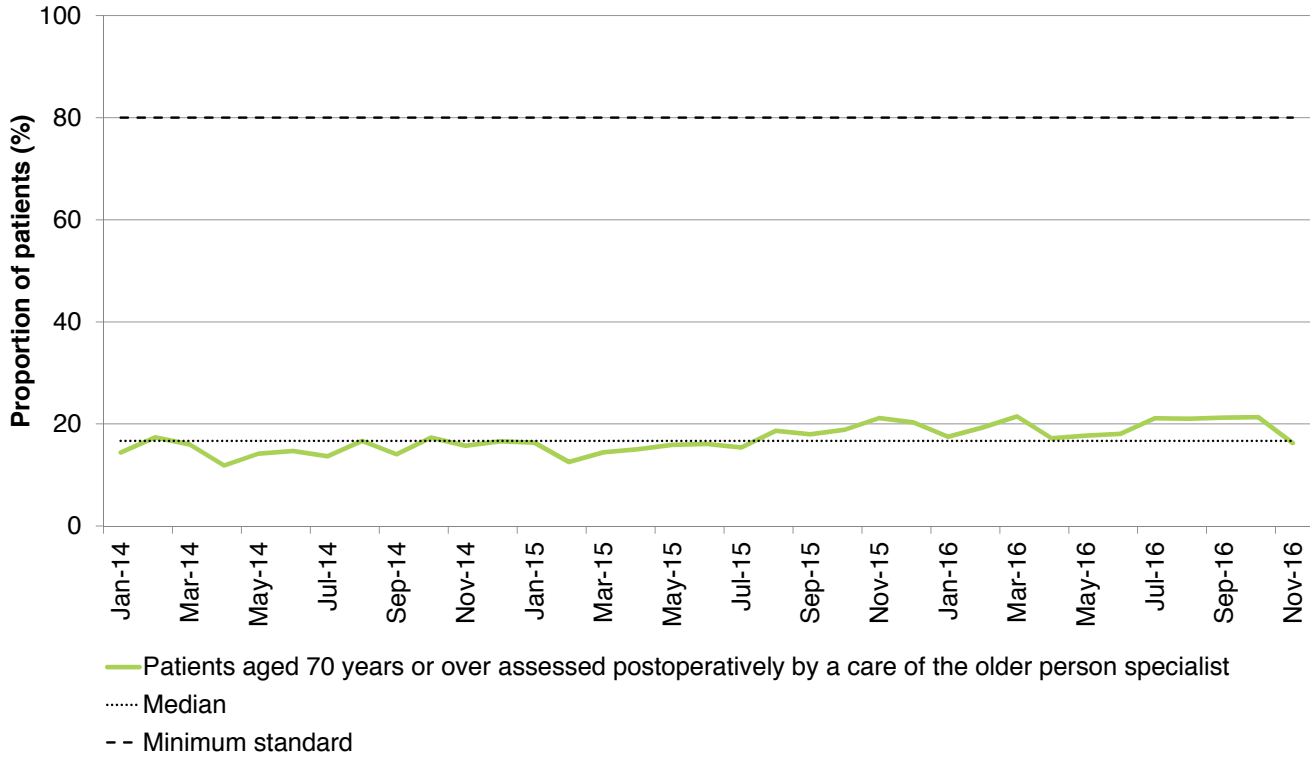
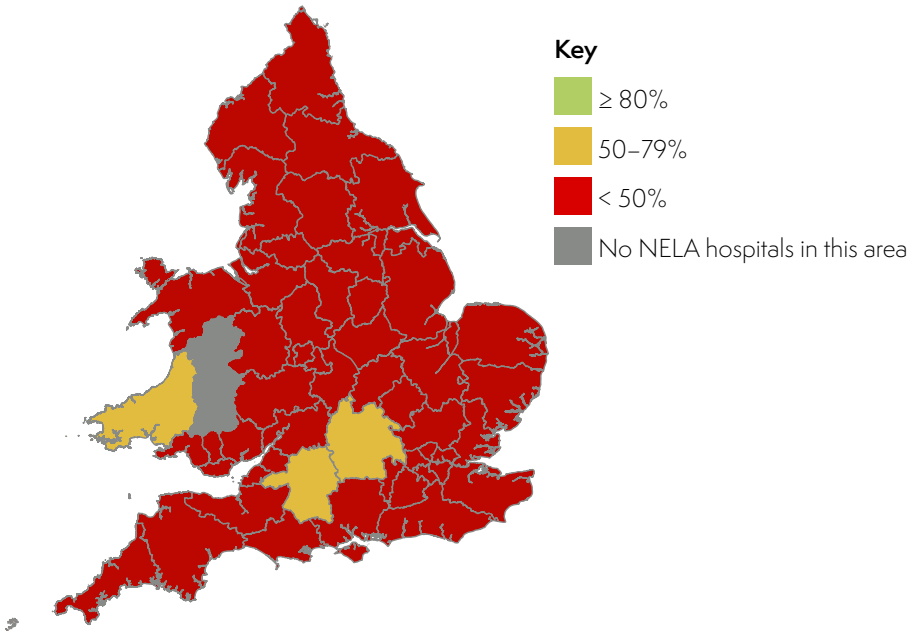


Figure 44
Variation between STPs and Health Boards in the proportion of patients aged 70 years or older assessed after surgery by a care of the older person specialist



What services are available at hospitals for the care of the older person?

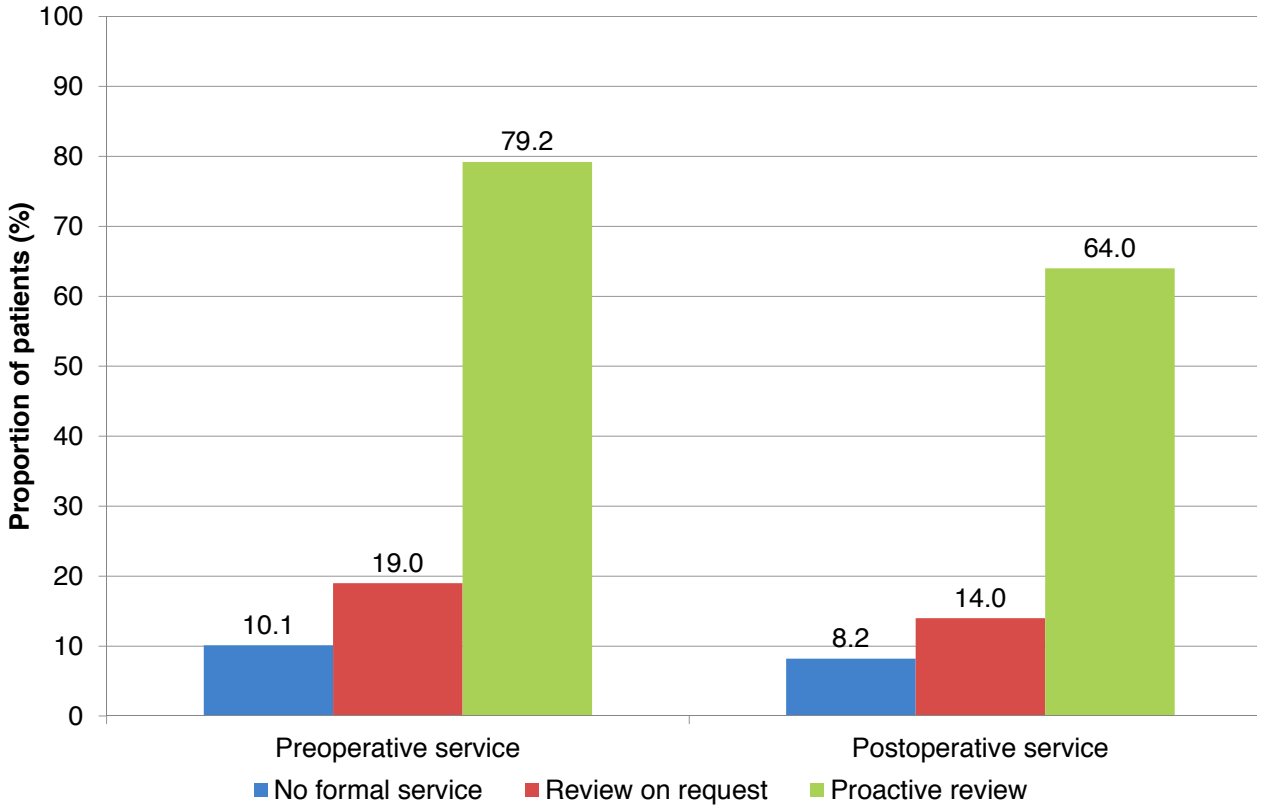
97% of hospitals had on-site care of the older person services provided by doctors, or supported by specialist nurses (Table 24). The provision of input of a geriatrician was not dependent on the size of hospital. Therefore hospital size alone should not be a barrier to the provision of specialist expertise.

Table 24
Availability of care of the older person services

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
Care of the older person service (provided by doctors, with or without specialist nurses)					
	40 (93%)	43 (100%)	42 (98%)	42 (98%)	167 (97%)
Care of the older person service (provided by both doctors and specialist nurses)					
	12 (28%)	16 (37%)	9 (21%)	18 (42%)	55 (32%)

Only six hospitals had a proactive preoperative service, and only 18 had a proactive postoperative service (Table 99). The rest had a service that was available on request only, or had no input at all. However, the existence of a proactive service significantly improved the proportion of patients reviewed in the perioperative period (Figure 45).

Figure 45
Proportions of patients aged 70 years or older assessed after surgery by a care of the older person specialist according to the level of service provided



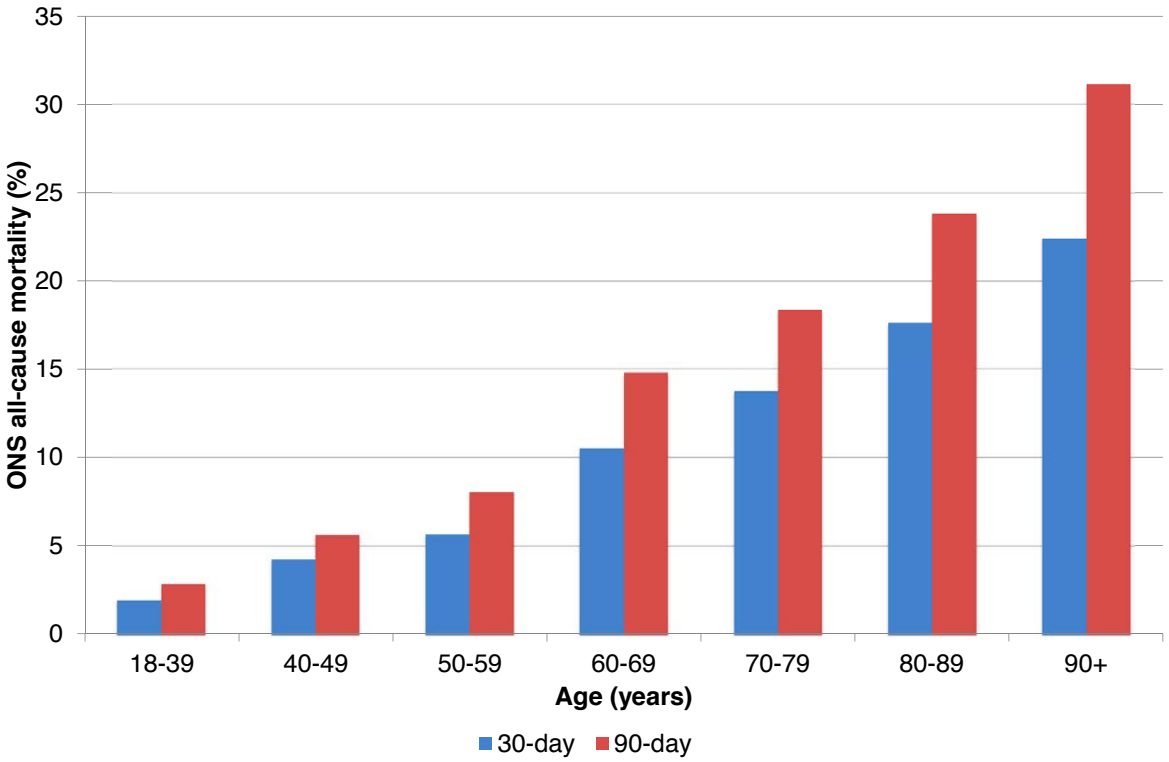
Care of the older person input is under consideration for inclusion in the proposed Best Practice Tariff.

How did the outcomes of patients aged 70 years or over compare with those of younger patients?

We found that patients aged 70 years or older had higher 30- and 90-day mortality rates (Figure 46). There was also a marked difference in length of stay between older and younger age groups (Table 37).

Investment in geriatricians to proactively contribute to the management of complex older patients may not only improve mortality and morbidity, but could also reduce length of stay. The results in this Report show a striking difference between the management of older emergency laparotomy patients and the management of older patients with a hip fracture. Hip-fracture services have seen investment in care of the older person provision, and 88% of these older patients are seen by a geriatrician within their first 72 hours in hospital.[22]

Figure 46
Age and mortality



Recommendations

Commissioners and providers

Commissioning should support care of the older person services for emergency general surgical patients.

Providers should review their local data urgently regarding the provision of care of the older person services for emergency general surgical patients. They should support the involvement of care of the older person teams in the care of older emergency laparotomy patients, and respond to their need for time to do this.

Clinical directors and multidisciplinary teams

Proactive pathways to facilitate the review of patients aged 70 and over requiring an emergency laparotomy should be developed and implemented.

NELA Leads

NELA Leads should develop a local system that utilises the NELA database to alert specialists in care of the older person to patients aged 70 and over who are listed for emergency laparotomy.

NELA Leads should work with care of the older person physicians to incorporate assessment tools for frailty, malnutrition, cognitive dysfunction, and functional impairment into the clerking pro-forma for all patients aged 70 and over.

Supplementary data tables are in the Appendix.

11.3 Clinical governance, pathways and policies

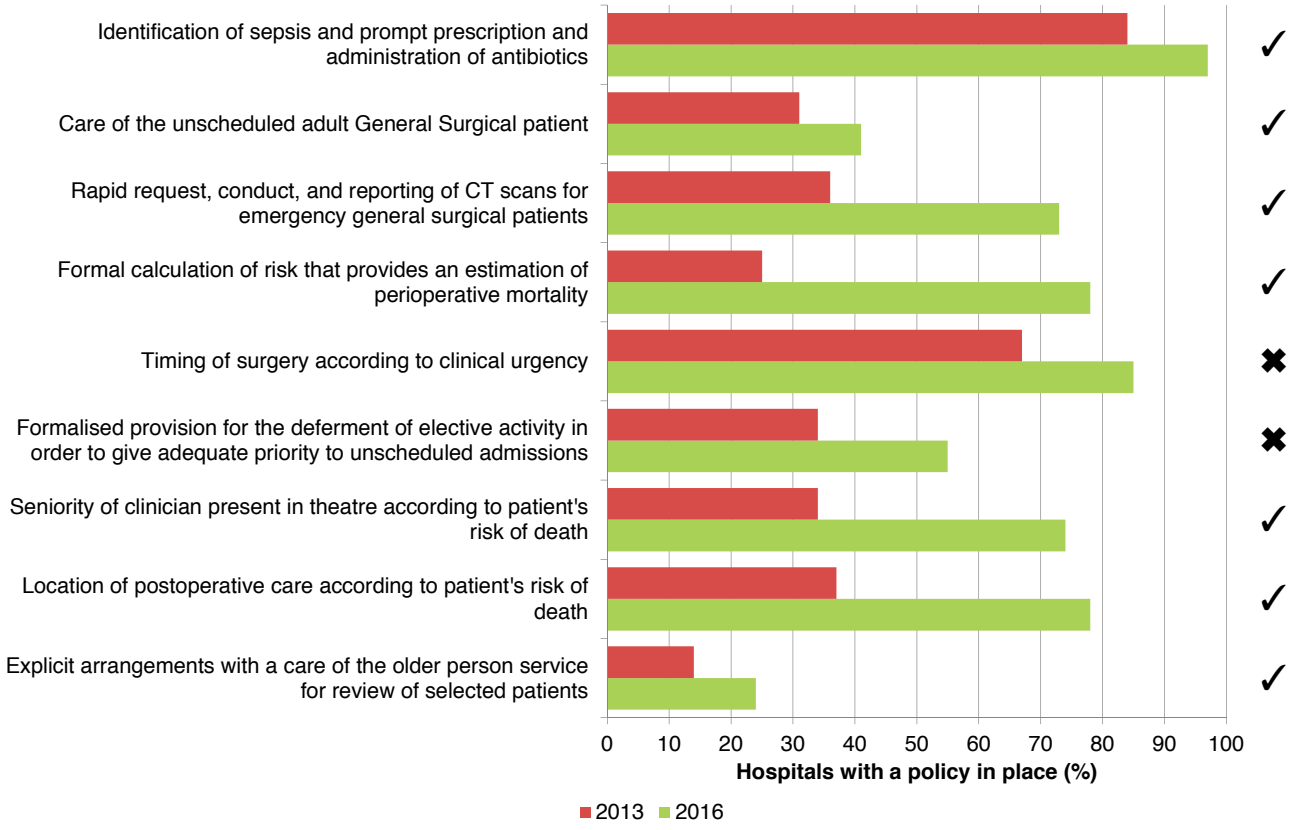
Why is this important for patients?

The implementation of protocols and pathways of care in unplanned surgery are recommended in many publications (Appendix 15.4). Written care pathways facilitate the reliable delivery of high-quality care to all emergency laparotomy patients, and can improve patient outcomes by reducing variability in the delivery of care.[23] Policies represent a clear statement of intent by a hospital to provide care that meets standards.

What proportions of hospitals have specific policies/protocols in place for aspects of the emergency surgical pathway, and how has this changed since 2013?

The full wording of this question in the 2016 Organisational Audit is shown in Table 101.

Figure 47
Hospital policies and protocols
(Ticks indicate an association between the presence of a policy/protocol and a higher proportion of patients meeting a relevant standard of care, crosses indicate no such association)



There has been an overall increase in the number of hospitals with specific emergency surgery protocols since the First Organisational Audit data collection in 2013 (Figure 47).

Formal sepsis pathways were widely available in hospitals accepting acute general surgical admissions (97%), reflecting the efforts of the Surviving Sepsis Campaign in promoting standardised care for acute sepsis.[24]

Many of the standards of care are based around risk assessment and subsequent allocation of resources depending on risk. Formal risk calculation policies have now been implemented in many hospitals since the First Organisational Audit, (25% in 2013, 78% in 2016), accompanied by an increase in policies concerning allocation of resources from around 35% to 75%.

In contrast, many of the surgery and EGS-specific protocols and pathways were available at less than half of hospitals performing emergency laparotomy. Single pathways for the care of the unscheduled adult general surgical patient were available in 41% of hospitals. Emergency laparotomy patients cross many hospital departments, with several potentially time-sensitive processes occurring in quick succession. The presence of a unified pathway may enable timely co-ordinated treatment and the appropriate allocation of resources where multiple demands on resources exist.

What relationship is there between having a specific policy and performance in the associated standard of care?

With the exception of timeliness of arrival in theatre, there was a positive association between having a policy in place and meeting a relevant standard of care for a given process measure. The number of specific policies has increased since the last Organisational Audit. However, the existence of policies does not guarantee delivery of care. Hospitals should use NELA data to confirm that effective care is being delivered. These process measures can be regularly reviewed within the NELA QI dashboards or data exports.

The role of morbidity and mortality reviews

Governance of the emergency surgery pathway will also include analysis of morbidity and mortality (i.e. harms and deaths during treatment). This is an important way to learn lessons about how care can improve, and to reduce the likelihood of similar events happening in the future.

NHS England's National Quality Board (NQB) has recently published the first edition of National Guidance on Learning from Deaths for Trusts. This recommends providers use a robust evidence based methodology for reviewing inpatient deaths. The National Mortality Case Record Review Programme[1] is also providing support to improve the capacity and capability of in hospital mortality reviews. Many of those who die following emergency laparotomy will be subject to the review structures outlined in this guidance.

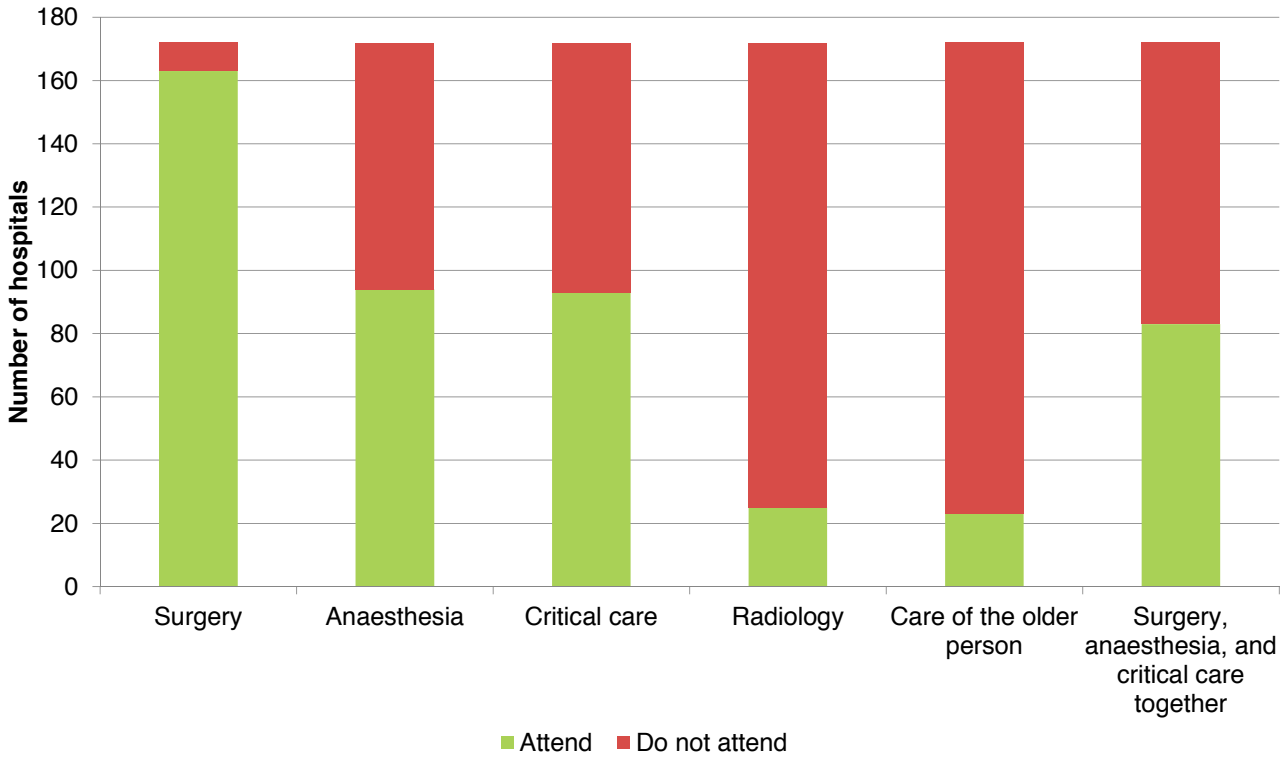
Do hospitals undertake regular (two-monthly) reviews of mortality related to emergency general surgery, and who attends these reviews?

163 (95%) hospitals accepting acute general surgical admissions conducted at least two-monthly reviews of all deaths related to emergency general surgery (Table 25). Mortality reviews are more effective in changing practice when conducted as part of a multidisciplinary meeting. While there was evidence of multidisciplinary involvement, 52% of hospitals did not review these cases with the most relevant multidisciplinary teams present (Figure 48).

Table 25
Regular (at least every two months) review of all deaths following emergency general surgery

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
	42 (98%)	42 (98%)	40 (93%)	39 (91%)	163 (95%)

Figure 48
Specialties providing input to mortality reviews



How is this important to clinical teams?

Clinical teams may also use structured reviews to examine care of patients whose care has not met recommended standards, but who have not come to harm. These cases may represent 'near misses' with useful learning points, or at the very least indicate potential areas for improvement in the emergency laparotomy pathway by highlighting areas of poor performance.

Structured multidisciplinary meetings should also seek to highlight areas of good performance, as these may also provide lessons to share about when the system or individuals work well, as well as benefiting teambuilding and morale.

Clinical coding

NELA acknowledges the importance of accurate clinical coding for emergency surgical cases. This is important not only for securing appropriate tariffs for work performed at hospitals and for supporting planning and development of future services, but also for allowing accurate outcomes data to be collected at national level.[25]

Quality improvement vignette

'Closer multidisciplinary team working with daily MDTs, co-located diagnostic, standard operating procedures and a holistic patient-centred approach have enabled significant advancements in care led by general surgical consultants with a career passion for acute care. Above all, the presence of a senior decision maker seven days a week and consultant surgical presence at all major operations has driven patient care and the demonstrated improvements.'

Mr Duncan Bew (Consultant Trauma and Acute Care Surgeon; Clinical Director of Major Trauma and Acute Surgery), King's College Hospital

Recommendations

Commissioners and providers

Commissioners should promote the principles defined by the National Quality Board, working with hospitals to ensure that there is sufficient resource allocated to support the delivery of safe, high-quality care, as defined by this NELA report, for emergency surgical services.

Hospitals should ensure that NELA data are used as part of the suite of quality-assurance metrics available to governance teams.

Senior Leadership Teams should embed regular multidisciplinary case reviews or MDTs that include all relevant disciplines, with active learning from cases to improve future outcomes and processes.

Consultants in anaesthesia and critical care should take ownership, alongside surgeons, of outcomes of emergency laparotomy patients.

Clinicians should support the process of accurate clinical coding of emergency surgical cases (for example, through good notekeeping by junior doctors) to ensure that centrally held datasets, such as HES, will be clinically relevant, accurate and useful for national projects such as NELA.

Clinical teams

Clinical teams should develop patient-specific pathways of care for emergency surgery patients.

Teams should monitor the efficacy of these pathways by analysis of the expected standards of care against their locally measured performance captured by the Audit.

Where variation from the care described in the pathway exist, teams should use quality improvement methodology to analyse and address the discrepancies.

Clinical teams should regularly (two-monthly) review their morbidity and mortality associated with emergency general surgery using a structured methodology. These teams should comprise all relevant clinical services involved in the case as a minimum, surgery, anaesthesia and critical care.

Anaesthetic departments should ensure that suitable time and resource is given to these governance requirements, and co ordinate their efforts with surgical and other teams to allow multidisciplinary discussion of performance, in addition to regular timely review of local NELA data (available via data export or visualised as time-series run charts on the NELA QI dashboard).

NELA Leads

NELA Leads should make NELA site data available to departmental and hospital governance teams as part of ongoing quality assurance reporting structures.

NELA Leads should ensure that protocols and pathways for the early identification and management of sepsis in emergency laparotomy patients are routinely available at every hospital performing emergency laparotomy.

Supplementary data tables are in the Appendix.

12 QUALITY IMPROVEMENT

Why is this important for patients?

NELA aims to provide robust national data to be used by teams in quality improvement (QI) initiatives at local level to facilitate effective change in their own processes and systems.

Importantly for patients, significantly improved outcomes can result from the engagement of teams, improved understanding of systems and processes, and the use of data to drive change.[26]

Why is this important for clinical teams?

Collecting NELA data is a time-consuming task for clinicians and other staff. To make best use of that time, it is vital that the data are used locally to improve care.

NELA provides an excellent topic for doctors in training to learn and apply QI knowledge and skills in a way that helps them to meet the learning requirements of the curriculum, as well as to engage in meaningful, sustainable improvement work. Royal College of Anaesthetists guidance confirms that participation in NELA-related improvements would satisfy many of the QI curriculum and annual assessment (ARCP) requirements for doctors in training.

The continuous nature of the Audit and its broad reach mean that doctors on rotation can participate in ongoing local NELA QI projects quickly upon rotation to a new hospital, thereby mitigating the impact of short rotation times.

The defined anaesthetic, surgical, and audit lead roles also give doctors in training a clear core group of senior NELA advocates with whom they can work on multidisciplinary improvement. NELA poster-prizes for such work at surgical and anaesthetic academic conferences further encourage participation.[27] Projects such as the Emergency Laparotomy Collaborative (ELC), which involves 24 trusts across the south of England, have helped create real and important joy in work generated by measuring processes, in working on them as a team and in seeing measurable improvement.

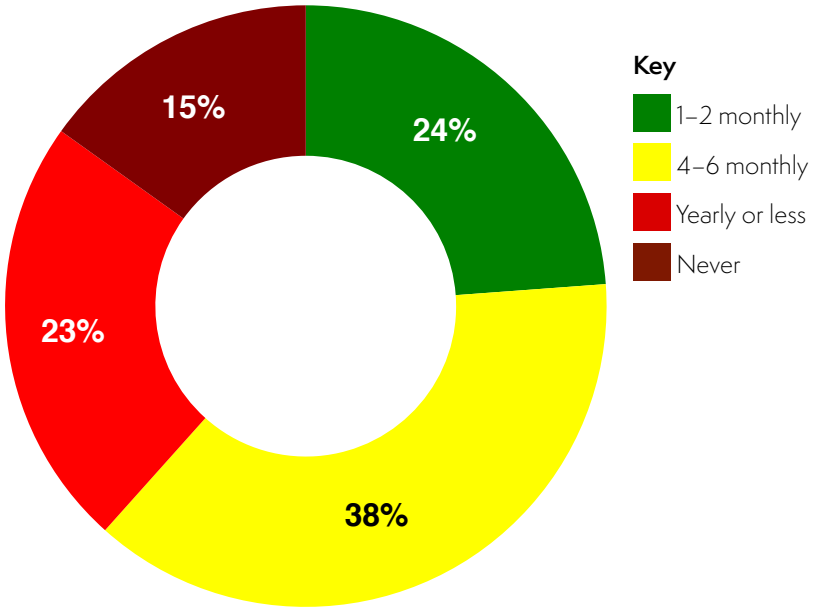
NELA and research

Over the past three years there have been at least two major UK studies using NELA data and quality improvement techniques for patients undergoing emergency laparotomy. The Enhanced Perioperative Care for High-risk (EPOCH) study[28] was a 90-hospital study testing the hypothesis that the use of quality improvement methodology would improve outcomes. The results of this study have not yet been published; however, an ethnographic observation of six of the participating hospitals found the use of risk scoring to be helpful in promoting decision making and in advocating for resources for high-risk patients.[29]

The ELC promotes quality improvement techniques and the use of the ELPQuIC (Emergency Laparotomy Pathway Quality Improvement Care) care bundle.[30]

NELA has also supported, provided data for, and collaborated with several other developing studies, both regional and national, such as ELF (frailty in patients undergoing emergency laparotomy), ALPINE (lung-protective ventilation during emergency laparotomy surgery), and FLOELA (cardiac-output-guided haemodynamic therapy during and after emergency laparotomy surgery).

Figure 49
How often are NELA dashboards or run charts used by hospitals?



A feature of this Audit is the provision of run charts to teams so they can easily visualise their progress over time and benchmark their work against national performance. It is important that these are made easily accessible and that all staff understand their context. The effective and frequent use of data is a cornerstone of successful QI projects. We would advise teams that, to be most useful, the data should be reviewed on a monthly basis.

The NELA website provides short animations to help local leads make best use of their data by applying some core improvement concepts such as time-series (run chart) analysis, good data-feedback techniques, driver diagrams, and process maps.

NELA are running a series of regional workshops and linking with local and national networks to encourage the use of NELA data for QI. These workshops will enable regions to share best practice and learn from each other.

Best-practice examples are also available on the NELA website as pathway examples and previous winning NELA conference posters, and through NHS Improvement's Improvement Hub.

Do NELA Leads have specific time allocated for the role, and do they have any assistance available to collect the data?

Supporting NELA through data entry and quality improvement is time consuming, and it is disappointing to see that in approximately 50% of hospitals there was no time allowance for QI activity and data entry for NELA Leads (Table 27). We are impressed by the amount of work that has been done for this Audit to improve care for patients undergoing emergency laparotomy by colleagues across the country, who are frequently doing this work in their own time.

By developing local methods to facilitate contemporaneous data entry, local leads can be freed from simple data-collection tasks, and can concentrate on collaborating with clinical colleagues, nursing staff, ODPs and audit teams to improve care by using the audit data.

Table 26
Availability of nursing, research, or audit staff tasked with collecting or inputting NELA patient data

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
Staff Available	19 (44%)	16 (37%)	13 (30%)	18 (42%)	66 (38%)

Table 27
Job-planned time for NELA Leads

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
Existing SPA	17 (40%)	14 (33%)	20 (47%)	18 (42%)	69 (40%)
Extra SPA	2 (5%)	6 (14%)	2 (5%)	3 (7%)	13 (8%)
No SPA	24 (56%)	23 (53%)	21 (49%)	22 (51%)	90 (52%)

Recommendations

Commissioners and providers

Commissioners should work with providers to ensure that there is sufficient quality improvement capacity and capability to make best use of NELA data to improve care locally.

Providers should ensure that NELA teams have access to quality improvement skills training to enable local use of national data.

Providers should ensure that local leads have the correct time and support allocated to allow continued data collection, and that they have time for multidisciplinary working on pathway improvements.

Clinical teams

Clinical teams should appraise their local performance, and use QI methodology to plan and execute improvements informed by their data.

NELA Leads

NELA Leads should seek to use their own data for improvement and provide regular feedback of data to others as part of iterative improvement cycles.

Applied QI methodology – what has worked for hospitals that use NELA data effectively?

It can be helpful to consider three phases of improvement – planning for improvement, implementing the improvement, and maintaining the improvement. These three phases were first described by the engineer and quality expert JM Juran.[31]

Planning for improvement

The NELA standards define a set of laparotomy processes, and hospitals can use these standards as quality goals. Examining local performance against the standards, analysis of local data, and benchmarking against national performance can highlight gaps in local pathway provision, define the most potentially productive areas of QI focus, and help to set priorities for improvement at each hospital.

Quality improvement vignette

Kingston hospital used NELA standards to define key measures to target for improvement: They assembled a multidisciplinary group of surgeons, anaesthetists, intensivists and radiologists who examined local NELA data together. They highlighted preoperative risk assessment, direct consultant supervision, critical care admission and timely CT imaging as their core focus. They then worked on those to improve outcomes, and by focusing on these four areas they were able to show a reduction in mortality across all age groups, particularly older patients, for whom mortality dropped by 45% during their improvement period.

Hospitals can use the NELA standards to help define laparotomy patient pathways, the reliability of which can be easily measured using continuously collected NELA data. On the NELA website, there are many examples of pathway documents which have been adapted to suit local contexts.

NELA has provided a QI animation on using driver diagrams and process maps alongside NELA to define and understand your laparotomy patient pathways.

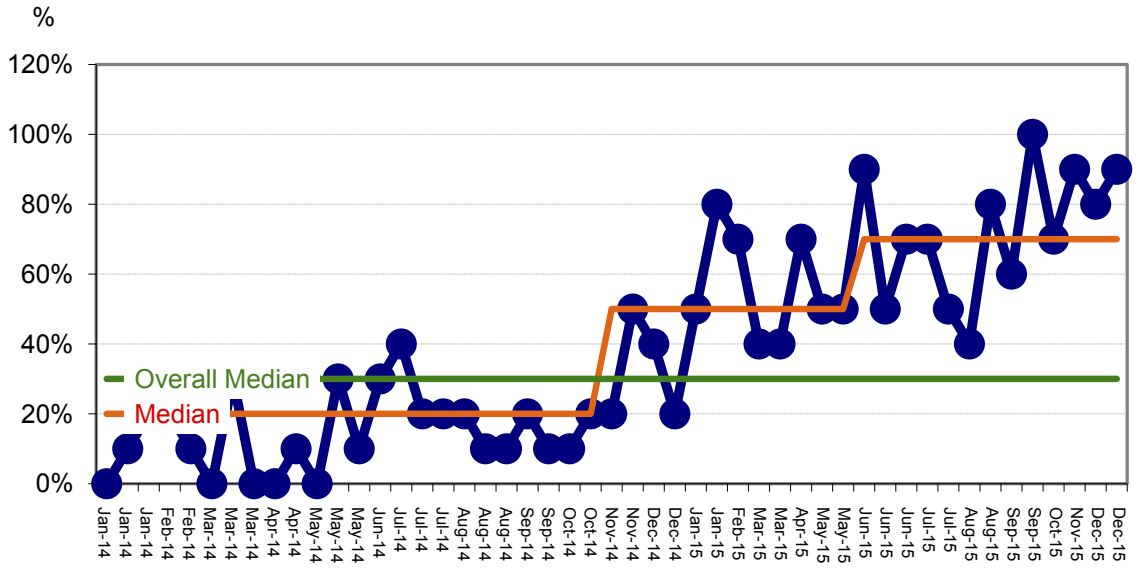
Doing the improvement

Quality improvement often requires many cycles of experimentation to understand what works locally and how best to achieve change. Improvement can be tracked using run charts, which describe performance over time. Hospitals can get realtime information about how changes such as educational and awareness sessions, changes to documentation, or other pathway changes are influencing elements of care like consultant presence and critical care admission. The NELA QI dashboard provides realtime run charts of submitted data.

Quality improvement vignette

University Hospital Southampton used run charts when improving preoperative risk assessment. They altered the emergency booking form to include risk assessment, and saw a stepwise improvement in the number of patients who had objective preoperative risk assessment. They followed this with weekly reminders and then a change in hospital policy. They were able to demonstrate further improvements with each change on their run charts.

Figure 50
Example run chart produced during a local QI project

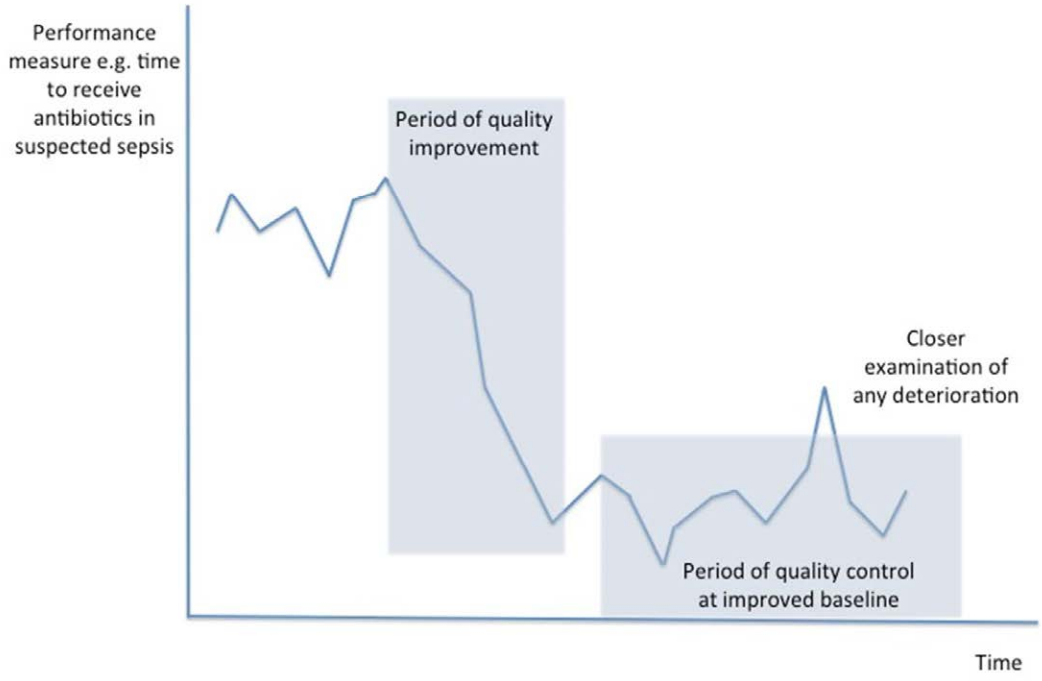


There is a short NELA QI animation on using and interpreting run charts which can be accessed via the NELA website or the RCoA YouTube page.

Maintaining the improvement

Once a hospital is confident that they have a functional pathway, ongoing attention to performance via the audit data is important to ensure that the change introduced is sustained. Performance can sometimes slip if dependent on individuals or actions that aren't part of normal business. Any such 'slip' can be easily detected by ongoing reviews of NELA measures.

Figure 51
Example of tracking change over time to ensure sustained improvement



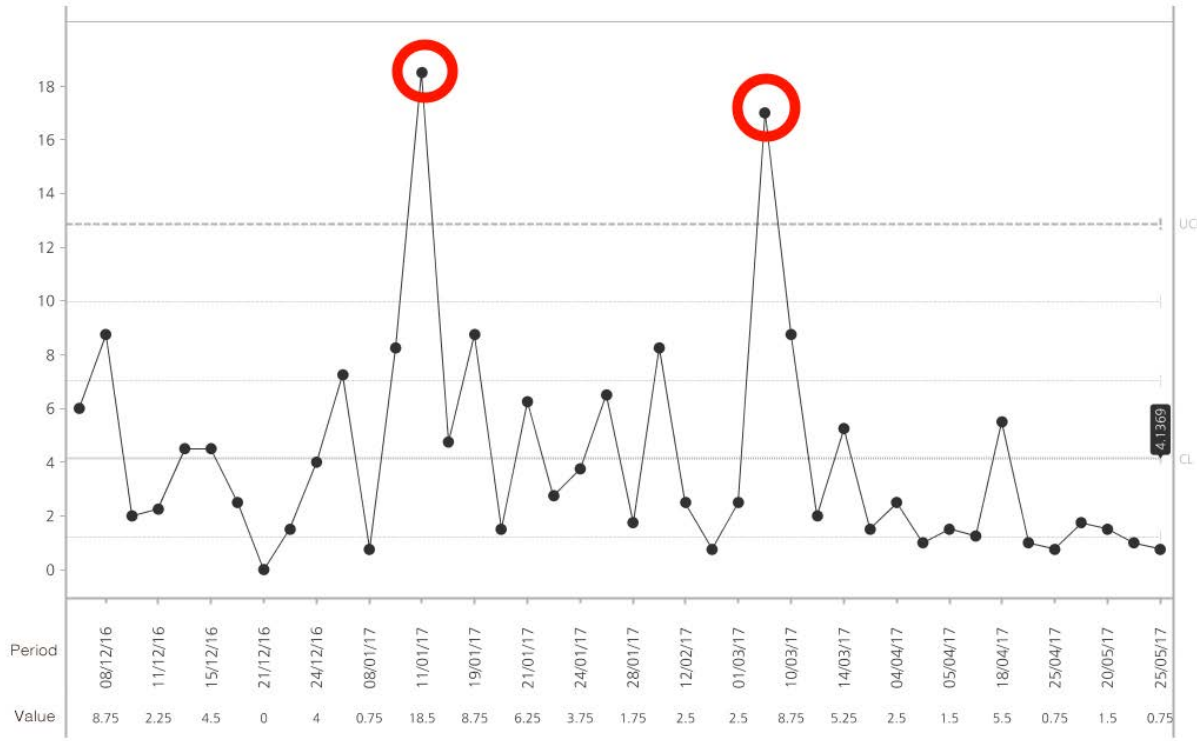
Quality improvement vignette

Royal United Hospitals Bath was an early adopter of emergency laparotomy improvements, seeing impressive improvements in outcomes as part of the ELPQuIC collaboration.[32] However after the initial period of improvement, and after a few key individuals leaving the organisation, they detected a decrease in performance by ongoing review of data. This indicated they had been 'too dependent initially on a few key individuals, and when they left, it became apparent that the new processes were not truly embedded into the system'. The Bath team re-established a multidisciplinary improvement team and have now regained their previous performance levels. Sustaining quality improvement gains is a common problem, which requires ongoing measurement of performance and ensuring that processes are embedded as 'the way we do it around here' and not dependent on a few individuals.

Using continuous data can be helpful for improving reliability of the pathway by highlighting times when the pathway fails to provide care up to the defined standard. NELA data can be used to spot 'outliers' who don't get the expected care. For example, analysis of patients' data using control charts can show where patients have waited too long before getting to theatre. These cases can then be examined more closely for the root causes of the delay, and these causes can be addressed to improve care by making the pathway more reliable.

Below is an example of a statistical process control (SPC) chart from a NELA site, showing access times to theatres. The highlighted cases fall outside the calculated control limits, and so are outliers. These individual cases were then examined to find any common features, in this instance leading to modification of the emergency theatre access policy.

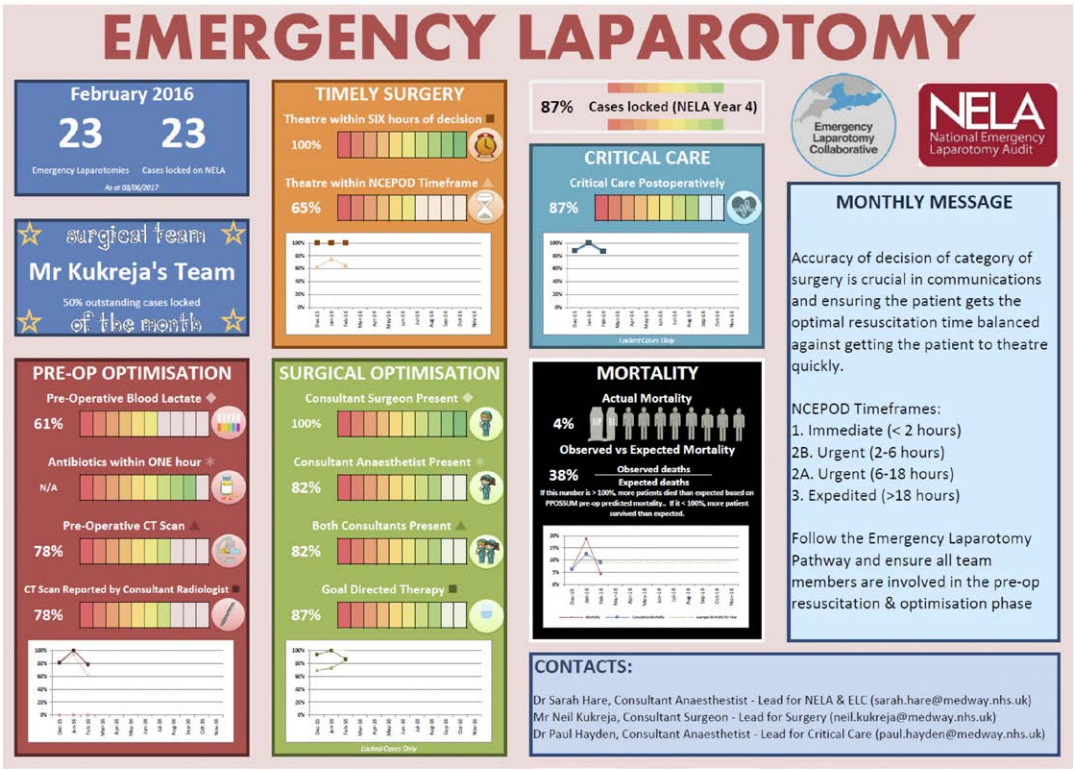
Figure 52
Example SPC chart tracking access times to theatre

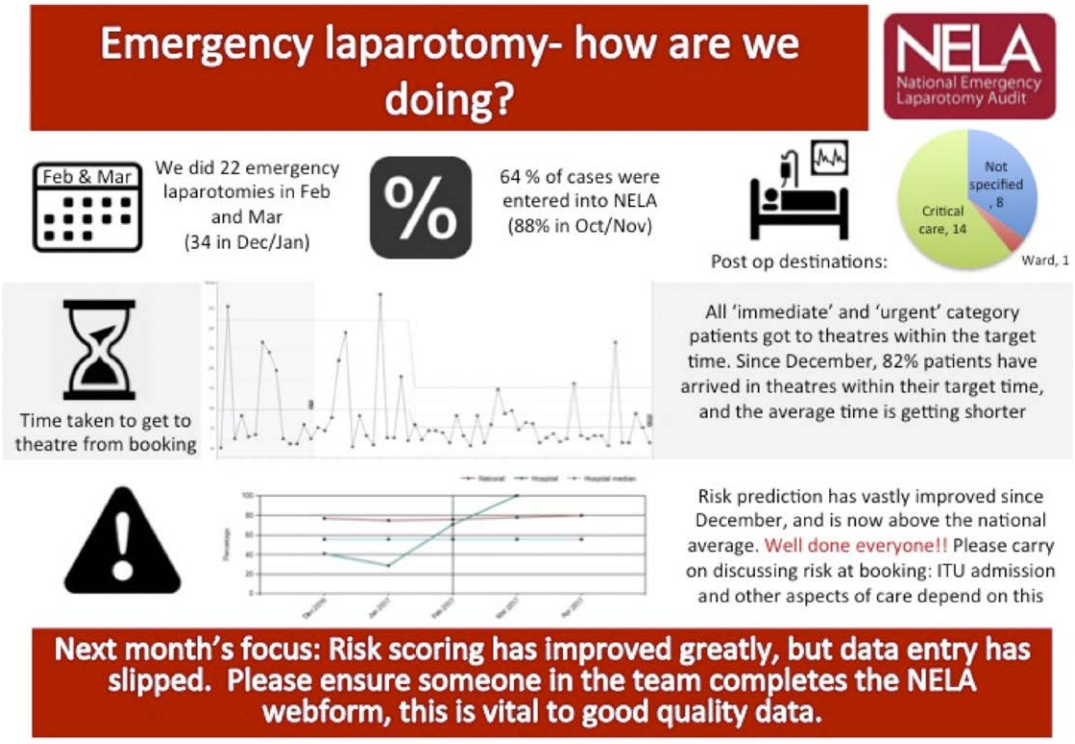


Some hospitals are adding a check against NELA standards of care to their structured mortality-review process. A case-note review of patients dying after emergency laparotomy may reveal common features, such as a lack of timely access to antibiotics in cases of suspected sepsis. This could trigger a review of sepsis pathways in the emergency department, the impact of which could be evaluated using prospective NELA data.

Giving regular feedback of current performance and trends to clinical teams can stimulate further interest in the quality of care provided. This is a relatively simple task once the data have been gathered, and it can increase engagement and commitment to improvement. Data can be communicated in hospitals' governance or quality reports, in regular audit meetings or committees, and via posters, e-mails and other communications. Some hospitals are displaying data as monthly infographics displayed in theatres and on wards.

Figure 53
Examples of hospitals' infographic data displays





NELA has produced a QI animation detailing some features of good data feedback, which can be found on the RCoA YouTube page.

As well as communicating performance to clinical teams, NELA data are also regularly reported to some trusts' executive boards or similar senior quality or governance committees. NELA data are soon to be included in the CQC/HQIP national clinical audit benchmarking (NCAB) process. Executive teams may examine local data to seek assurance of performance in anticipation of CQC inspections. The NELA quarterly reports sent to local NELA teams may provide this function in part.

Figure 54
An example of a quarterly performance report sent to local hospitals by the NELA Project Team

	1 June 2017 - 31 August 2017
Estimated number of cases expected per quarter (based on historical HES data):	33
Total number of cases entered into the National Emergency Laparotomy Audit in this quarter:	30
Cases locked:	22
Cases unlocked:	8

Estimated case ascertainment (Overall performance labled as n/a may indicate unavailable data, or uncertainty over data accuracy)					
		Hospital value (%)	National mean (%)		Overall performance
		90.9	69.4		

CT scan reported before surgery by a consultant radiologist					
Patients included	Data completeness (%)	Hospital value (%)	National mean (%)		Overall performance
28	93	46.4	79.5		

Risk of death documented before surgery					
Patients included	Data completeness (%)	Hospital value (%)	National mean (%)		Overall performance
30	100	66.7	77.4		

Arrival in theatre within a timescale appropriate for urgency					
Patients included	Data completeness (%)	Hospital value (%)	National mean (%)		Overall performance
23	88	87.0	81.9		

Consultant surgeon and anaesthetist present in theatre when the risk of death ≥5%					
Patients included	Data completeness (%)	Hospital value (%)	National mean (%)		Overall performance
18	100	88.9	83.8		

Consultant surgeon present in theatre when the risk of death ≥5%					
Patients included	Data completeness (%)	Hospital value (%)	National mean (%)		Overall performance
18	100	88.9	92.0		

Consultant anaesthetist present in theatre when the risk of death ≥5%					
Patients included	Data completeness (%)	Hospital value (%)	National mean (%)		Overall performance
18	100	100.0	89.2		

Admitted to critical care following surgery when the risk of death ≥5% (Excludes patients who died in theatre or with a decision to palliate)					
Patients included	Data completeness (%)	Hospital value (%)	National mean (%)		Overall performance
17	100	100.0	81.0		

Admitted to critical care following surgery when the risk of death >10% (Excludes patients who died in theatre or with a decision to palliate)					
Patients included	Data completeness (%)	Hospital value (%)	National mean (%)		Overall performance
11	100	100.0	87.4		

Assessment by elderly medicine specialist in patients aged 70 years and over					
Patients included	Data completeness (%)	Hospital value (%)	National mean (%)		Overall performance
10	77	0.0	18.8		

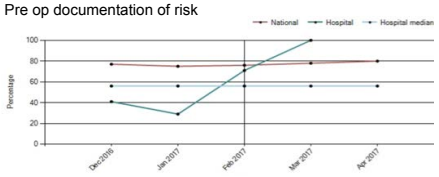
Figure 55

An example of NELA data displayed in a hospital's quality report to the executive team.

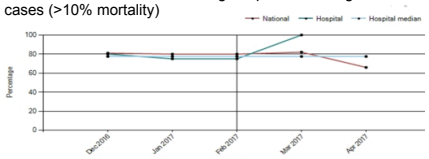
National Emergency Laparotomy Audit performance

Metric	CQC domain	Year 3 (Dec '16- Mar '17) Performance and comments
Case ascertainment- completion of audit data is assessed annually and RAG rated against HES data	Well led	Year 4 performance has improved from year 3. Targeted reminders starting in April should improve this position further. IT infrastructure is crucial to data capture, which is being improved by the IT team.
Pre op documentation of risk of death Patients should have objective risk scoring, to guide intra-op and post op management	Effective	There has been consistent improvement in year 3, due to changing electronic booking form and building awareness. New functionality in NELA webtool and a standalone app is expected improve this further in coming months.
Access to theatres in appropriate timescale NCEPOD urgent classification cases- access in <6 hours, NCEPOD immediate- <2 hours	Responsive	Since Dec, 82% patients have been reaching theatre in appropriate timescale. Proposed changes in electronic booking system to further support this are currently pending implementation. RCA long waiters will then be easier.
Consultant surgeon and anaesthetist present in theatres if >5% predicted mortality	Effective	90% cases meet this standard. This is a consistently strong area of performance for St Georges.
Cases >10% predicted mortality) admitted to high dependency	Safe	GICU aim to take patients with risk of death >5%, 100% patients meeting admission internal standard. We are amongst the best performers nationally.
Length of stay	Not reported to CQC	Average LoS Dec to Mar is 19.7 days, median 13.3 days. Plans to introduce elderly care liaison provision may improve this.
Mortality	Effective	In hosp mortality Dec 16-Mar 17 is XX%. Average predicted risk of death was XX% This is higher than equivalent Y3 figure XX% - predicted mortality in Y3 was XX%

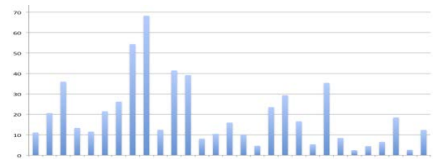
Pre op documentation of risk



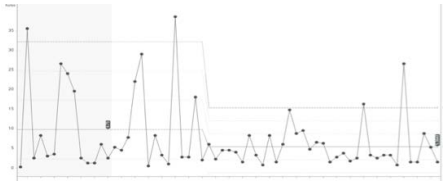
Consultant anaesthetist and surgeon present for high risk cases (>10% mortality)



Length of stay of discharged patients (days) Dec '16- Mar '17



SPC chart of theatre access times- urgent cases



13 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.

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.

CCT
Certificate of Completion of Training.

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. This 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.

ED
Emerency Department.

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

Elective
In this Report, refers 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.

FICM
Faculty of Intensive Care Medicine.

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

GI
Gastrointestinal.

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
(see Appendix 15.7)

HQIP
Healthcare Quality Improvement Partnership.

HSRC
Health Services Research Centre.

ICNARC
Intensive Care National Audit and 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.

MDT
Multidisciplinary team.

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.

Non-operative
Treatment options that do not require surgery.

NQB
NHS England National Quality Board.

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.

ODP
Operating Department Practitioner.

OJEU
Official Journal of the European Union.

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. [5]

Preoperative
Before surgery.

QI
Quality Improvement.

Radiological imaging
Diagnostic techniques including X-ray and CT.

RAG
Red Amber Green.

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.

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.

NELA
National Emergency Laparotomy Audit

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15 APPENDICES

15.1 Hospitals that do not accept acute general surgical admissions

Twelve hospitals provided emergency laparotomy for inpatients when clinically indicated, but did not accept acute general surgical admissions. These hospitals were either regional or national cancer or cardiothoracic surgical centres, or hospitals within multi-site healthcare trusts. In these hospitals, patients will require an emergency laparotomy in order to treat complications of other types of surgery. While their facilities might differ to those hospitals that do receive acute general surgical admissions, the same standards of care still apply.

Characteristics

These hospitals were typically smaller, with fewer operating theatres than hospitals that accept acute general surgical admissions (Table 28).

Table 28
Characteristics of hospitals not accepting acute general surgical admissions

	Hospitals not accepting acute general surgical admissions (n = 12)	Hospitals accepting acute general surgical admissions (n = 172)
Hospital beds		
Range	108–764	49–1,183
Median (IQR)	217 (167–331)	504 (361–660)
Operating theatres		
Range	5–20	4–38
Median (IQR)	8 (6–12)	12 (9–17)

Respondents reported that elective gastrointestinal surgery was undertaken at five of these hospitals (42%). Regardless of whether or not gastrointestinal surgery is undertaken at specialist hospitals, there are minimum requirements for the safe delivery of emergency general surgery (EGS), including access to relevant facilities and multidisciplinary expertise, and these requirements should be met.

Facilities

Only five (42%) of these hospitals provided fully-staffed operating theatres that were available for adult EGS cases at all times.

Respondents indicated that the provision of diagnostic imaging facilities was good: all hospitals had 24-hour access to on-site X-ray and CT. However, in common with those hospitals admitting acute general surgical patients, interventional radiology and endoscopy provision was less comprehensive at these 12 hospitals.

Ten of the 12 hospitals had 24-hour access to biochemistry, haematology and blood-bank laboratories, but outside working hours this was provided off-site at one of the hospitals at which elective gastrointestinal (GI) surgery was performed.

With the exception of policies for identifying acutely unwell patients and those with sepsis, the availability of EGS-specific perioperative pathways was patchy and often poor.

These hospitals should review the availability of facilities, staff, and processes required to perform EGS safely, and take appropriate action to ensure that standards of care are delivered. It is also important that these specialist hospitals participate fully in the ongoing patient-data collection in order to determine if standards of care are being met on an individual patient basis.

Table 29
Facilities at hospitals not accepting acute general surgical admissions

Hospital	Elective adult GI surgery	24-hour availability of a fully-staffed theatre for emergency general surgery	24-hour contemporaneous CT reporting	Regular (at least every two months) review of mortality following emergency general surgery cases
Castle Hill Hospital	Yes	No	Yes	Yes
Churchill Hospital	Yes	Yes	Yes	No
City Hospital	No	No	Yes	Yes
Freeman Hospital	Yes	Yes	Yes	Yes
Harefield Hospital	No	No	Yes	Yes
Liverpool Heart and Chest Hospital	No	Yes	Yes	Yes
Papworth Hospital	No	Yes	Yes	Yes
The Christie	Yes	No	Yes	Yes
Royal Brompton Hospital	No	Yes	Yes	Yes
Royal Marsden Hospital	Yes	No	Yes	Yes
The Walton Centre	No	No	Yes	No
University Hospital Llandough	No	No	Yes	Yes

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15.2 Hospital-level data

We have produced graphs that show each hospital's performance against its peers. Each hospital has been allocated an individual three-letter code. The list of hospitals and codes is shown in Table 30. Please use pdf search function to identify your hospital – see page 21 for further details.

Table 30
Participating hospitals and case ascertainment key

Hospital	Identifier	Hospital	Identifier
Addenbrookes Hospital	ADD	Diana Princess of Wales Hospital	GGH
Aintree University Hospital	FAZ	Doncaster Royal Infirmary	DID
Airedale General Hospital	AIR	Dorset County Hospital	WDH
Arrowe Park Hospital	WIR	Ealing Hospital	EAL
Barnet Hospital	BNT	East Surrey Hospital	ESU
Barnsley Hospital	BAR	Freeman Hospital	FRE
Basildon University Hospital	BAS	Friarage Hospital	FRR
Basingstoke & North Hampshire Hospital	NHH	Frimley Park Hospital	FRM
Bedford Hospital	BED	Furness General Hospital	FGH
Birmingham Heartlands Hospital	EBH	George Eliot Hospital	NUN
Blackpool Victoria Hospital	VIC	Glan Clwyd District General Hospital	CLW
Bradford Royal Infirmary	BRD	Glangwili General Hospital	GLG
Bristol Royal Infirmary	BRI	Gloucestershire Royal Hospital	GLO
Bronglais General Hospital	BRG	Good Hope Hospital	GHS
Broomfield Hospital	BFH	Harefield Hospital	HHX
Castle Hill Hospital	CAS	Harrogate District Hospital	HAR
Charing Cross	CHX	Hereford County Hospital	HCH
Chelsea and Westminster Hospital	WES	Hillingdon Hospital	HIL
Cheltenham Hospital	CGH	Hinchingbrooke Hospital	HIN
Chesterfield Royal Hospital	CHE	Homerton Hospital	HOM
Churchill Hospital	CCH	Huddersfield Royal Infirmary	HUD
City Hospital	CTY	Hull Royal Infirmary	HUL
Colchester General Hospital	COL	Ipswich Hospital	IPS
Conquest Hospital	CON	James Paget University Hospital	JPH
Countess of Chester Hospital	COC	John Radcliffe Hospital	RAD
Croydon University Hospital	MAY	Kettering General Hospital	KGH
Cumberland Infirmary	CMI	King George Hospital	KNG
Darent Valley Hospital	DVH	King's College Hospital	KCH
Darlington Memorial Hospital	DAR	Kings Mill Hospital	KMH
Derriford Hospital	PLY	Kingston Hospital	KTH
Dewsbury and District Hospital	DDH	Leicester General Hospital	LEI

Key

Green
Case ascertainment ≥80%

Amber
Case ascertainment 50% to 79%

Red
Case ascertainment <50%

Purple
Case ascertainment unknown

Italicised
Fewer than ten cases included in Year 3 NELA patient dataset

Hospital	Identifier	Hospital	Identifier
Leicester Royal Infirmary	LER	Princess Alexandra Hospital	PAH
Leighton Hospital	LEG	Princess of Wales Hospital	POW
Lincoln County Hospital	LIN	Queen Alexandra Hospital	QAP
Lister Hospital	LIS	Queen Elizabeth Hospital, Gateshead	QEG
Liverpool Heart and Chest Hospital	LHC	Queen Elizabeth Hospital (Lewisham and Greenwich NHS Trust)	QEL
Luton & Dunstable Hospital	LDH	Queen Elizabeth Hospital Birmingham	QEB
Macclesfield District General Hospital	MAC	Queen Elizabeth The Queen Mother Hospital	QEQ
Maidstone Hospital	MST	Queen's Hospital, Burton	BRT
Manchester Royal Infirmary	MRI	Queen's Hospital, Romford	QHR
Medway Maritime Hospital	MDW	Queens Medical Centre, Nottingham	QMC
Milton Keynes Hospital	MKH	Rotherham Hospital	ROT
Morriston Hospital	MOR	Royal Albert Edward Infirmary	AEI
Musgrove Park Hospital	MPH	Royal Berkshire Hospital	RBE
Nevill Hall Hospital	NEV	Royal Blackburn Hospital	BLA
New Cross Hospital	NCR	Royal Bolton Hospital	BOL
Newham University Hospital	NWG	Royal Brompton Hospital	BMP
Norfolk and Norwich University Hospital	NOR	Royal Cornwall Hospital	RCH
North Devon District Hospital	NDD	Royal Derby Hospital	DER
North Manchester General Hospital	NMG	Royal Devon & Exeter Hospital	RDE
North Middlesex University Hospital	NMH	Royal Free Hospital	RFH
Northampton General Hospital	NTH	Royal Glamorgan	RGH
Northern General Hospital	NGS	Royal Gwent Hospital	GWE
Northumbria Specialist Emergency Care Hospital	NSH	Royal Hampshire County Hospital	RHC
Northwick Park/St Marks Hospital	NPH	Royal Lancaster Infirmary	RLI
Nottingham City Hospital	NOT	Royal Liverpool University Hospital	RLU
Papworth Hospital	PAP	Royal Marsden Hospital	MAR
Peterborough City Hospital	PET	Royal Preston Hospital	RPH
Pilgrim Hospital	PIL	Royal Shrewsbury Hospital	RSS
Pinderfields Hospital	PIN	Royal Stoke University Hospital	RSH
Poole Hospital	PGH	Royal Surrey County Hospital	RSU
Prince Charles Hospital	PCH	Royal Sussex County Hospital	RSC

Key

Green

Case ascertainment ≥80%

Amber

Case ascertainment 50% to 79%

Red

Case ascertainment <50%

Purple

Case ascertainment unknown

Italicised

Fewer than ten cases included in Year 3 NELA patient dataset

Hospital	Identifier	Hospital	Identifier
Royal United Hospital	BAT	The Royal Oldham Hospital	OHM
Royal Victoria Infirmary	RVN	The Walton Centre	WLT
Russells Hall Hospital	RUS	Torbay District General Hospital	TOR
Salford Royal Hospital	SLF	Tunbridge Wells Hospital	TUN
Salisbury District Hospital	SAL	University College Hospital	UCL
Sandwell General Hospital	SAN	University Hospital Lewisham	LEW
Scarborough Hospital	SCA	University Hospital Llandough	UHL
Scunthorpe General Hospital	SCU	University Hospital North Durham	DRY
South Tyneside District Hospital	STD	University Hospital of North Tees	NTG
Southampton General Hospital	SGH	University Hospital of Wales	UHW
Southend University Hospital	SEH	University Hospital, Coventry	UHC
Southmead Hospital	SMH	Walsall Manor Hospital	WMH
Southport District General Hospital	SPD	Warrington Hospital	WDG
St George's Hospital	GEO	Warwick Hospital	WAW
St Helier Hospital	SHC	Watford General Hospital	WAT
St James's University Hospital	SJH	West Middlesex University Hospital	WMU
St Mary's Hospital	STM	West Suffolk Hospital	WSH
St Mary's Hospital, IoW	MIW	Weston General Hospital	WGH
St Peter's Hospital	SPH	Wexham Park Hospital	WEX
St Richards Hospital	STR	Whipps Cross University Hospital	WHC
St Thomas' Hospital	STH	Whiston Hospital	WHI
Stepping Hill Hospital	SHH	Whittington Hospital	WHT
Stoke Mandeville Hospital	SMV	William Harvey Hospital	WHH
Sunderland Royal Hospital	SUN	Withybush General Hospital	WYB
Tameside General Hospital	TGA	Worcestershire Royal Hospital	WRC
The Christie	CHR	Worthing Hospital	WRG
The Great Western Hospital	PMS	Wrexham Maelor Hospital	WRX
The James Cook University Hospital	SCM	Wythenshawe Hospital	WYT
The Princess Royal University Hospital	BRO	Yeovil District Hospital	YEO
The Queen Elizabeth Hospital, King's Lynn	QKL	York Hospital	YDH
The Royal Bournemouth Hospital	BTH	Ysbyty Gwynedd Hospital	GWY
The Royal London Hospital	LON		

Key

Green

Case ascertainment ≥80%

Amber

Case ascertainment 50% to 79%

Red

Case ascertainment <50%

Purple

Case ascertainment unknown

Italicised

Fewer than ten cases included in Year 3 NELA patient dataset

Figure 56

Proportion of patients in each hospital who had risk documented preoperatively. Black bars indicate hospitals with fewer than ten cases in this analysis.

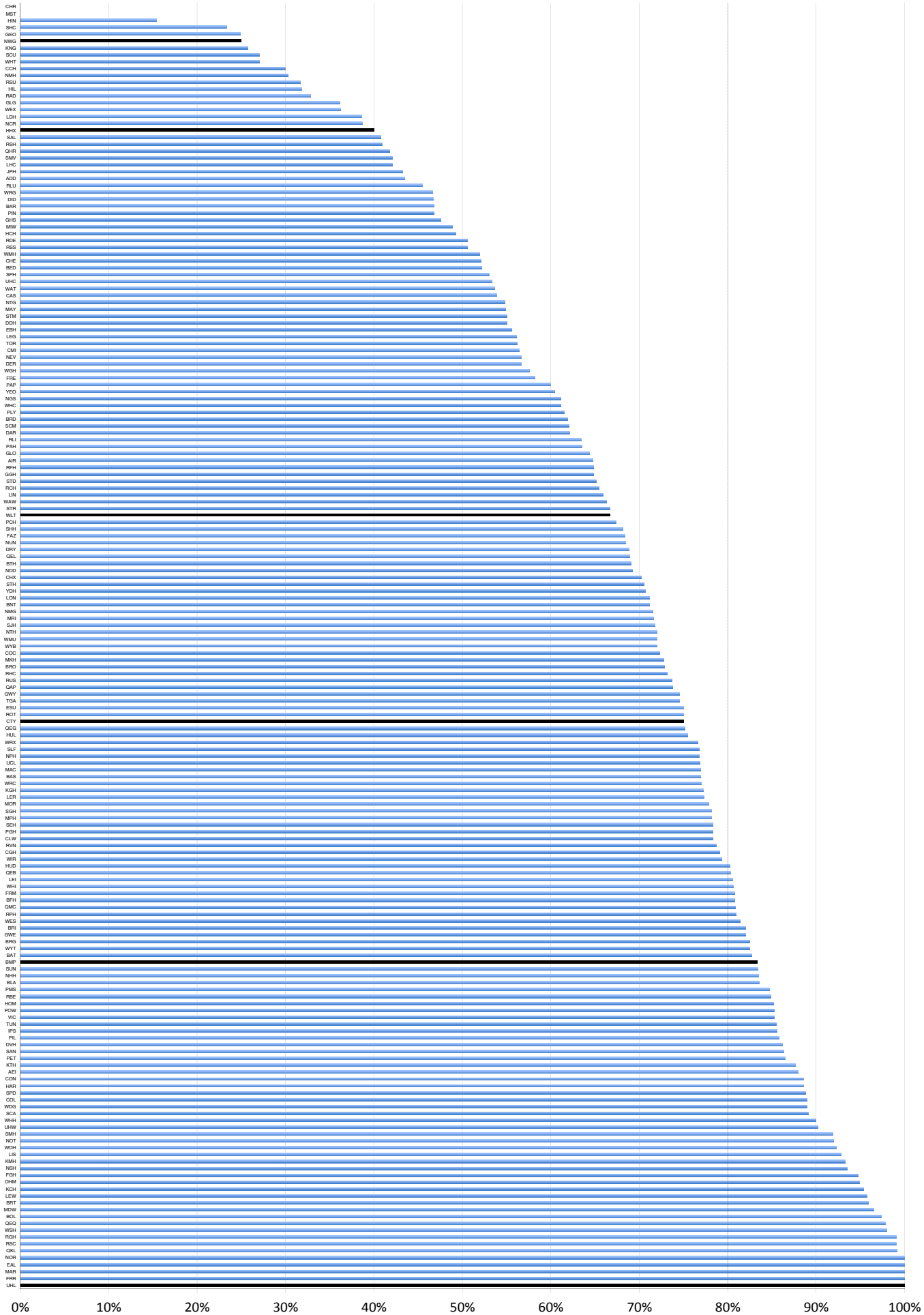


Figure 57

Proportion of patients in each hospital who were reviewed by a consultant surgeon within 14 hours of emergency admission to hospital. Black bars indicate hospitals with fewer than ten cases in this analysis

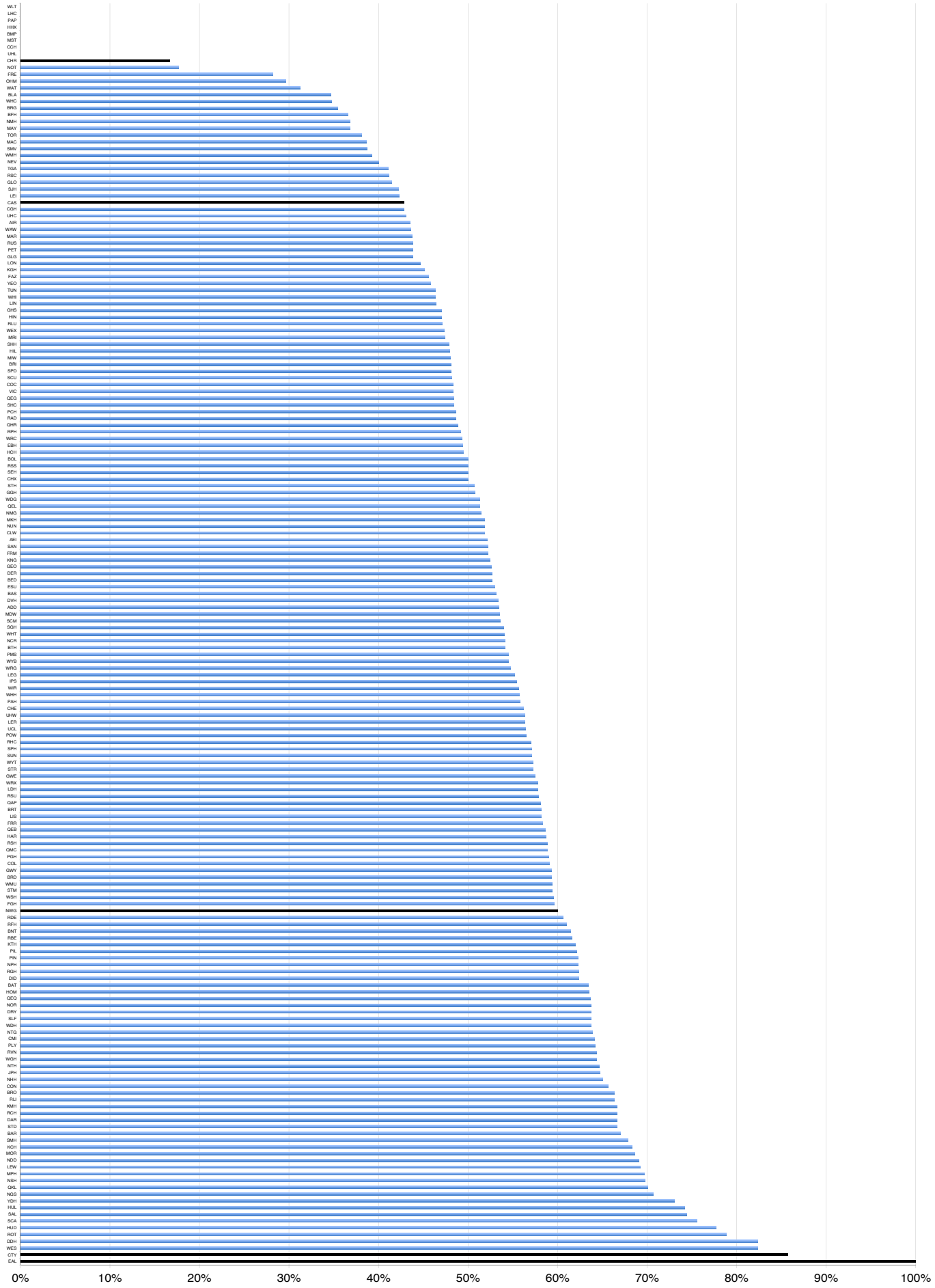


Figure 58

Proportion of patients in each hospital with a calculated preoperative P-POSSUM risk of death ≥5%, who were reviewed by a consultant surgeon and consultant anaesthetist before emergency laparotomy. Black bars indicate hospitals with fewer than ten cases in this analysis

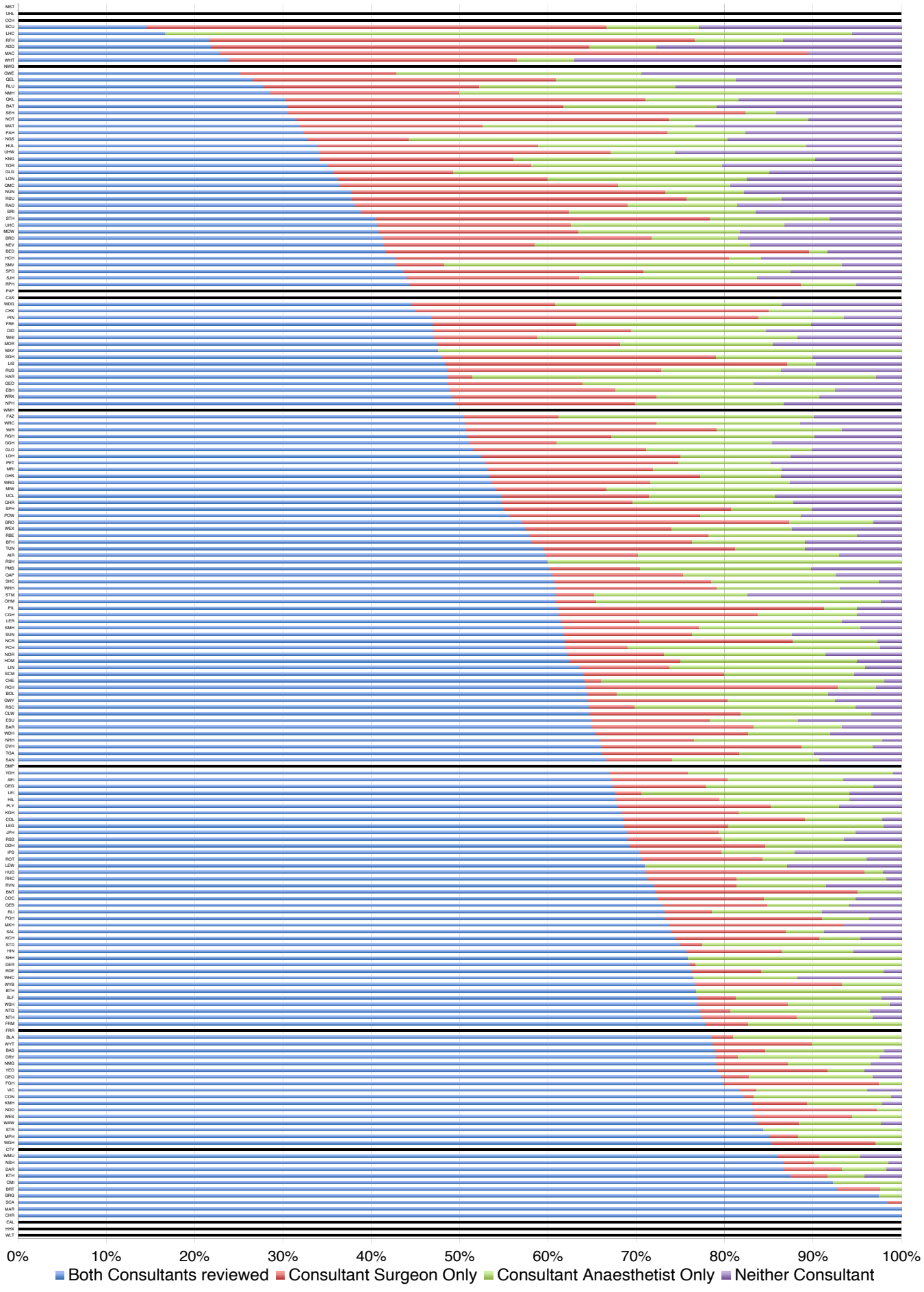


Figure 59

Proportion of patients in each hospital with a calculated preoperative P-POSSUM risk of death ≥5%, for whom surgery was directly supervised by a consultant surgeon and consultant anaesthetist. Black bars indicate hospitals with fewer than ten cases in this analysis

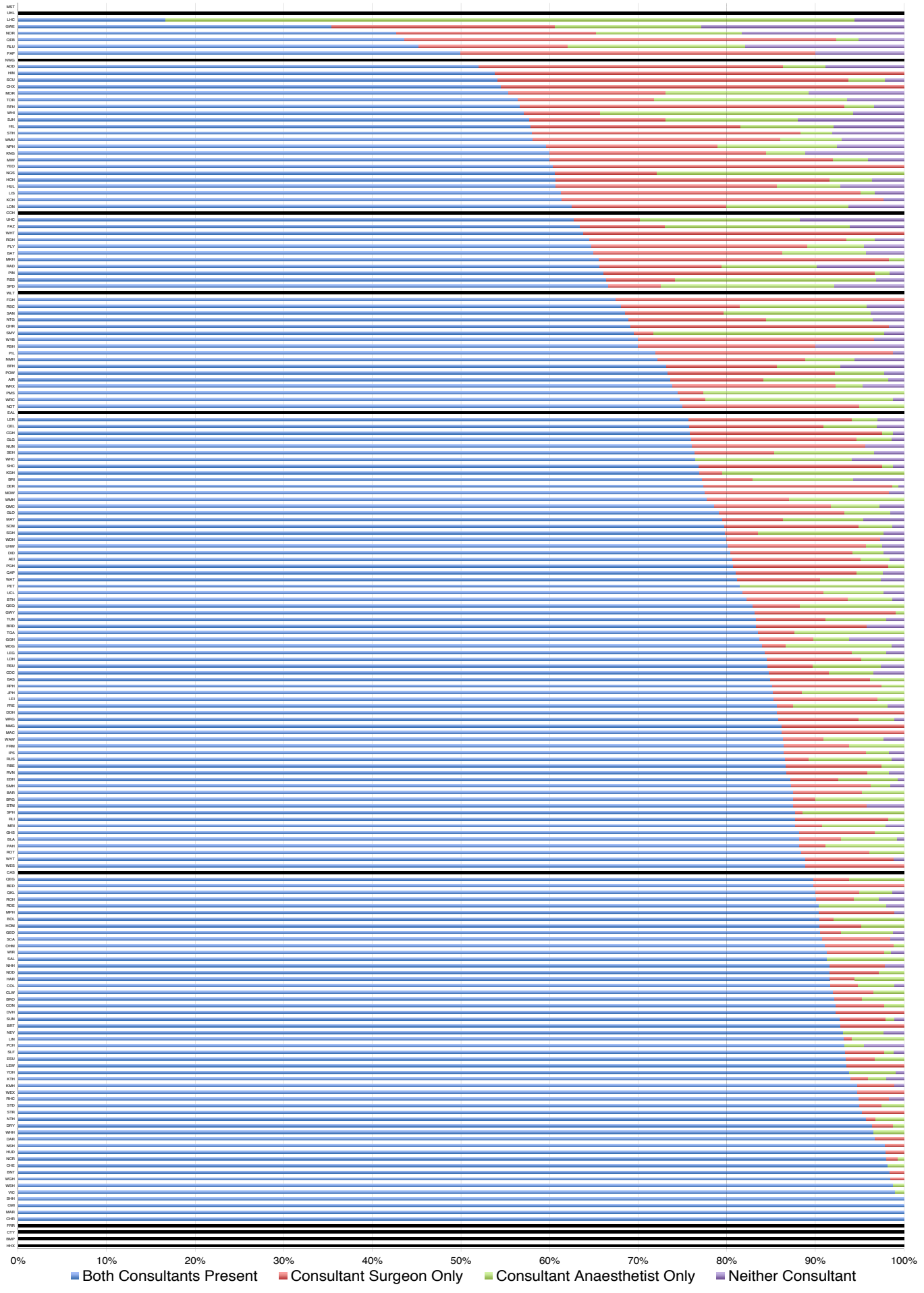


Figure 60

Proportion of patients in each hospital where the interval from decision to operate (or time of booking) to arrival in theatre was appropriate to operative urgency. This excludes Expedited cases. Black bars indicate hospitals with fewer than ten cases in this analysis

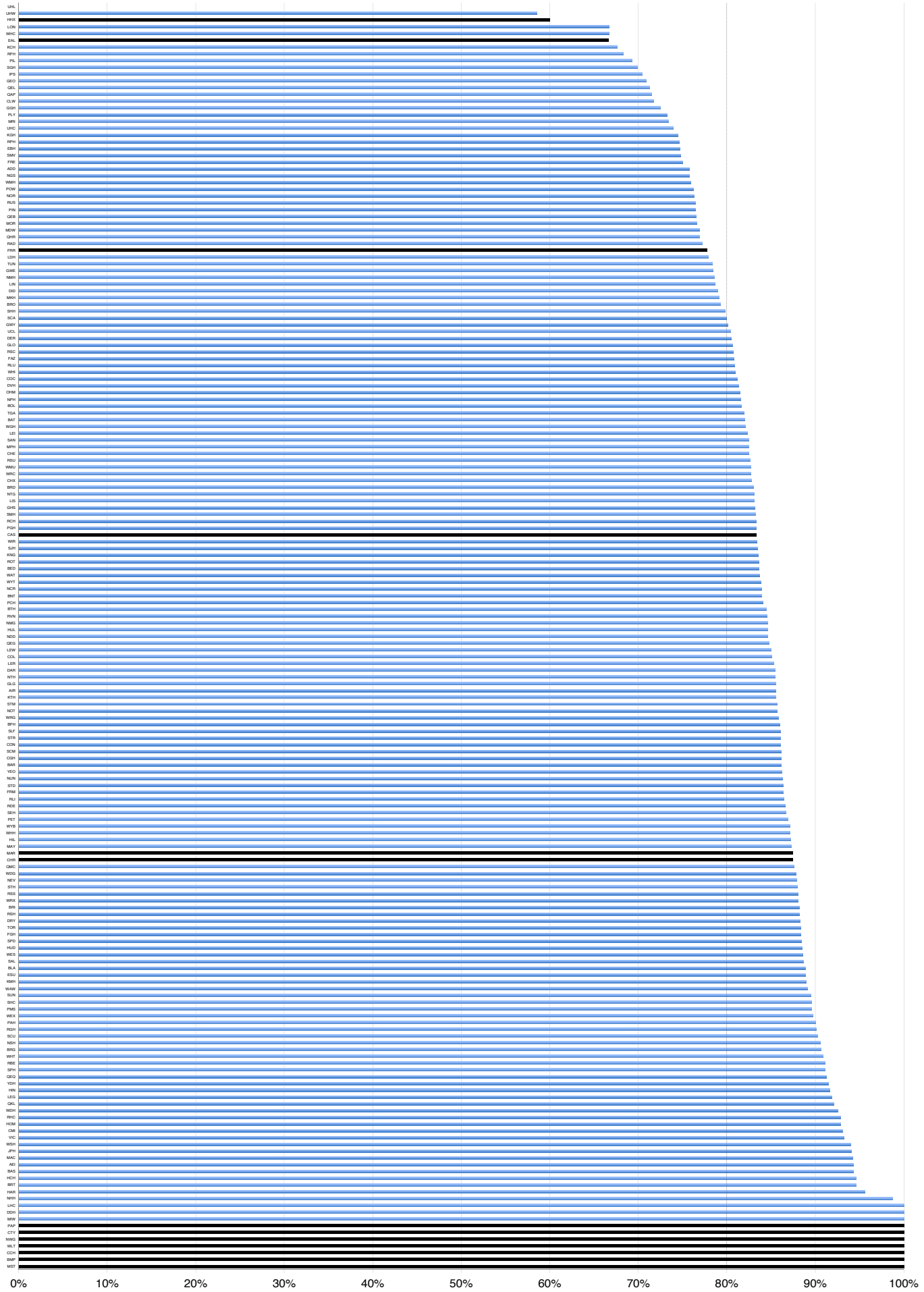


Figure 61

Proportion of patients in each hospital with a calculated postoperative P-POSSUM risk of death 5–10% who were admitted directly to a critical care unit from theatre following emergency laparotomy. Black bars indicate hospitals with fewer than ten cases in this analysis

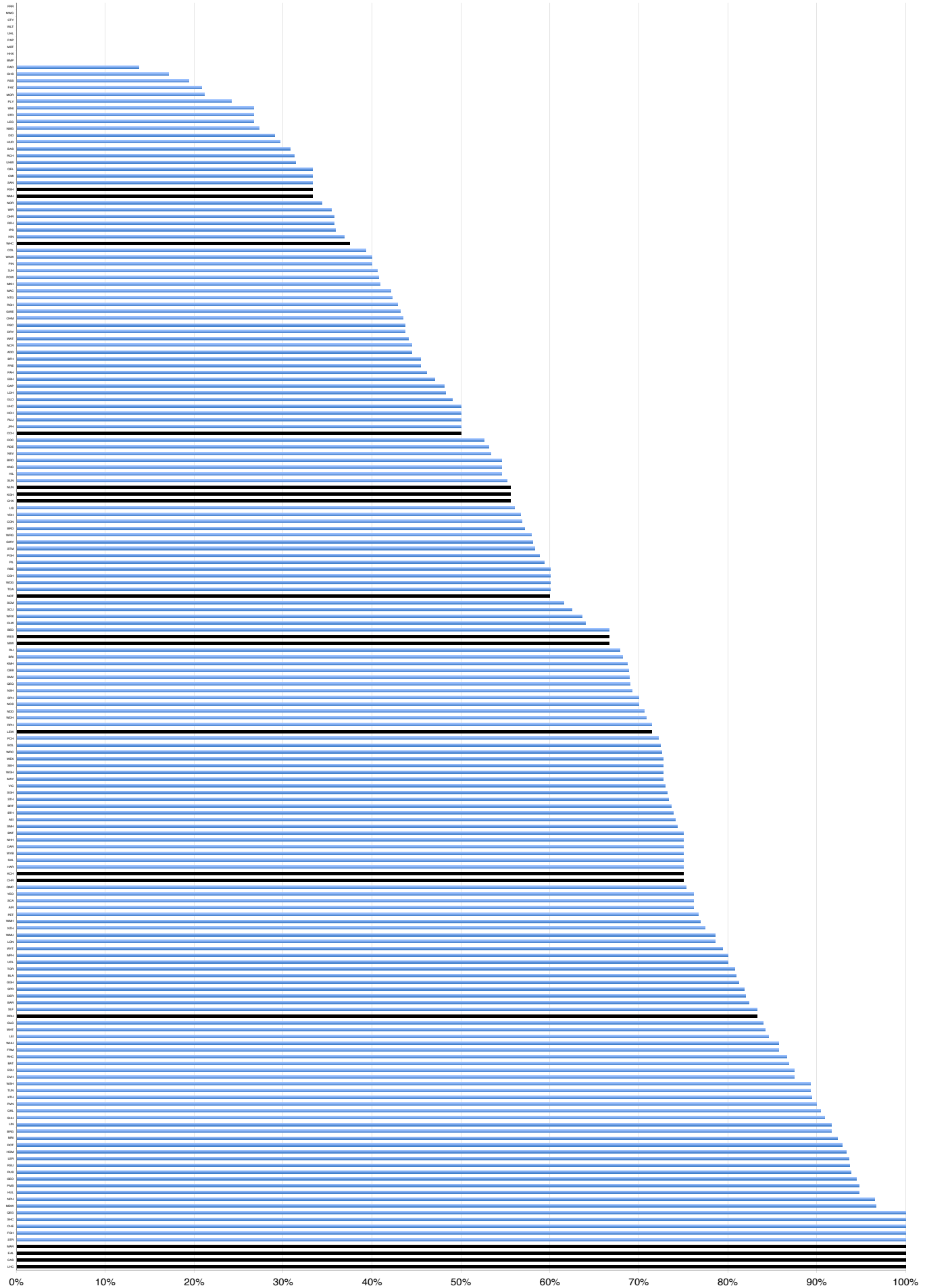


Figure 62

Proportion of the patients in each hospital with a calculated postoperative P-POSSUM risk of death >10% who were admitted directly to a critical care unit from theatre following emergency laparotomy. Black bars indicate hospitals with fewer than ten cases in this analysis

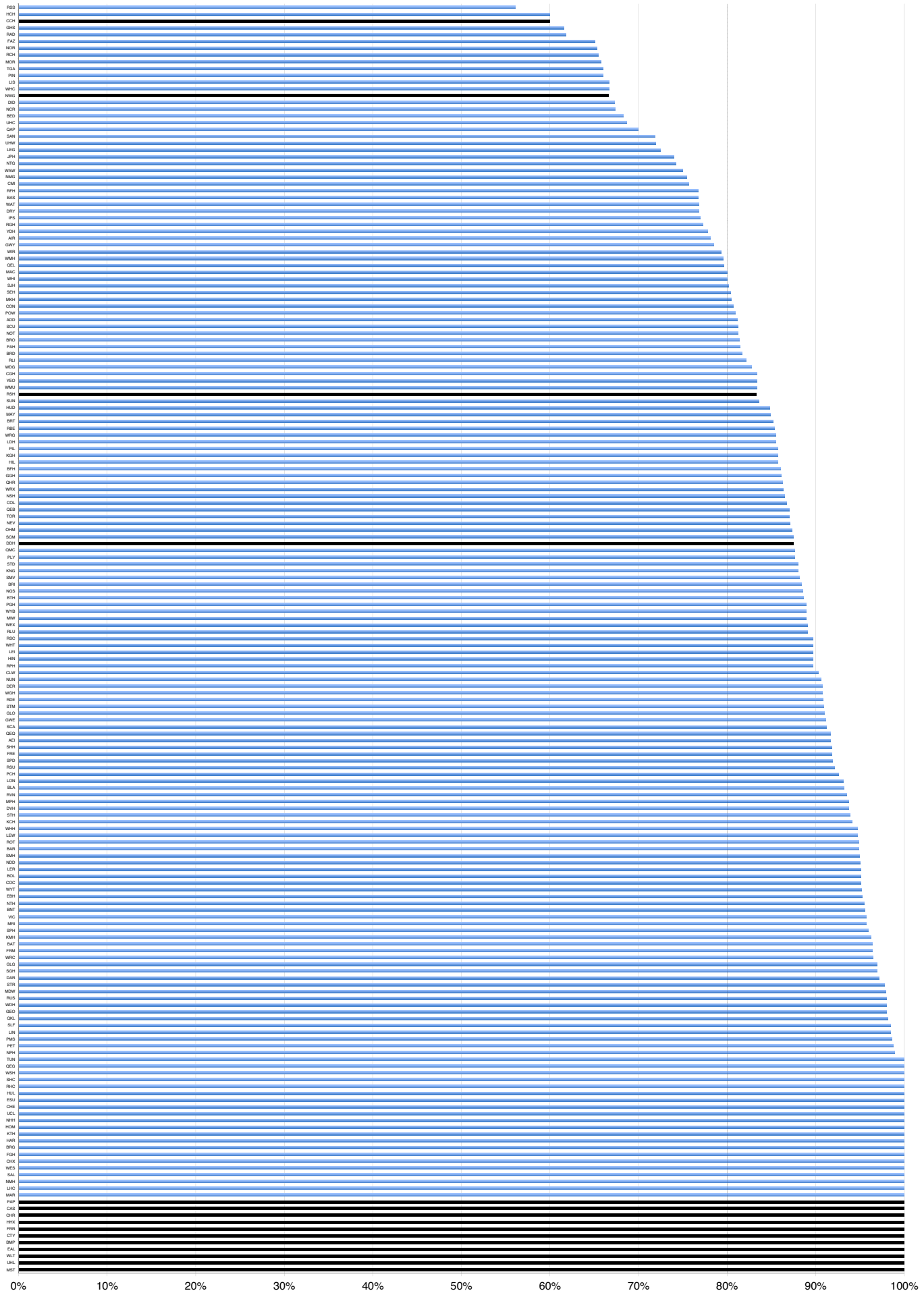


Figure 63
Proportion of patients in each operative urgency category by hospital. Black bars indicate hospitals with fewer than ten cases in this analysis

Figure 64

Proportion of patients in each hospital who had a CT scan performed and reported by a consultant radiologist before emergency laparotomy. Black bars indicate hospitals with fewer than ten cases in this analysis

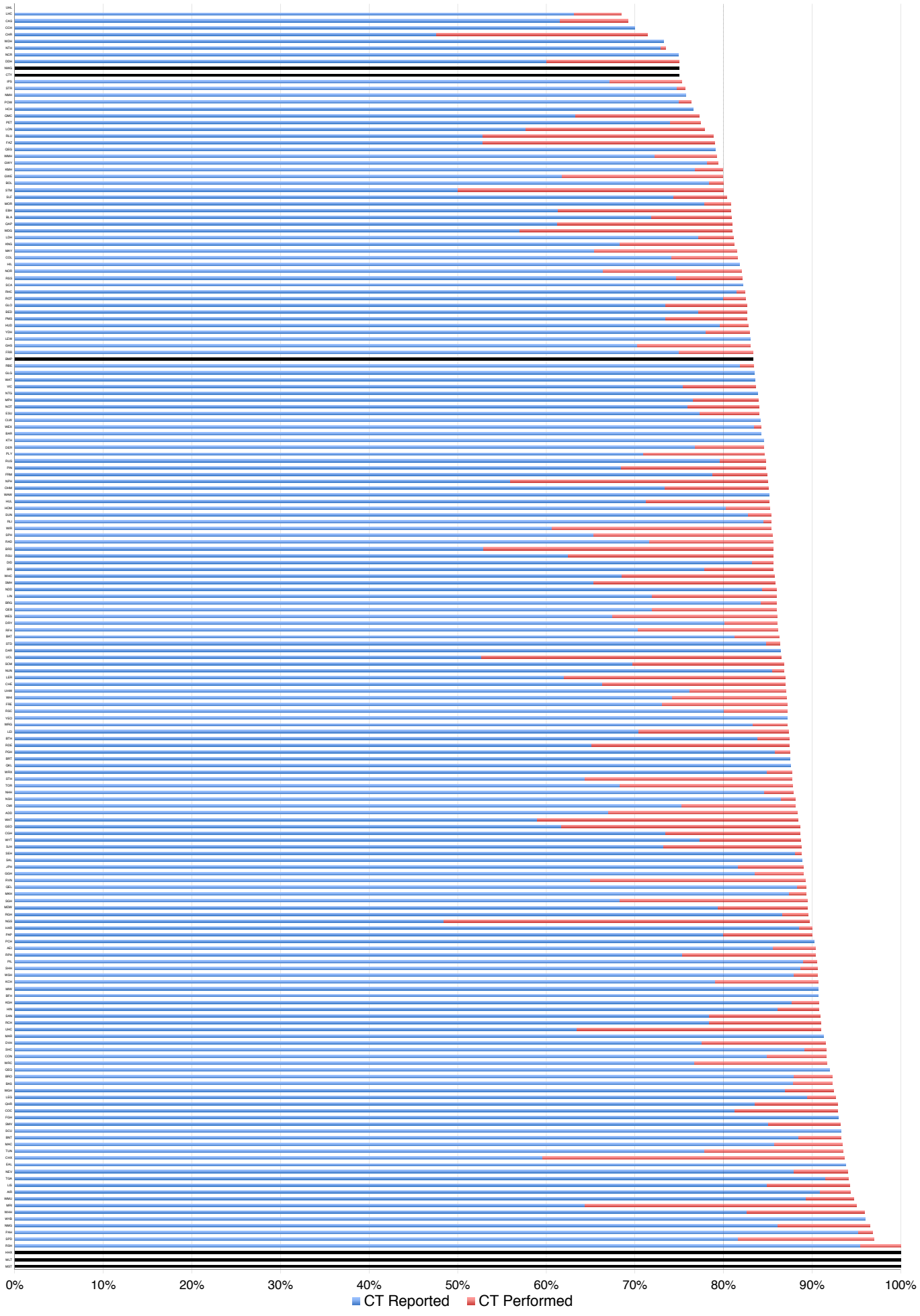


Figure 65

Proportion of patients in each hospital aged 70 or over who were assessed by a care of the older person specialist after surgery. Black bars indicate hospitals with fewer than ten cases in this analysis

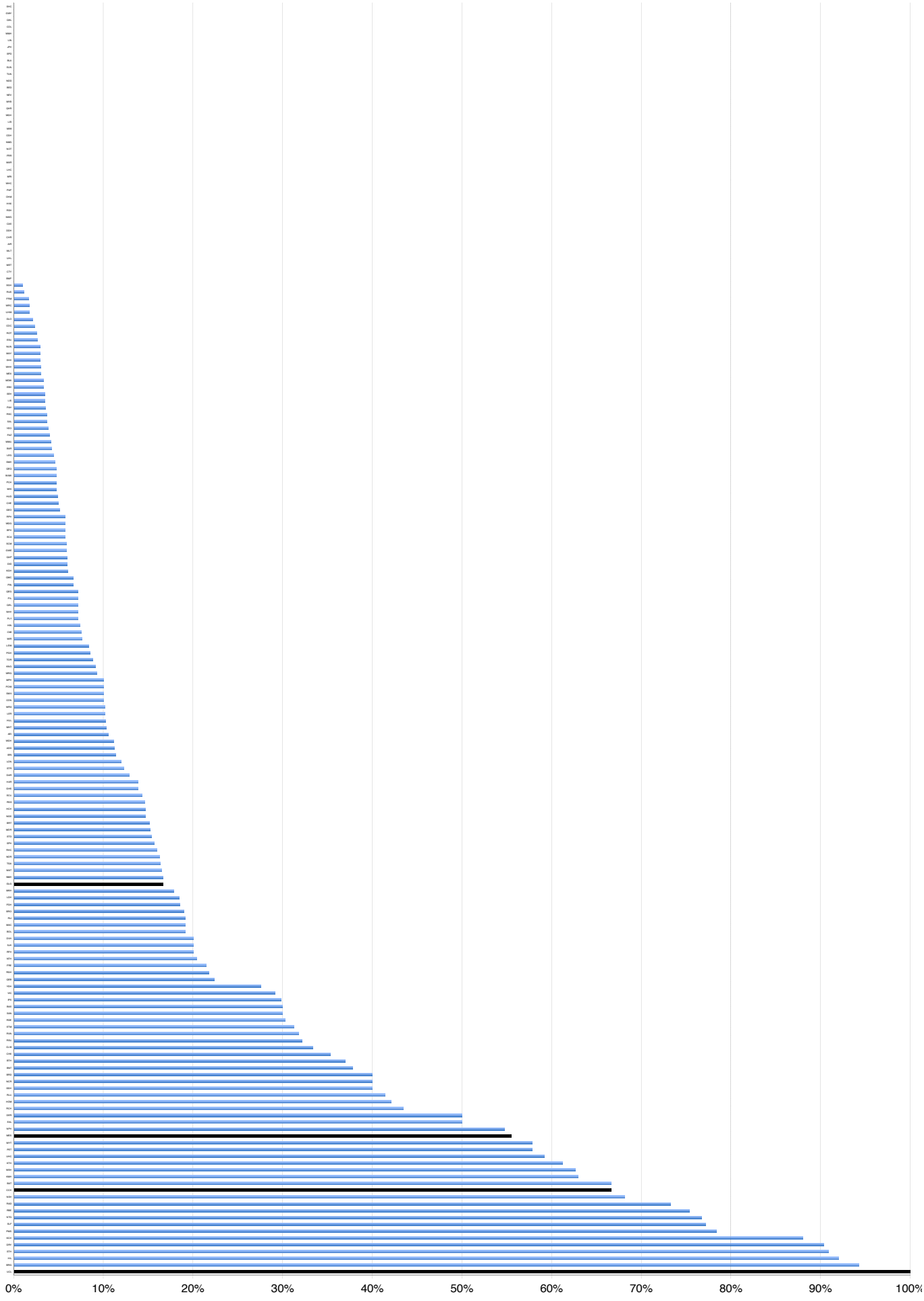


Figure 66

Median postoperative length of stay (days) of patients surviving to hospital discharge. Black bars indicate hospitals with fewer than ten cases in this analysis.

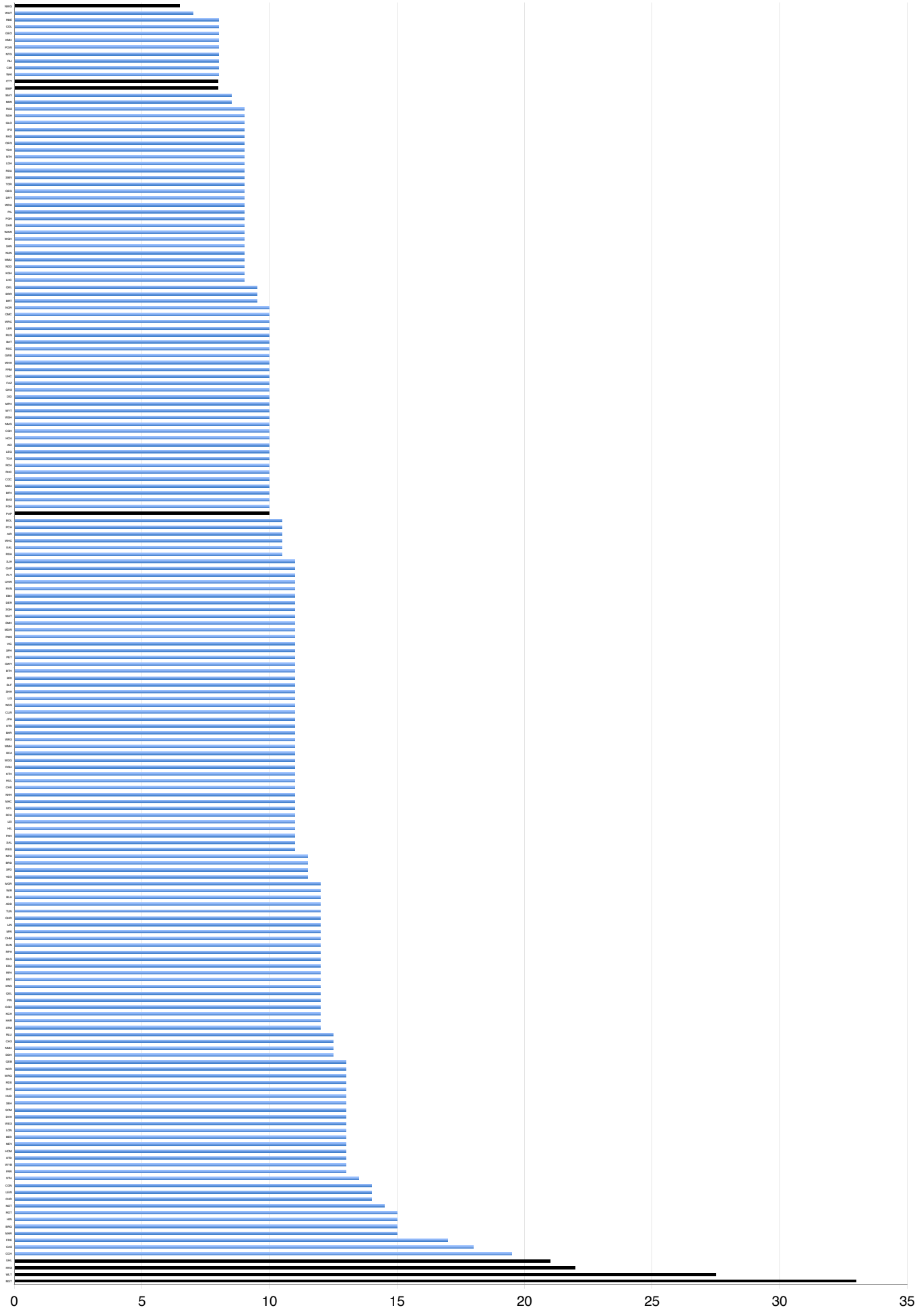


Figure 67

Proportion of patients that returned to theatre following an initial emergency laparotomy. Black bars indicate hospitals with fewer than ten cases in this analysis

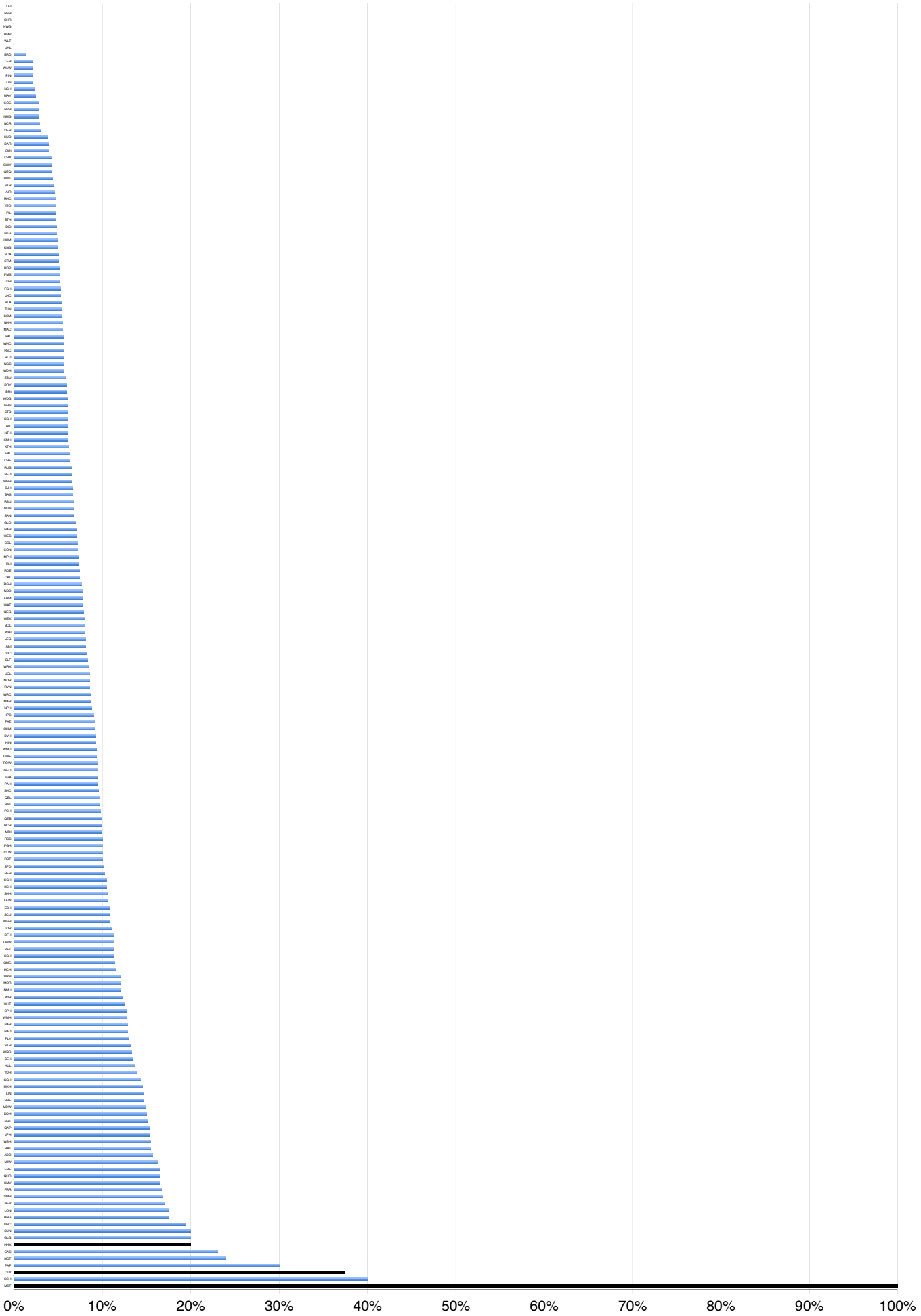


Figure 68
Proportion of patients that had an unplanned admission to critical care from the ward within seven days of their emergency laparotomy across all hospitals. Black bars indicate hospitals with fewer than ten cases in this analysis.
(*University Hospital Coventry (UHC) excluded due to concerns over data quality)

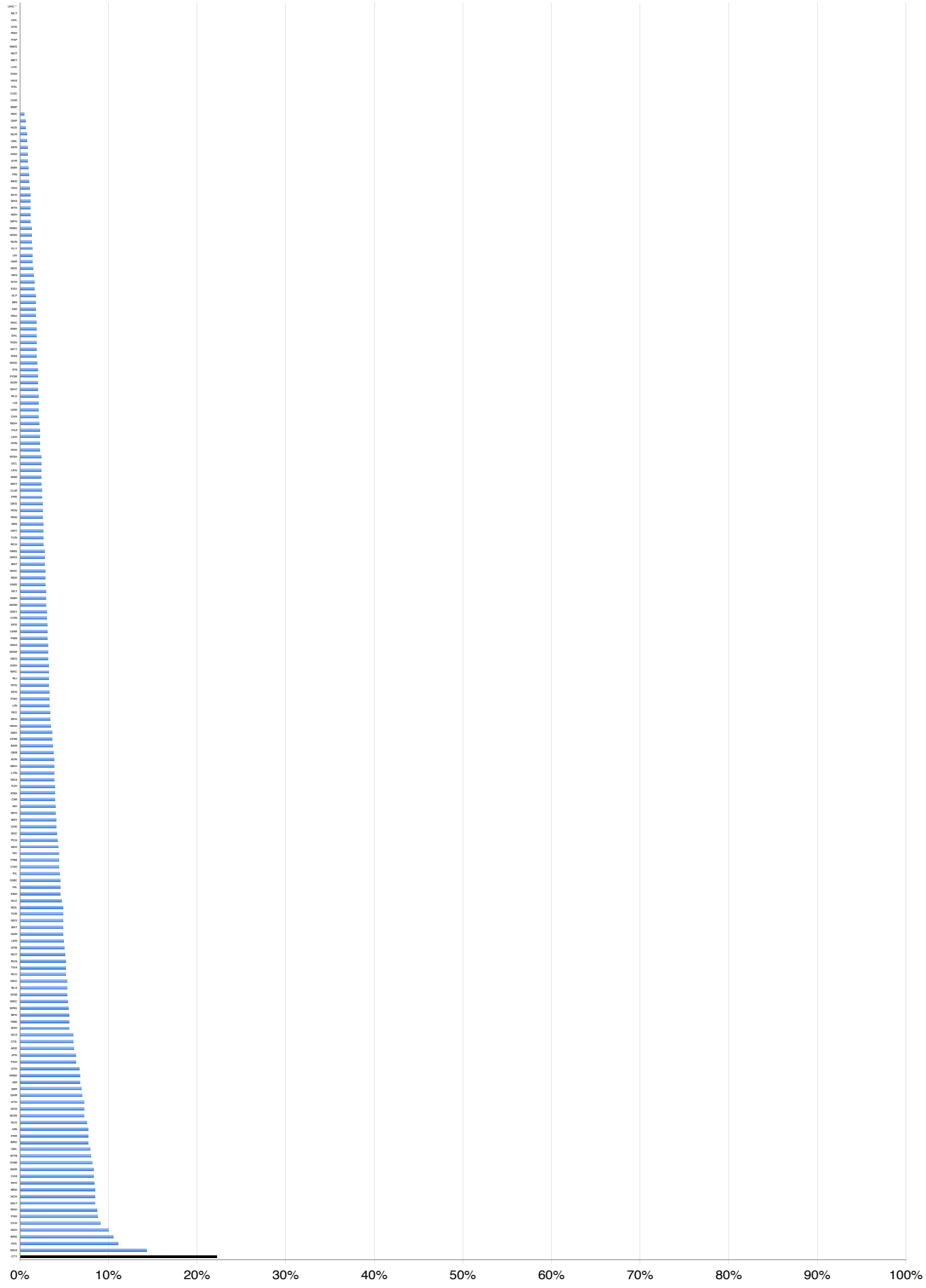


Figure 69

Percentage case ascertainment at English hospitals, relative to HES algorithm estimates of annual volume of emergency laparotomies performed

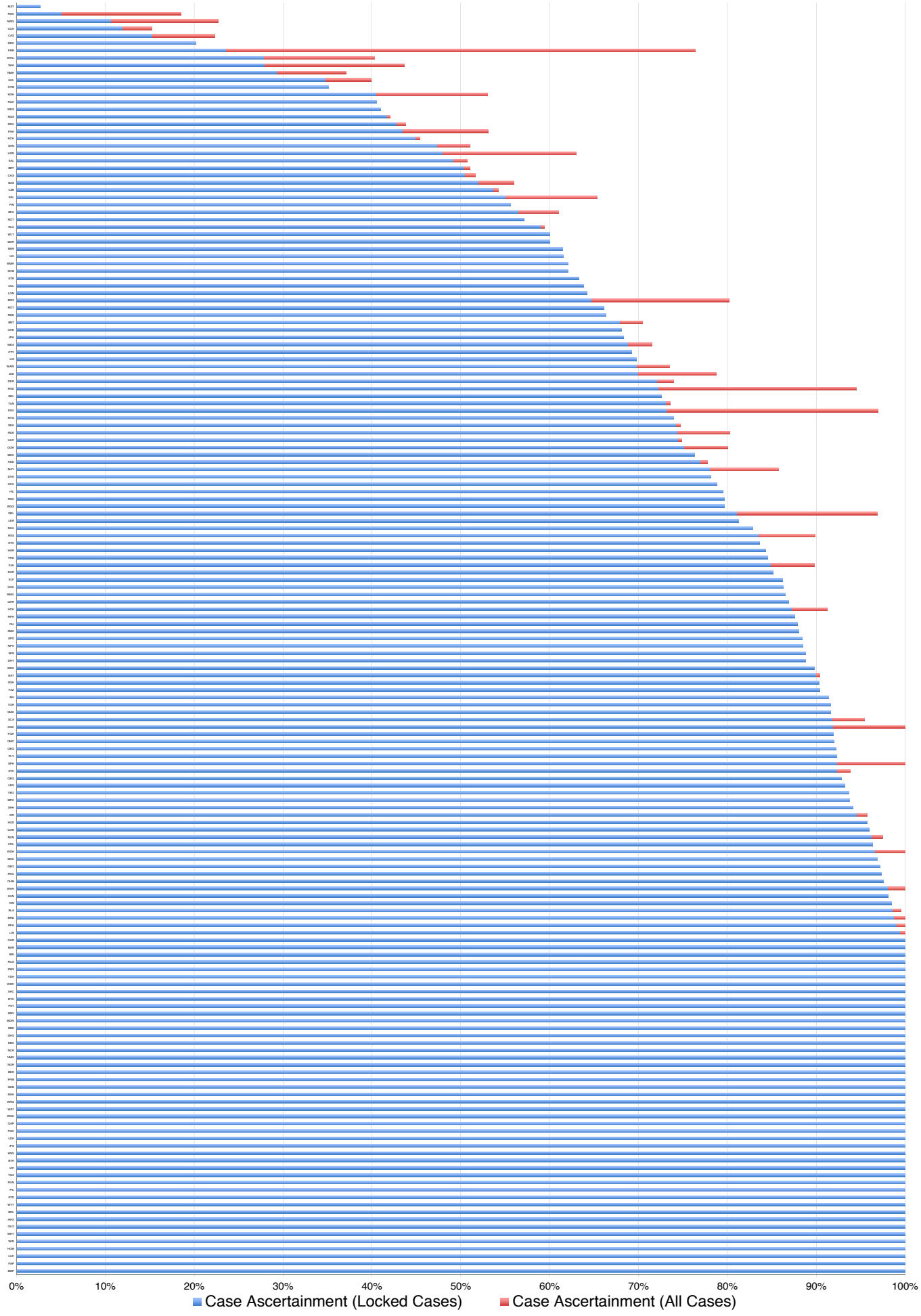


Figure 70

Proportion of included cases in each hospital where the time of decision to operate (or the time of booking for theatre) was not entered. Black bars indicate hospitals with fewer than ten cases in this analysis

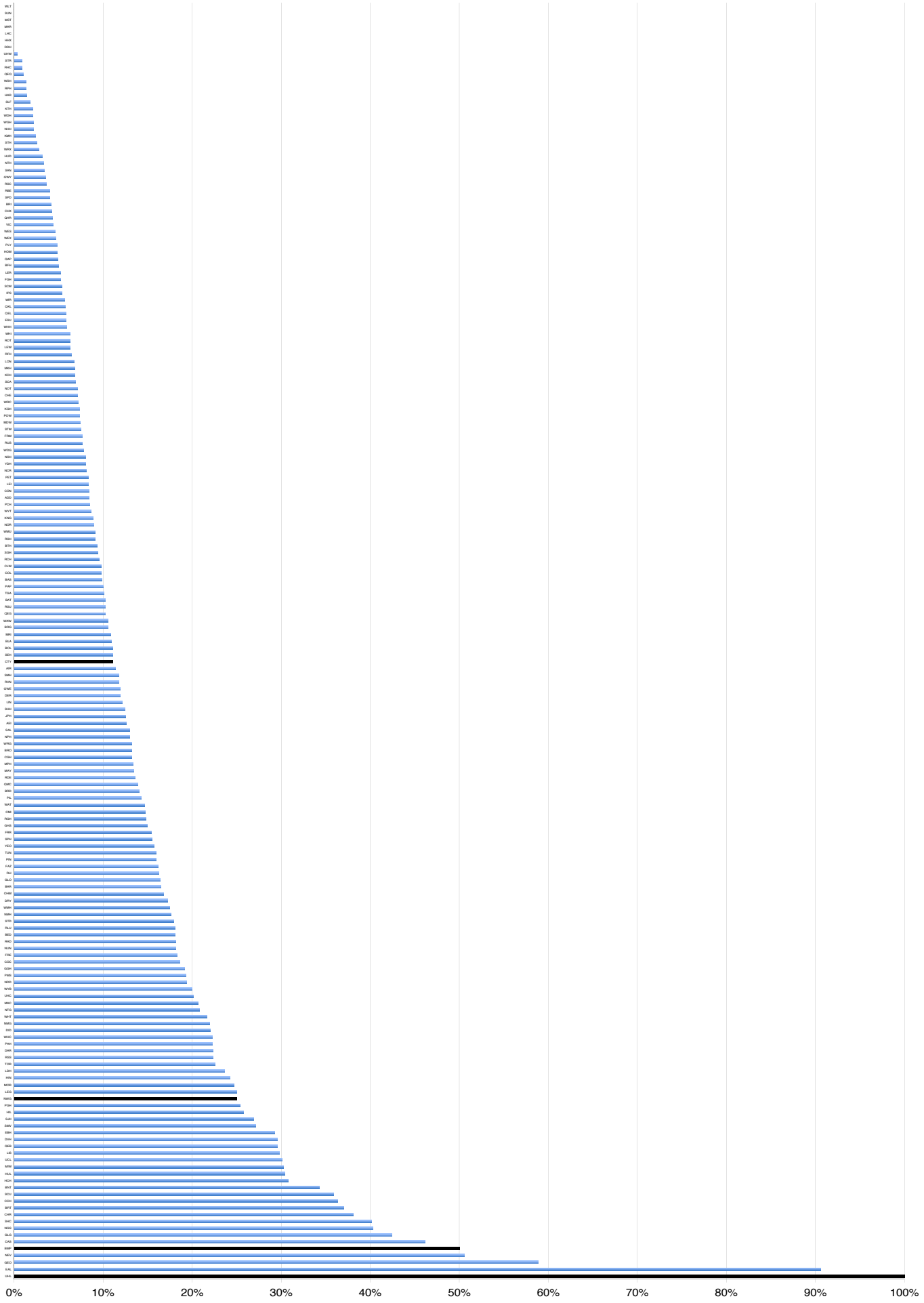


Figure 71

Proportion of submitted cases in each hospital with missing preoperative and postoperative P-POSSUM fields. Black bars indicate hospitals with fewer than ten cases in this analysis

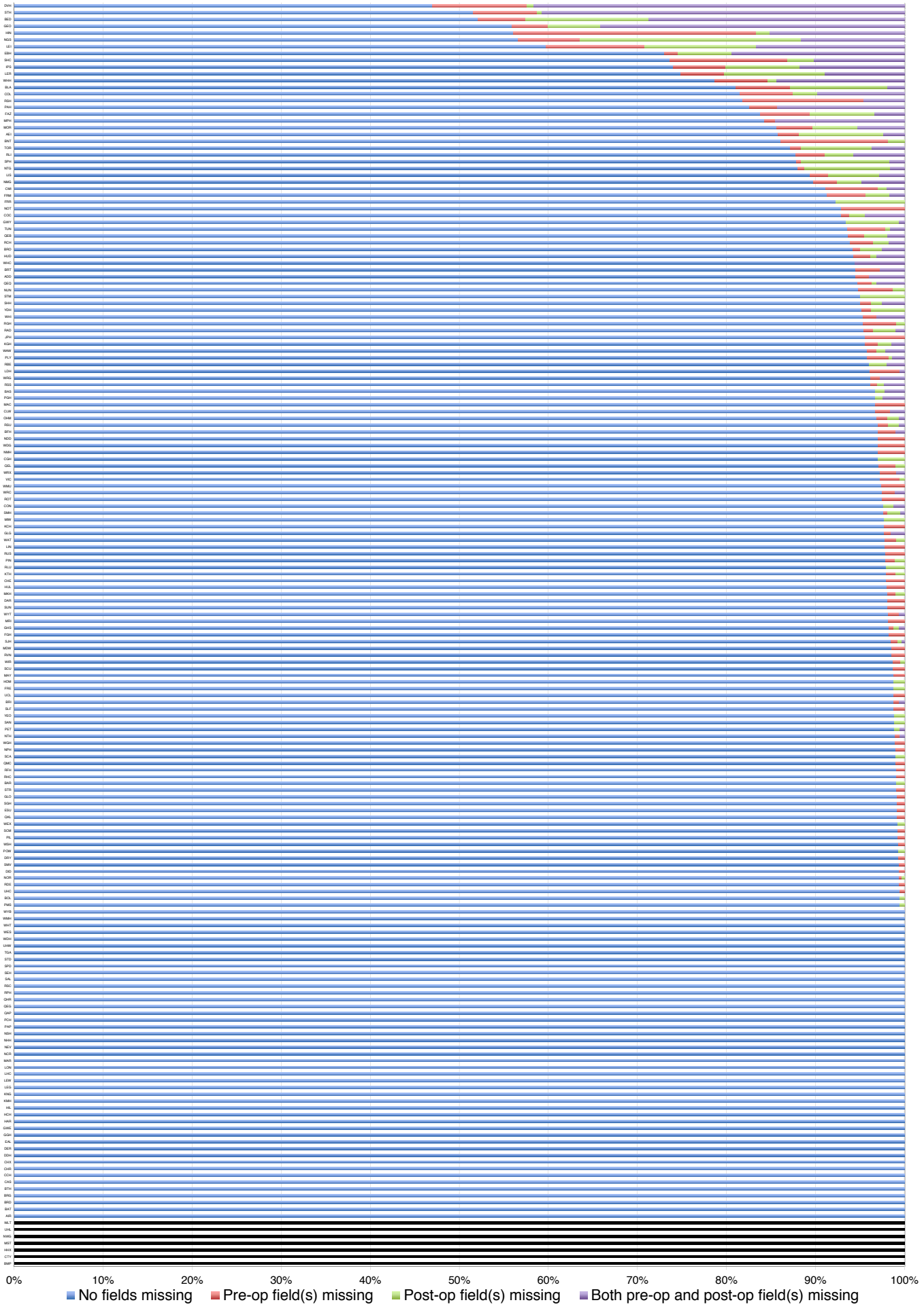


Figure 72
Achievement of key process measures in each hospital
Hospital size: 1=smallest quartile, 4 =largest

Region	Hospital Code	Health Boards	Hospital Name	Adjusted mortality rate (%)	99.8% upper limit (%)	99.8% lower limit (%)		Total number of cases in Year 3	Final Case Ascertainment	CT reported before surgery	Risk documented preoperatively	Arrival in theatre in timescale appropriate to urgency	Preoperative review by a consultant surgeon and anaesthetist when risk of death >=5%	Consultant surgeon and anaesthetist present in theatre when risk of death >=5%	Consultant surgeon present in theatre when risk of death >=5%	Consultant anaesthetist present in theatre when risk of death >=5%	Admitted to critical care post op when risk of death >10%	Assessment by eldery medicine specialist in patients > 70 years	Median post-op length of stay in patients surviving to hospital discharge (days)	Proportion returning to theatre after emergency laparotomy (%)	Proportion with unexpected critical care admission from the ward < 7 days post op (%)	Quartile (based on total number of hospital beds)
London - North Central	BNT	Royal Free London NHS Foundation Trust	Barnet Hospital	12.5	21.2	2.1		108											13.0	10.3	2.8	1
London - North Central	NMH	North Middlesex University Hospital NHS Trust	North Middlesex University Hospital	15.8	31.5	0.0		34											13.0	11.8	2.9	3
London - North Central	RFH	Royal Free London NHS Foundation Trust	Royal Free Hospital	8.3	21.2	2.1		108											12.0	10.3	8.4	2
London - North Central	UCL	University College London Hospitals NHS Foundation Trust	University College Hospital	11.5	22.8	1.2		83											11.0	8.5	2.4	3
London - North Central	WHT	Whittington Health	Whittington Hospital	10.0	21.8	1.7		97											8.0	13.4	2.1	1
London - North East	HOM	Homerton University Hospital NHS Foundation Trust	Homerton Hospital	4.4	23.0	1.1		82											12.5	4.9	3.7	2
London - North East	KNG	Barking Havering & Redbridge Univ Hosps NHS Trust	King George Hospital	14.9	21.6	1.9		101											13.0	5.0	4.0	1
London - North East	LON	Barts Health NHS Trust	The Royal London Hospital	7.3	21.4	2.0		104											15.0	17.5	3.9	3
London - North East	NWG	Barts Health NHS Trust	Newham University Hospital	0.0	61.5	0.0		8														2
London - North East	QHR	Barking Havering & Redbridge Univ Hosps NHS Trust	Queen's Hospital - Romford	13.7	18.4	4.0		186											13.0	16.7	7.0	4
London - North East	WHC	Barts Health NHS Trust	Whipps Cross University Hospital	4.2	30.4	0.0		36											10.0	5.6	2.9	2
London - North West	EAL	London North West Healthcare NHS Trust	Ealing Hospital	10.2	32.1	0.0		32											10.5	6.3	0.0	1
London - North West	HHX	Royal Brompton & Harefield NHS Foundation Trust	Harefield Hospital	13.6	79.1	0.0		5														n/a
London - North West	HIL	The Hillingdon Hospitals NHS Foundation Trust	Hillingdon Hospital	10.7	24.6	0.1		66											11.0	6.1	4.5	2
London - North West	NPH	London North West Healthcare NHS Trust	Northwick Park/St Marks Hospital	8.9	18.1	4.2		200											12.0	9.5	5.5	4
London - North West	STM	Imperial College Healthcare NHS Trust	St Mary's Hospital	12.0	29.5	0.0		40											11.0	5.0	5.0	1
London - North West	WMU	Chelsea and Westminster Hosp NHS Foundation Trust	West Middlesex University Hospital	7.5	23.4	0.6		77											10.0	10.7	1.3	1
London - South East	BRO	King's College Hospital NHS Foundation Trust	The Princess Royal University Hospital	9.6	20.5	2.6		121											10.0	5.1	7.7	2
London - South East	KCH	King's College Hospital NHS Foundation Trust	King's College Hospital	5.3	22.5	1.3		88											12.0	10.3	1.1	4
London - South East	LEW	Lewisham and Greenwich NHS Trust	University Hospital Lewisham	12.6	27.4	0.0		48											14.0	10.4	2.1	2
London - South East	QEL	Lewisham and Greenwich NHS Trust	Queen Elizabeth Hospital (Lewisham and Greenwich NHS Trust)	14.6	21.4	2.0		103											12.0	9.7	7.9	2
London - South East	STH	Guy's and St Thomas' NHS Foundation Trust	St Thomas' Hospital	8.2	18.2	4.1		194											14.0	13.5	6.7	3
London - South West	BMP	Royal Brompton & Harefield NHS Foundation Trust	Royal Brompton Hospital	15.6	73.1	0.0		6														n/a
London - South West	CHX	Imperial College Healthcare NHS Trust	Charing Cross	17.2	27.6	0.0		47											11.5	4.3	2.1	3
London - South West	GEO	St George's Healthcare NHS Trust	St George's Hospital	10.1	18.8	3.7		170											9.0	9.4	5.3	4
London - South West	KTH	Kingston Hospital NHS Trust	Kingston Hospital	8.7	21.8	1.7		97											11.0	6.2	7.2	3
London - South West	MAR	The Royal Marsden NHS Foundation Trust	Royal Marsden Hospital	8.6	36.4	0.0		24											14.0	8.3	8.3	n/a
London - South West	MAY	Croydon Health Services NHS Trust	Croydon University Hospital	12.6	23.0	1.1		82											9.0	2.4	2.4	2
London - South West	SHC	Epsom and St Helier University Hospitals NHS Trust	St Helier Hospital	10.0	18.9	3.7		167											13.0	9.6	4.2	1
London - South West	WES	Chelsea and Westminster Hosp NHS Foundation Trust	Chelsea and Westminster Hospital	13.8	28.7	0.0		43											11.0	7.1	14.3	2

Region	Hospital Code	Health Boards	Hospital Name	Adjusted mortality rate (%)	99.8% upper limit (%)	99.8% lower limit (%)		Total number of cases in Year 3	Final Case Ascertainment	CT reported before surgery	Risk documented preoperatively	Arrival in theatre in timescale appropriate to urgency	Preoperative review by a consultant surgeon and anaesthetist when risk of death >=5%	Consultant surgeon and anaesthetist present in theatre when risk of death >=5%	Consultant surgeon present in theatre when risk of death >=5%	Consultant anaesthetist present in theatre when risk of death >=5%	Admitted to critical care post op when risk of death >10%	Assessment by eldery medicine specialist in patients > 70 years	Median post-op length of stay in patients surviving to hospital discharge (days)	Proportion returning to theatre after emergency laparotomy (%)	Proportion with unexpected critical care admission from the ward < 7 days post op (%)	Quartile (based on total number of hospital beds)
Central - East Midlands	CHE	Chesterfield Royal Hospital NHS Foundation Trust	Chesterfield Royal Hospital	13.5	21.8	1.7		98											12.0	6.3	4.1	3
Central - East Midlands	DER	Derby Hospitals NHS Foundation Trust	Royal Derby Hospital	9.2	17.4	4.7		235											11.0	3.0	0.9	4
Central - East Midlands	KGH	Kettering General Hospital NHS Foundation Trust	Kettering General Hospital	7.4	24.4	0.2		68											9.0	5.9	0.0	3
Central - East Midlands	KMH	Sherwood Forest Hospitals NHS Foundation Trust	Kings Mill Hospital	11.4	19.0	3.6		164											8.0	6.1	1.8	3
Central - East Midlands	LEI	University Hospitals of Leicester NHS Trust	Leicester General Hospital	7.5	23.9	0.4		72											11.0	0.0	1.4	1
Central - East Midlands	LER	University Hospitals of Leicester NHS Trust	Leicester Royal Infirmary	9.4	17.3	4.8		247											10.0	2.2	4.9	4
Central - East Midlands	LIN	United Lincolnshire Hospitals NHS Trust	Lincoln County Hospital	12.7	18.5	3.9		181											14.0	14.4	3.3	3
Central - East Midlands	NOT	Nottingham University Hospitals NHS Trust	Nottingham City Hospital	8.9	34.1	0.0		28											18.5	22.2	0.0	n/a
Central - East Midlands	NTH	Northampton General Hospital NHS Trust	Northampton General Hospital	12.5	18.5	3.9		183											9.0	6.0	1.6	3
Central - East Midlands	NUN	George Eliot Hospital NHS Trust	George Eliot Hospital	16.9	23.4	0.6		77											11.0	6.8	1.4	1
Central - East Midlands	PIL	United Lincolnshire Hospitals NHS Trust	Pilgrim Hospital	12.1	20.0	2.9		133											9.0	4.5	4.5	1
Central - East Midlands	QMC	Nottingham University Hospitals NHS Trust	Queens Medical Centre - Nottingham	12.2	16.5	5.4		310											11.0	11.7	4.5	4
Central - East of England	ADD	Cambridge University Hosps NHS Foundation Trust	Addenbrookes Hospital	7.9	18.1	4.2		201											12.0	15.5	6.1	4
Central - East of England	BAS	Basildon and Thurrock University Hospitals NHS Foundation Trust	Basildon University Hospital	12.6	22.3	1.4		91											12.5	6.7	1.1	3
Central - East of England	BED	Bedford Hospital NHS Trust	Bedford Hospital	13.9	22.1	1.5		94											14.5	7.4	1.1	1
Central - East of England	BFH	Mid Essex Hospital Services NHS Trust	Broomfield Hospital	8.9	21.7	1.9		100											10.0	11.1	4.0	3
Central - East of England	COL	Colchester Hospital University NHS Foundation Trust	Colchester General Hospital	14.4	18.4	3.9		184											9.0	7.1	6.0	3
Central - East of England	HIN	Hinchingbrooke Health Care NHS Trust	Hinchingbrooke Hospital	9.9	24.6	0.1		66											15.0	9.4	7.7	1
Central - East of England	IPS	Ipswich Hospital NHS Trust	Ipswich Hospital	9.1	18.0	4.3		204											10.0	9.5	2.0	3
Central - East of England	JPH	James Paget University Hosps NHS Foundation Trust	James Paget University Hospital	11.9	21.0	2.2		112											11.5	15.5	6.3	2
Central - East of England	LDH	Luton and Dunstable Hospital NHS Foundation Trust	Luton & Dunstable Hospital	14.7	18.6	3.9		178											9.0	5.1	2.3	3
Central - East of England	LIS	East and North Hertfordshire NHS Trust	Lister Hospital	14.5	19.7	3.1		141											11.0	2.1	2.1	3
Central - East of England	NOR	Norfolk and Norwich University Hospitals NHS Foundation Trust	Norfolk and Norwich University Hospital	9.4	16.2	5.7		345											10.0	8.7	2.0	4
Central - East of England	PAH	The Princess Alexandra Hospital NHS Trust	Princess Alexandra Hospital	12.8	25.2	0.0		63											12.0	9.5	6.3	3
Central - East of England	PAP	Papworth Hospital NHS Foundation Trust	Papworth Hospital	13.6	55.9	0.0		10												30.0		n/a
Central - East of England	PET	Peterborough & Stamford Hosps NHS Foundation Trust	Peterborough City Hospital	13.3	18.6	3.9		180											11.0	11.6	2.9	3
Central - East of England	QKL	The Queen Elizabeth Hospital King's Lynn NHS Foundation Trust	The Queen Elizabeth Hospital - King's Lynn	9.6	20.4	2.6		122											10.0	7.4	0.8	2
Central - East of England	SEH	Southend University Hospital NHS Foundation Trust	Southend University Hospital	13.0	19.6	3.1		144											15.0	13.6	4.3	3
Central - East of England	WAT	West Hertfordshire Hospitals NHS Trust	Watford General Hospital	10.1	17.6	4.6		225											11.0	9.4	8.5	3
Central - East of England	WSH	West Suffolk NHS Foundation Trust	West Suffolk Hospital	7.5	19.4	3.3		149											11.0	15.4	1.3	2
Central - West Midlands	BRT	Burton Hospitals NHS Foundation Trust	Queen's Hospital - Burton	11.3	23.9	0.4		73											10.0	15.1	4.1	2
Central - West Midlands	CTY	Sandwell & West Birmingham Hospitals NHS Trust	City Hospital	23.1	57.2	0.0		9														n/a
Central - West Midlands	EBH	Heart of England NHS Foundation Trust	Birmingham Heartlands Hospital	11.2	17.1	5.0		263											11.0	11.1	4.6	3
Central - West Midlands	GHS	Heart of England NHS Foundation Trust	Good Hope Hospital	12.9	18.9	3.7		167											10.0	6.0	7.2	2
Central - West Midlands	HCH	Wye Valley NHS Trust	Hereford County Hospital	10.3	20.1	2.8		130											11.0	11.5	8.5	1
Central - West Midlands	NCR	The Royal Wolverhampton Hospitals NHS Trust	New Cross Hospital	10.6	17.3	4.8		246											13.0	2.9	0.8	4
Central - West Midlands	QEB	University Hosp Birmingham NHS Foundation Trust	Queen Elizabeth Hospital Birmingham	9.2	17.0	5.0		267											14.0	9.8	3.8	4
Central - West Midlands	RSH	University Hospitals of North Midlands NHS Trust	Royal Stoke University Hospital	19.0	37.6	0.0		22											12.0	0.0	0.0	4
Central - West Midlands	RSS	The Shrewsbury and Telford Hospital NHS Trust	Royal Shrewsbury Hospital	12.6	17.0	5.0		264											9.0	9.9	1.9	3
Central - West Midlands	RUS	The Dudley Group NHS Foundation Trust	Russells Hall Hospital	10.5	17.5	4.7		234											10.0	6.4	5.2	4
Central - West Midlands	SAN	Sandwell & West Birmingham Hospitals NHS Trust	Sandwell General Hospital	15.0	22.4	1.3		89											9.0	6.8	2.3	1
Central - West Midlands	UHC	University Hospitals Coventry & Warwickshire NHS Trust	University Hospital, Coventry	9.1	18.4	3.9		184											10.0	19.0		4
Central - West Midlands	WAW	South Warwickshire NHS Foundation Trust	Warwick Hospital	4.2	22.0	1.5		95											9.5	2.1	3.2	2
Central - West Midlands	WMH	Walsall Healthcare NHS Trust	Walsall Manor Hospital	9.6	21.4	2.0		103											14.0	12.6	6.8	2
Central - West Midlands	WRC	Worcestershire Acute Hospitals NHS Trust	Worcestershire Royal Hospital	9.7	16.9	5.1		278											11.0	8.7	5.4	2

Region	Hospital Code	Health Boards	Hospital Name	Adjusted mortality rate (%)	99.8% upper limit (%)	99.8% lower limit (%)		Total number of cases in Year 3	Final Case Ascertainment	CT reported before surgery	Risk documented preoperatively	Arrival in theatre in timescale appropriate to urgency	Preoperative review by a consultant surgeon and anaesthetist when risk of death >=5%	Consultant surgeon and anaesthetist present in theatre when risk of death >=5%	Consultant surgeon present in theatre when risk of death >=5%	Consultant anaesthetist present in theatre when risk of death >=5%	Admitted to critical care post op when risk of death >10%	Assessment by eldery medicine specialist in patients > 70 years	Median post-op length of stay in patients surviving to hospital discharge (days)	Proportion returning to theatre after emergency laparotomy (%)	Proportion with unexpected critical care admission from the ward < 7 days post op (%)	Quartile (based on total number of hospital beds)
North - North East	DAR	County Durham & Darlington NHS Foundation Trust	Darlington Memorial Hospital	13.5	21.4	2.0		103											9.5	3.9	4.9	1
North - North East	DRY	County Durham & Darlington NHS Foundation Trust	University Hospital North Durham	8.1	19.4	3.4		151											10.0	6.0	2.6	2
North - North East	FRE	The Newcastle upon Tyne Hospitals NHS Foundation Trust	Freeman Hospital	8.5	23.0	1.1		82											21.0	16.0	2.5	n/a
North - North East	NSH	Northumbria Healthcare NHS Foundation Trust	Northumbria Specialist Emergency Care Hospital	12.1	17.1	5.0		262											9.0	3.5	1.2	1
North - North East	NTG	North Tees & Hartlepool NHS Foundation Trust	University Hospital of North Tees	12.6	20.4	2.6		125											8.0	4.9	3.3	3
North - North East	QEG	Gateshead Health NHS Foundation Trust	Queen Elizabeth Hospital - Gateshead	11.4	19.2	3.4		156											10.0	7.7	2.6	3
North - North East	RVN	The Newcastle upon Tyne Hospitals NHS Foundation Trust	Royal Victoria Infirmary	7.8	16.9	5.1		272											11.0	8.5	2.6	4
North - North East	SCM	South Tees Hospitals NHS Foundation Trust	The James Cook University Hospital	9.2	20.1	2.8		131											14.0	5.4	5.3	4
North - North East	STD	South Tyneside NHS Foundation Trust	South Tyneside District Hospital	11.4	24.6	0.2		67											13.0	6.0	0.0	1
North - North East	SUN	City Hospitals Sunderland NHS Foundation Trust	Sunderland Royal Hospital	11.5	19.2	3.4		157											12.5	20.0	3.9	4
North - North West	AEI	Wrightington, Wigan & Leigh NHS Foundation Trust	Royal Albert Edward Infirmary	13.6	20.3	2.7		127											10.0	8.0	4.0	1
North - North West	BLA	East Lancashire Hospitals NHS Trust	Royal Blackburn Hospital	9.7	17.9	4.4		211											14.0	5.3	5.3	3
North - North West	BOL	Bolton NHS Foundation Trust	Royal Bolton Hospital	9.4	18.3	4.1		190											12.0	8.1	4.8	3
North - North West	CHR	The Christie NHS Foundation Trust	The Christie	24.2	38.0	0.0		21											14.0	0.0	0.0	n/a
North - North West	CMI	North Cumbria University Hospitals NHS Trust	Cumberland Infirmary	16.1	21.5	2.0		102											8.0	4.0	4.0	1
North - North West	COC	Countess of Chester Hospital NHS Foundation Trust	Countess of Chester Hospital	7.4	20.9	2.2		113											11.0	2.7	0.0	3
North - North West	FAZ	Aintree University Hospitals NHS Foundation Trust	Aintree University Hospital	11.6	18.6	3.9		179											10.0	9.0	2.2	4
North - North West	FGH	University Hospitals of Morecambe Bay NHS Foundation Trust	Furness General Hospital	9.7	25.9	0.0		57											10.0	5.3	8.8	1
North - North West	LEG	Mid Cheshire Hospitals NHS Foundation Trust	Leighton Hospital	14.4	20.4	2.6		124											10.0	8.1	2.4	3
North - North West	LHC	Liverpool Heart & Chest Hospital NHS Foundation Trust	Liverpool Heart and Chest Hospital	12.1	40.5	0.0		19											13.5	5.6	0.0	n/a
North - North West	MAC	East Cheshire NHS Trust	Macclesfield District General Hospital	14.1	22.2	1.4		92											11.0	5.4	3.3	1
North - North West	MRI	Central Manchester University Hospitals NHS Foundation Trust	Manchester Royal Infirmary	9.6	18.9	3.7		166											13.0	9.9	2.6	4
North - North West	NMG	The Pennine Acute Hospitals NHS Trust	North Manchester General Hospital	10.3	19.6	3.2		146											11.0	2.8	2.8	2
North - North West	OHM	The Pennine Acute Hospitals NHS Trust	The Royal Oldham Hospital	6.1	19.1	3.5		161											12.0	8.8	8.2	2
North - North West	RLI	University Hospitals of Morecambe Bay NHS Foundation Trust	Royal Lancaster Infirmary	13.0	20.4	2.6		123											8.0	7.3	3.3	1
North - North West	RLU	Royal Liverpool and Broadgreen Univ Hospitals NHS Trust	Royal Liverpool University Hospital	11.1	19.6	3.1		144											13.0	5.6	2.1	4
North - North West	RPH	Lancashire Teaching Hospitals NHS Foundation Trust	Royal Preston Hospital	7.3	19.5	3.3		148											12.0	2.7	3.4	4
North - North West	SHH	Stockport NHS Foundation Trust	Stepping Hill Hospital	11.1	19.1	3.5		161											11.0	10.6	5.6	4
North - North West	SLF	Salford Royal NHS Foundation Trust	Salford Royal Hospital	7.4	18.8	3.7		169											11.0	8.3	1.8	4
North - North West	SPD	Southport & Ormskirk Hospital NHS Trust	Southport District General Hospital	14.9	21.8	1.8		99											11.5	10.2	3.1	1
North - North West	TGA	Tameside Hospital NHS Foundation Trust	Tameside General Hospital	9.5	20.6	2.5		119											10.0	10.3	5.2	2
North - North West	VIC	Blackpool Teaching Hospitals NHS Foundation Trust	Blackpool Victoria Hospital	13.7	18.5	3.9		183											12.0	8.2	4.4	4
North - North West	WDG	Warrington & Halton Hospitals NHS Foundation Trust	Warrington Hospital	18.2	21.5	2.0		102											12.0	5.9	2.0	2
North - North West	WHI	St Helens & Knowsley Teaching Hospitals NHS Trust	Whiston Hospital	22.1	24.8	0.1		64											9.0	9.5	1.6	4
North - North West	WIR	Wirral University Teaching Hospital NHS Foundation Trust	Arrowe Park Hospital	9.4	17.6	4.6		230											12.0	12.3	7.0	4
North - North West	WLT	The Walton Centre NHS Foundation Trust	The Walton Centre	0.0		0.0		3														n/a
North - North West	WYT	University Hospital of South Manchester NHS Foundation Trust	Wythenshawe Hospital	9.2	19.0	3.6		162											10.5	4.3	1.9	4

Region	Hospital Code	Health Boards	Hospital Name	Adjusted mortality rate (%)	99.8% upper limit (%)	99.8% lower limit (%)		Total number of cases in Year 3	Final Case Ascertainment	CT reported before surgery	Risk documented preoperatively	Arrival in theatre in timescale appropriate to urgency	Preoperative review by a consultant surgeon and anaesthetist when risk of death >=5%	Consultant surgeon and anaesthetist present in theatre when risk of death >=5%	Consultant surgeon present in theatre when risk of death >=5%	Consultant anaesthetist present in theatre when risk of death >=5%	Admitted to critical care post op when risk of death >10%	Assessment by eldery medicine specialist in patients > 70 years	Median post-op length of stay in patients surviving to hospital discharge (days)	Proportion returning to theatre after emergency laparotomy (%)	Proportion with unexpected critical care admission from the ward < 7 days post op (%)	Quartile (based on total number of hospital beds)
North - Yorkshire and Humber	AIR	Airedale NHS Foundation Trust	Airedale General Hospital	8.3	22.5	1.3		88											11.0	4.5	6.8	1
North - Yorkshire and Humber	BAR	Barnsley Hospital NHS Foundation Trust	Barnsley Hospital	11.1	21.1	2.1		109											12.0	12.8	3.7	1
North - Yorkshire and Humber	BRD	Bradford Teaching Hospitals NHS Foundation Trust	Bradford Royal Infirmary	12.8	19.2	3.4		157											13.0	1.3	8.4	3
North - Yorkshire and Humber	CAS	Hull and East Yorkshire Hospitals NHS Trust	Castle Hill Hospital	0.0	47.9	0.0		13											18.0	25.0	8.3	n/a
North - Yorkshire and Humber	DDH	The Mid Yorkshire Hospitals NHS Trust	Dewsbury and District Hospital	9.0	39.3	0.0		20											12.0	15.0	10.0	n/a
North - Yorkshire and Humber	DID	Doncaster and Bassetlaw Hosps NHS Foundation Trust	Doncaster Royal Infirmary	9.8	18.9	3.7		168											11.0	4.8	1.8	2
North - Yorkshire and Humber	FRR	South Tees Hospitals NHS Foundation Trust	Friarage Hospital	11.6	47.9	0.0		13											17.0	15.4	7.7	1
North - Yorkshire and Humber	GGH	Northern Lincolnshire and Goole Hospitals NHS Foundation Trust	Diana Princess of Wales Hospital	9.3	22.1	1.5		94											13.0	14.9	3.2	1
North - Yorkshire and Humber	HAR	Harrogate and District NHS Foundation Trust	Harrogate District Hospital	13.5	24.1	0.3		70											13.0	7.1	1.4	1
North - Yorkshire and Humber	HUD	Calderdale & Huddersfield NHS Foundation Trust	Huddersfield Royal Infirmary	9.8	19.2	3.4		158											13.5	3.9	0.7	3
North - Yorkshire and Humber	HUL	Hull and East Yorkshire Hospitals NHS Trust	Hull Royal Infirmary	9.7	21.5	2.0		102											11.0	14.1	11.1	4
North - Yorkshire and Humber	NGS	Sheffield Teaching Hospitals NHS Foundation Trust	Northern General Hospital	12.5	20.1	2.7		129											12.5	5.5	3.9	4
North - Yorkshire and Humber	PIN	The Mid Yorkshire Hospitals NHS Trust	Pinderfields Hospital	12.8	22.1	1.5		94											12.0	2.2	1.1	4
North - Yorkshire and Humber	ROT	The Rotherham NHS Foundation Trust	Rotherham Hospital	13.4	23.2	0.9		80											15.0	10.1	5.1	2
North - Yorkshire and Humber	SCA	York Teaching Hospital NHS Foundation Trust	Scarborough Hospital	9.2	21.6	1.9		101											12.0	5.0	6.0	1
North - Yorkshire and Humber	SCU	Northern Lincolnshire and Goole Hospitals NHS Foundation Trust	Scunthorpe General Hospital	11.8	23.3	0.7		78											11.0	10.4	5.2	1
North - Yorkshire and Humber	SJH	The Leeds Teaching Hospitals NHS Trust	St James's University Hospital	9.0	15.9	5.9		383											11.0	6.9	4.0	4
North - Yorkshire and Humber	YDH	York Teaching Hospital NHS Foundation Trust	York Hospital	8.3	18.4	4.0		186											9.0	13.7	1.1	3
South - South Central	CCH	Oxford University Hospitals NHS Trust	Churchill Hospital	16.1	52.8	0.0		11												45.5	9.1	n/a
South - South Central	MIW	Isle of Wight NHS Trust	St Mary's Hospital - IOW	20.1	28.7	0.0		43											9.0	17.1	2.4	1
South - South Central	MKH	Milton Keynes Hospital NHS Foundation Trust	Milton Keynes Hospital	9.2	21.4	2.0		103											10.0	14.7	3.9	2
South - South Central	NHH	Hampshire Hospitals NHS Foundation Trust	Basingstoke & North Hampshire Hospital	9.0	22.2	1.4		92											11.0	5.4	8.7	2
South - South Central	QAP	Portsmouth Hospitals NHS Trust	Queen Alexandra Hospital	9.8	16.6	5.4		305											11.0	15.1	0.7	4
South - South Central	RAD	Oxford University Hospitals NHS Trust	John Radcliffe Hospital	11.5	18.1	4.2		198											9.0	12.8	2.6	4
South - South Central	RBE	Royal Berkshire NHS Foundation Trust	Royal Berkshire Hospital	11.6	18.1	4.2		200											8.0	14.7	5.6	4
South - South Central	RHC	Hampshire Hospitals NHS Foundation Trust	Royal Hampshire County Hospital	12.7	21.1	2.1		109											10.0	4.6	1.8	1
South - South Central	SGH	University Hospital Southampton NHS Foundation Trust	Southampton General Hospital	6.3	17.5	4.7		233											11.0	11.2	0.9	4
South - South Central	SMV	Buckinghamshire Healthcare NHS Trust	Stoke Mandeville Hospital	12.7	18.9	3.7		166											9.5	16.5	3.6	3
South - South Central	WEX	Frimley Health NHS Foundation Trust	Wexham Park Hospital	10.4	20.2	2.7		128											13.5	7.9	3.1	3
South - South East Coast	CON	East Sussex Healthcare NHS Trust	Conquest Hospital	10.2	18.9	3.7		167											14.0	7.2	3.0	4
South - South East Coast	DVH	Dartford & Gravesham NHS Trust	Darent Valley Hospital	14.9	20.1	2.9		132											14.0	9.3	2.3	2
South - South East Coast	ESU	Surrey & Sussex Healthcare NHS Trust	East Surrey Hospital	5.6	20.6	2.6		120											12.0	5.8	1.7	3
South - South East Coast	FRM	Frimley Health NHS Foundation Trust	Frimley Park Hospital	9.2	18.5	3.9		183											10.0	8.2	4.4	4
South - South East Coast	MDW	Medway NHS Foundation Trust	Medway Maritime Hospital	14.0	18.1	4.2		202											11.0	15.0	3.0	3
South - South East Coast	MST	Maidstone and Tunbridge Wells NHS Trust	Maidstone Hospital	0.0		0.0		1														n/a
South - South East Coast	QEQ	East Kent Hospitals University NHS Foundation Trust	Queen Elizabeth The Queen Mother Hospital	10.0	18.3	4.1		190											9.0	4.2	3.2	2
South - South East Coast	RSC	Brighton and Sussex University Hospitals NHS Trust	Royal Sussex County Hospital	8.4	17.7	4.5		219											11.0	5.5	0.5	2
South - South East Coast	RSU	Royal Surrey County Hospital NHS Foundation Trust	Royal Surrey County Hospital	9.9	18.9	3.7		166											9.5	6.6	1.8	2
South - South East Coast	SPH	Ashford & St Peter's Hospital NHS Foundation Trust	St Peter's Hospital	10.0	18.5	3.9		181											12.0	12.7	3.3	2
South - South East Coast	STR	Western Sussex Hospitals NHS Trust	St Richards Hospital	14.5	21.0	2.2		112											12.0	4.5	0.9	2
South - South East Coast	TUN	Maidstone and Tunbridge Wells NHS Trust	Tunbridge Wells Hospital	8.5	18.4	4.0		188											12.0	5.3	2.7	2
South - South East Coast	WHH	East Kent Hospitals University NHS Foundation Trust	William Harvey Hospital	11.5	18.1	4.2		202											10.0	6.5	3.5	2
South - South East Coast	WRG	Western Sussex Hospitals NHS Trust	Worthing Hospital	12.5	18.5	3.9		182											13.0	13.3	5.5	3

Region	Hospital Code	Health Boards	Hospital Name	Adjusted mortality rate (%)	99.8% upper limit (%)	99.8% lower limit (%)		Total number of cases in Year 3	Final Case Ascertainment	CT reported before surgery	Risk documented preoperatively	Arrival in theatre in timescale appropriate to urgency	Preoperative review by a consultant surgeon and anaesthetist when risk of death >=5%	Consultant surgeon and anaesthetist present in theatre when risk of death >=5%	Consultant surgeon present in theatre when risk of death >=5%	Consultant anaesthetist present in theatre when risk of death >=5%	Admitted to critical care post op when risk of death >10%	Assessment by eldery medicine specialist in patients > 70 years	Median post-op length of stay in patients surviving to hospital discharge (days)	Proportion returning to theatre after emergency laparotomy (%)	Proportion with unexpected critical care admission from the ward < 7 days post op (%)	Quartile (based on total number of hospital beds)
South - South West	BAT	Royal United Hospital Bath NHS Trust	Royal United Hospital	10.2	17.6	4.6		225											11.0	15.1	4.9	3
South - South West	BRI	University Hospitals of Bristol NHS Foundation Trust	Bristol Royal Infirmary	8.5	18.9	3.7		168											11.0	6.6	1.8	2
South - South West	BTH	The Royal Bournemouth and Christchurch Hosps NHS Foundation Trust	The Royal Bournemouth Hospital	7.2	18.8	3.7		171											11.0	4.7	1.2	4
South - South West	CGH	Gloucestershire Hospitals NHS Foundation Trust	Cheltenham Hospital	10.3	19.9	3.0		136											11.0	11.0	4.4	1
South - South West	GLO	Gloucestershire Hospitals NHS Foundation Trust	Gloucestershire Royal Hospital	7.8	17.5	4.6		232											9.0	6.9	4.7	3
South - South West	MPH	Taunton & Somerset NHS Foundation Trust	Musgrove Park Hospital	9.1	18.9	3.7		165											10.0	7.3	1.2	3
South - South West	NDD	Northern Devon Healthcare NHS Trust	North Devon District Hospital	7.0	24.6	0.2		67											9.0	7.5	1.5	1
South - South West	PGH	Poole Hospital NHS Foundation Trust	Poole Hospital	8.3	20.4	2.6		122											10.0	9.9	3.3	2
South - South West	PLY	Plymouth Hospitals NHS Trust	Derriford Hospital	6.7	16.7	5.2		288											11.0	13.2	1.4	4
South - South West	PMS	Great Western Hospitals NHS Foundation Trust	The Great Western Hospital	11.0	18.2	4.2		197											12.0	5.1	3.1	2
South - South West	RCH	Royal Cornwall Hospitals NHS Trust	Royal Cornwall Hospital	9.6	20.8	2.3		115											11.0	9.8	2.7	3
South - South West	RDE	Royal Devon & Exeter NHS Foundation Trust	Royal Devon & Exeter Hospital	8.4	18.6	3.8		177											13.0	7.5	2.9	4
South - South West	SAL	Salisbury NHS Foundation Trust	Salisbury District Hospital	6.7	26.3	0.0		54											11.0	5.6	1.9	2
South - South West	SMH	North Bristol NHS Trust	Southmead Hospital	10.5	17.8	4.4		213											12.0	16.5	0.9	4
South - South West	TOR	South Devon Healthcare NHS Foundation Trust	Torbay District General Hospital	13.9	19.0	3.6		164											10.0	11.7	4.9	3
South - South West	WDH	Dorset County Hospital	Dorset County Hospital	8.7	19.6	3.1		143											9.5	5.9	2.1	1
South - South West	WGH	Weston Area Health NHS Trust	Weston General Hospital	13.6	22.2	1.4		92											10.5	11.9	2.4	1
South - South West	YEO	Yeovil District Hospital NHS Foundation Trust	Yeovil District Hospital	5.1	22.4	1.3		89											11.0	4.5	3.4	1
Wales	BRG	Hywel Dda Health Board	Bronglais General Hospital	6.3	25.9	0.0		57											15.0	17.5	10.5	1
Wales	CLW	Betsi Cadwaladr University Health Board	Glan Clwyd District General Hospital	7.4	20.4	2.6		123											11.0	9.8	2.5	2
Wales	GLG	Hywel Dda Health Board	Glangwili General Hospital	13.5	20.1	2.9		132											13.0	19.7	7.6	1
Wales	GWE	Aneurin Bevan Health Board	Royal Gwent Hospital	14.2	17.9	4.4		210											11.0	9.7	2.9	3
Wales	GWY	Betsi Cadwaladr University Health Board	Ysbyty Gwynedd Hospital	8.6	18.9	3.7		168											11.0	4.2	3.0	2
Wales	MOR	Abertawe Bro Morgannwg University Health Board	Morriston Hospital	13.3	16.4	5.5		320											13.0	12.0	7.3	4
Wales	NEV	Aneurin Bevan Health Board	Nevill Hall Hospital	15.0	22.8	1.2		83											14.0	17.1	4.9	2
Wales	PCH	Cwm Taf Health Board	Prince Charles Hospital	19.7	22.1	1.5		94											12.0	9.6	4.3	1
Wales	POW	Abertawe Bro Morgannwg University Health Board	Princess of Wales Hospital	13.5	19.5	3.3		149											9.0	9.4	2.0	1
Wales	RGH	Cwm Taf Health Board	Royal Glamorgan	11.5	21.2	2.1		108											13.5	7.4	1.9	1
Wales	UHL	Cardiff and Vale University Health Board	University Hospital Llandough	0.0		0.0		1														n/a
Wales	UHW	Cardiff and Vale University Health Board	University Hospital of Wales	10.0	16.7	5.3		292											12.0	11.3	3.1	4
Wales	WRX	Betsi Cadwaladr University Health Board	Wrexham Maelor Hospital	13.2	21.1	2.1		109											11.0	8.3	2.8	2
Wales	WYB	Hywel Dda Health Board	Withybush General Hospital	8.1	27.2	0.0		50											13.0	12.0	8.0	1

15.3 Supplementary summary tables

Summary of measures of structure and process

Table 31
Comparison of additional key process measures between the First, Second and Third NELA Patient Reports

Process Measure		First NELA Patient Report	Second NELA Patient Report	Third NELA Patient Report
Preoperative consultant involvement as a proportion of all patients	Decision to operate made in person by a consultant surgeon, and patient reviewed preoperatively by a consultant anaesthetist	61%	58%	57%
	Decision to operate made in person by a consultant surgeon	76%	75%	77%
	Preoperative review by a consultant anaesthetist	77%	74%	71%
Preoperative consultant involvement as a proportion of patients with a preoperative P-POSSUM risk of death ≥5%	Decision to operate made in person by a consultant surgeon, and patient reviewed preoperatively by a consultant anaesthetist	62%	59%	58%
	Decision to operate made in person by a consultant surgeon	75%	74%	76%
	Preoperative review by a consultant anaesthetist	80%	77%	74%
Consultant presence in theatre as a proportion of all patients	Both a consultant surgeon and a consultant anaesthetist present	65%	70%	75%
	Consultant surgeon	85%	87%	89%
	Consultant anaesthetist	74%	78%	82%
Proportion of patients with no preoperative and no intraoperative consultant involvement	All patients	2.7%	2.1%	1.5%
	Patients with a preoperative P-POSSUM risk of death ≥5%	2.3%	1.7%	1.1%
Proportion of high and highestrisk patients who were admitted directly to critical care after surgery	Patients with a postoperative P-POSSUM risk of death 5-10%	58%	62%	63%
	Patients with a postoperative P-POSSUM risk of death >10%	83%	85%	87%

Table 32
Comparison of structures between 2013 Organisational Audit and 2016 Organisational Audit (Hospitals accepting acute general surgical admissions only)

Structure Measure	2013 Organisational Audit n=176	2016 Organisational Audit n=172
Operating theatre available 24/7	137 (78%)	142 (83%)
Operating theatre available 24/7, exclusively for EGS patients	50 (28%)	44 (26%)
Emergency surgical unit	55 (31%)	61 (35%)
Minimum four-tier surgical rota at all times	85 (48%)	92 (53%)
Contemporaneous CT reporting 24/7	159 (90%)	167 (97%)
Formal rota for on-site interventional radiology 24/7	58 (33%)	60 (35%)
Formal rota for on-site diagnostic endoscopy 24/7	112 (64%)	123 (72%)
Formal rota for on-site interventional endoscopy 24/7	116 (66%)	128 (74%)
Consultant pathology advice 24/7	155 (88%)	157 (91%)
Critical care unit with 24/7 cover by consultant intensivist	152 (86%)	158 (92%)
Critical care outreach availability 24/7	64 (36%)	92 (53%)
Policy for formal calculation of risk of perioperative mortality	44 (25%)	134 (78%)
Policy for anaesthetic seniority according to risk	58 (33%)	127 (74%)
Policy for surgical seniority according to risk	59 (34%)	127 (74%)
Policy for location of post-op. care according to risk	65 (37%)	135 (78%)
Explicit arrangement for review by care of the older person service	24 (14%)	42 (24%)
Policy for deferment of elective activity to prioritise emergencies	60 (34%)	94 (55%)
Pathway for the management of patients with sepsis	147 (84%)	167 (97%)
Pathway for enhanced recovery of EGS patients	53 (30%)	44 (26%)
Single pathway for adult EGS patients	54 (31%)	71 (41%)
At least two-monthly reviews of all EGS deaths	143 (81%)	162 (94%)
Preoperative input by care of the older person services for EGS patients	7 (4%)	6 (3%)
Postoperative input by care of the older person services for EGS patients	11 (6%)	18 (10%)
Perioperative input by general medicine for EGS patients	1 (1%)	4 (2%)

Mortality

Table 33
ONS 30-day and 90-day mortality – by patient characteristics

	Number of patients (frequency (%))	ONS 30-day mortality (frequency (%))	ONS 90-day mortality (frequency (%))
Age (years)			
18–39	2,762 (11.1)	54 (2.0)	79 (2.9)
40–49	2,426 (9.7)	104 (4.3)	137 (5.6)
50–59	3,506 (14.1)	199 (5.7)	283 (8.1)
60–69	5,144 (20.7)	543 (10.6)	761 (14.8)
70–79	6,224 (25.0)	856 (13.8)	1,146 (18.4)
80–89	4,246 (17.1)	750 (17.7)	1,013 (23.9)
≥90	584 (2.3)	131 (22.4)	182 (31.2)
ASA			
1	2,548 (10.2)	18 (0.7)	38 (1.5)
2	8,785 (35.3)	269 (3.1)	429 (4.9)
3	8,789 (35.3)	829 (9.4)	1,253 (14.3)
4	4,262 (17.1)	1,221 (28.6)	1,559 (36.6)
5	508 (2.0)	300 (59.1)	322 (63.4)
Admission type			
Emergency	23,258 (93.4)	2,460 (10.6)	3,379 (14.5)
Elective	1,634 (6.6)	177 (10.8)	222 (13.6)
Documented risk			
Lower	7,192 (28.9)	152 (2.1)	282 (3.9)
High	4,149 (16.7)	324 (7.8)	527 (12.7)
Highest	6,262 (25.2)	1,644 (26.3)	2,023 (32.3)
Not documented	7,289 (29.3)	517 (7.1)	769 (10.6)
Overall	**24,892 (100.0)**	**2,637 (10.6)**	**3,601 (14.5)**

Table 34
ONS 30-day and 90-day mortality – by operative urgency

Urgency of surgery	Number of patients (frequency (%))	ONS 30-day mortality (frequency (%))	ONS 90-day mortality (frequency (%))
<2 hours	2,870 (11.6)	749 (26.1)	831 (29.0)
2–6 hours	9,602 (38.7)	1,131 (11.8)	1,484 (15.5)
6–18 hours	8,127 (32.8)	495 (6.1)	788 (9.7)
18–24 hours	4,208 (17.0)	247 (5.9)	480 (11.4)
Overall	**24,807 (100.0)**	**2,622 (10.6)**	**3,583 (14.4)**

Table 35
ONS 30-day and 90-day mortality – by indication for surgery (more than one may apply)

Indication for surgery	Number of patients (frequency (%))	ONS 30-day mortality (frequency (%))	ONS 90-day mortality (frequency (%))
Small bowel obstruction	9,066 (36.4)	688 (7.6)	1,074 (11.8)
Perforation	5,964 (24.0)	862 (14.5)	1,072 (18.0)
Peritonitis	5,061 (20.3)	774 (15.3)	940 (18.6)
Large bowel obstruction	3,653 (14.7)	366 (10.0)	578 (15.8)
Ischaemia	1,938 (7.8)	516 (26.6)	580 (29.9)
Sepsis – other	1,754 (7.0)	355 (20.2)	410 (23.4)
Abdominal abscess	1,574 (6.3)	116 (7.4)	154 (9.8)
Incarcerated hernia	1,171 (4.7)	106 (9.1)	138 (11.8)
Colitis	891 (3.6)	45 (5.1)	55 (6.2)
Haemorrhage	885 (3.6)	144 (16.3)	165 (18.6)
Volvulus	747 (3.0)	64 (8.6)	91 (12.2)
Anastomotic leak	675 (2.7)	57 (8.4)	75 (11.1)
Internal hernia	585 (2.4)	45 (7.7)	60 (10.3)
Pneumoperitoneum	527 (2.1)	93 (17.6)	110 (20.9)
Intestinal fistula	488 (2.0)	31 (6.4)	62 (12.7)
Necrosis	400 (1.6)	115 (28.8)	124 (31.0)
Acidosis	350 (1.4)	146 (41.7)	160 (45.7)
Phlegmon	346 (1.4)	21 (6.1)	26 (7.5)
Intestinal obstruction	163 (0.7)	16 (9.8)	28 (17.2)
Intussusception	160 (0.6)	4 (2.5)	4 (2.5)
Iatrogenic injury	150 (0.6)	11 (7.3)	14 (9.3)
Foreign body	136 (0.5)	2 (1.5)	3 (2.2)
Abdominal wound dehiscence	135 (0.5)	10 (7.4)	13 (9.6)
Pseudo-obstruction	86 (0.3)	10 (11.6)	13 (15.1)
Planned relook	81 (0.3)	12 (14.8)	13 (16.0)
Abdominal compartment syndrome	64 (0.3)	32 (50.0)	34 (53.1)
Other	34 (0.1)	5 (14.7)	6 (17.6)

Table 36
ONS 30-day and 90-day mortality – by operative findings (more than one may apply)

Operative findings	Number of patients (frequency (%))	ONS 30-day mortality (frequency (%))	ONS 90-day mortality (frequency (%))
Adhesions	6,531 (26.2)	459 (7.0)	644 (9.9)
Perforation – small bowel/colonic	4,997 (20.1)	777 (15.5)	970 (19.4)
Intestinal ischaemia	3,060 (12.3)	705 (23.0)	808 (26.4)
Abscess	2,810 (11.3)	242 (8.6)	322 (11.5)
Malignancy – localised	2,470 (9.9)	203 (8.2)	321 (13.0)
Colorectal cancer	1,735 (7.0)	201 (11.6)	318 (18.3)
Incarcerated hernia	1,607 (6.5)	145 (9.0)	190 (11.8)
Malignancy – disseminated	1,592 (6.4)	276 (17.3)	573 (36.0)
Perforation – peptic ulcer	1,561 (6.3)	204 (13.1)	245 (15.7)
Diverticulitis	1,458 (5.9)	133 (9.1)	165 (11.3)
Internal hernia	1,087 (4.4)	82 (7.5)	106 (9.8)
Stricture	1,087 (4.4)	77 (7.1)	113 (10.4)
Volvulus	1,053 (4.2)	93 (8.8)	129 (12.3)
Crohn's disease	770 (3.1)	19 (2.5)	30 (3.9)
Anastomotic leak	660 (2.7)	60 (9.1)	78 (11.8)
Intestinal fistula	447 (1.8)	29 (6.5)	54 (12.1)
Ulcerative colitis	375 (1.5)	11 (2.9)	15 (4.0)
Normal intra-abdominal findings	373 (1.5)	54 (14.5)	59 (15.8)
Haemorrhage – postoperative	356 (1.4)	36 (10.1)	47 (13.2)
Stoma complications	297 (1.2)	16 (5.4)	24 (8.1)
Haemorrhage – intestinal	293 (1.2)	57 (19.5)	64 (21.8)
Colitis – other	269 (1.1)	20 (7.4)	26 (9.7)
Gallstone ileus	261 (1.0)	13 (5.0)	15 (5.7)
Foreign body	200 (0.8)	7 (3.5)	10 (5.0)
Intussusception	193 (0.8)	3 (1.6)	5 (2.6)
Haemorrhage – peptic ulcer	192 (0.8)	38 (19.8)	41 (21.4)
Pseudo-obstruction	185 (0.7)	26 (14.1)	33 (17.8)
Meckel's diverticulum	171 (0.7)	8 (4.7)	11 (6.4)
Abdominal wound dehiscence	125 (0.5)	10 (8.0)	14 (11.2)
Other	75 (0.3)	7 (9.3)	10 (13.3)
Abdominal compartment syndrome	70 (0.3)	31 (44.3)	34 (48.6)
Gastric cancer	62 (0.2)	15 (24.2)	26 (41.9)
Necrotising fasciitis	39 (0.2)	10 (25.6)	11 (28.2)
Colitis	20 (0.1)	1 (5.0)	1 (5.0)

Length of stay

Table 37
Postoperative length of stay in patients surviving to hospital discharge – by patient characteristics

	Number of patients	Median (IQR) postoperative length of stay (days)
Age (years)		
18–39	2,668	8 (5–13)
40–49	2,285	9 (6–15)
50–59	3,250	10 (6–16)
60–69	4,484	11 (7–19)
70–79	5,195	13 (8–22)
80–89	3,367	15 (10–25)
≥90	435	16 (10–25)
ASA		
1	2,511	7 (5–11)
2	8,430	9 (6–15)
3	7,766	13 (8–22)
4	2,804	20 (12–35)
5	173	27 (13–41)
Admission type		
Emergency	1,386	15 (9–28)
Elective	20,298	11 (7–19)
Documented risk		
Lower	6,975	8 (6–13)
High	3,740	13 (8–21)
Highest	4,310	18 (11–31)
Not documented	6,659	10 (6–18)
Return to theatre after initial operation		
No return to theatre	19,875	10 (7–18)
One or more returns	1,629	28 (17–46)
Overall	**21,684**	**11 (7–19)**

Table 38
Postoperative length of stay in patients surviving to discharge from hospital – by operative urgency

Urgency of surgery	Number of patients	Median (IQR) postoperative length of stay (days)
<2 hours	1,991	14 (8–29)
2–6 hours	8,210	12 (7–20)
6–18 hours	7,512	10 (7–17)
18–24 hours	3,902	10 (7–18)
Overall	21,615	11 (7–19)

Unplanned return to theatre

Table 39
Proportion of patients who returned to theatre following their initial emergency laparotomy – by patient characteristics

	Total number of patients	Proportion patients who returned to theatre following initial emergency laparotomy (%)
Age (years)		
18–39	2,732	7.9
40–49	2,401	9.2
50–59	3,460	10.1
60–69	5,079	10.3
70–79	6,152	9.9
80–89	4,187	6.8
≥90	577	2.4
ASA		
1	2,521	4.8
2	8,711	6.6
3	8,698	9.4
4	4,188	14.7
5	470	17.9
Admission type		
Emergency	22,977	8.4
Elective	1,611	18.1
Overall	24,588	9.0

Hospital characteristics

Table 40
Number of beds available to patients undergoing gastrointestinal surgery

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
Beds available to patients undergoing gastrointestinal surgery					
Range	23–121	24–181	25–174	45–259	23–259
Median (IQR)	54 (39–68)	66 (47–85)	80 (62–90)	86 (69–114)	70 (51–90)
Beds available to patients undergoing gastrointestinal surgery – as a percentage of total hospital beds					
Range	8–89	5–39	5–27	5–27	5–89
Median (IQR)	19 (14–24)	14 (11–20)	14 (11–17)	11 (8–12)	14 (10–18)

Table 41
Continuous resident consultant cover within the Emergency Department

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
Yes	5 (12%)	6 (14%)	7 (16%)	17 (40%)	35 (20%)
No	37 (86%)	37 (86%)	36 (84%)	25 (58%)	135 (78%)
No ED	1 (2%)	0 (0%)	0 (0%)	1 (2%)	2 (1%)

Patient and surgical characteristics

Table 42
Characteristics of patients included in this Report

Characteristic	Group		Number of patients	Frequency (%)
Gender	Female		12,844	51.6
	Male		12,053	48.4
Age in years	18–39		2,762	11.1
	40–49		2,426	9.7
	50–59		3,507	14.1
	60–69		5,144	20.7
	70–79		6,226	25.0
	80–89		4,248	17.1
	≥90		584	2.35
Hospital admission type	Emergency		23,263	93.4
	Elective		1,634	6.6
ASA grade	1		2,548	10.2
	2		8,786	35.3
	3		8,790	35.3
	4		4,264	17.1
	5		509	2.0
Urgency of surgery	<2 hours		2,873	11.5
	2–6 hours		9,604	38.6
	6–18 hours		8,127	32.6
	18–24 hours		4,208	16.9
Procedure	Primary procedure		22,563	90.6
	Surgery for a complication of a recent procedure		2,334	9.4
Preoperative predicted risk of death within 30 days of surgery (P-POSSUM)	<5%	Lower risk	10,646	42.8
	5.0–10.0	High risk	4,343	17.4
	10.1–25.0%	Highest risk	4,546	18.3
	25.1–50.0%		2,740	11.0
	>50%		2,622	10.5

Table 43
Preoperative P-POSSUM categories – by year

Preoperative P-POSSUM risk of death	Year 1		Year 2		Year 3	
	Number of patients	Frequency (%)	Number of patients	Frequency (%)	Number of patients	Frequency (%)
<5%	8,284	39.5	9,737	41.1	10,646	42.8
5.0–10.0%	3,614	17.2	4,161	17.5	4,343	17.4
10.1–25.0%	3,952	18.8	4,499	19.0	4,546	18.3
25.1–50.0%	2,567	12.2	2,622	11.1	2,740	11.0
>50%	2,556	12.2	2,694	11.4	2,622	10.5

Table 44
Preoperative NELA model risk categories – by year

Preoperative NELA model risk of death	Year 1		Year 2		Year 3	
	Number of patients	Frequency (%)	Number of patients	Frequency (%)	Number of patients	Frequency (%)
<5%	7,641	37.9	8,965	39.5	9,584	39.9
5.0–10.0%	1,368	6.8	1,545	6.8	1,611	6.7
10.1–25.0%	4,506	22.4	5,297	23.3	5,742	23.9
25.1–50.0%	3,848	19.1	3,986	17.6	4,180	17.4
>50%	2,777	13.8	2,910	12.8	2,878	12.0

Table 45
Recorded primary surgical procedure at emergency laparotomy and ONS 30-day and 90-day mortality

Primary operative procedure	Number of patients (frequency (%))	ONS 30-day mortality (frequency (%))	ONS 90-day mortality (frequency (%))
Adhesiolysis	4,182 (16.8)	212 (5.1)	294 (7.0)
Small-bowel resection	4,040 (16.2)	440 (10.9)	599 (14.8)
Colectomy – right (including ileocaecal resection)	3,307 (13.3)	290 (8.8)	419 (12.7)
Hartmann's procedure	2,956 (11.9)	316 (10.7)	415 (14.0)
Stoma formation	1,353 (5.4)	155 (11.5)	332 (24.5)
Peptic ulcer – suture or repair of perforation	1,350 (5.4)	154 (11.4)	186 (13.8)
Colectomy – subtotal or panproctocolectomy	1,309 (5.3)	187 (14.3)	225 (17.2)
Colectomy – left (including anterior resection)	929 (3.7)	104 (11.2)	125 (13.5)
Drainage of abscess/collection	670 (2.7)	59 (8.8)	70 (10.4)
Washout only	566 (2.3)	70 (12.4)	85 (15.0)
Exploratory/relook laparotomy only	519 (2.1)	146 (28.1)	164 (31.6)
Repair of intestinal perforation	397 (1.6)	54 (13.6)	63 (15.9)
Colorectal resection – other	393 (1.6)	40 (10.2)	58 (14.8)
Gastric surgery – other	294 (1.2)	38 (12.9)	56 (19.0)
Intestinal bypass	288 (1.2)	43 (14.9)	109 (37.8)
Enterotomy	269 (1.1)	15 (5.6)	19 (7.1)
Reduction of volvulus	220 (0.9)	10 (4.5)	14 (6.4)
Haemostasis	219 (0.9)	34 (15.5)	42 (19.2)
Not amenable to surgery	186 (0.7)	132 (71.0)	150 (80.6)
Abdominal wall closure	185 (0.7)	8 (4.3)	14 (7.6)
Peptic ulcer – oversew of bleed	175 (0.7)	28 (16.0)	28 (16.0)
Evacuation of haematoma	165 (0.7)	18 (10.9)	22 (13.3)
Stoma revision	157 (0.6)	5 (3.2)	9 (5.7)
Repair or revision of anastomosis	148 (0.6)	7 (4.7)	11 (7.4)
Gastrectomy – partial or total	134 (0.5)	23 (17.2)	30 (22.4)
Abdominal wall reconstruction	95 (0.4)	6 (6.3)	7 (7.4)
Removal of foreign body	88 (0.4)	2 (2.3)	2 (2.3)
Resection of Meckel's diverticulum	88 (0.4)	5 (5.7)	5 (5.7)
Laparostomy formation	76 (0.3)	28 (36.8)	34 (44.7)
Resection of other intra-abdominal tumour(s)	47 (0.2)	1 (2.1)	3 (6.4)
Repair of intestinal fistula	42 (0.2)	1 (2.4)	5 (11.9)
Debridement	23 (0.1)	5 (21.7)	5 (21.7)

Stricturoplasty	22 (0.1)	1 (4.5)	1 (4.5)

Documentation of risk

Table 46
P-POSSUM risk of death, observed ONS 30-day and 90-day mortality – by documented preoperative risk category

Documented preoperative risk category	Patients (frequency (%))	Median P-POSSUM risk of death within 30 days of surgery (%)	Observed 30-day mortality based on ONS data (frequency (%))	Observed 90-day mortality based on ONS data (frequency (%))
Lower (<5%)	7,192 (28.9)	2.7	152 (2.1)	282 (3.9)
High (5–10%)	4,149 (16.7)	8.2	324 (7.8)	527 (12.7)
Highest (>10%)	6,262 (25.2)	30.0	1,644 (26.3)	2,023 (32.3)
Not documented	7,289 (29.3)	4.9	517 (7.1)	769 (10.6)
Overall	**24,892 (100.0)**	**6.7**	**2,637 (10.6)**	**3,601 (14.5)**

Table 47
Relative proportions in each risk category (based on calculated preoperative P-POSSUM risk of death) – by time of arrival in operating theatre

Time-of-day	Total number of patients	Proportion of patients (%)		
		Lower risk (<5%)	High risk (5–10%)	Highest risk (>10%)
08.00–11.59	5,845	46.9	18.7	34.4
12.00–17.59	10,096	46.0	18.2	35.8
18.00–23.59	5,837	38.0	15.5	46.5
00.00–07.59	2,061	25.8	15.2	59.0
Overall	**23,839**	**42.5**	**17.4**	**40.1**
(Data missing)	*1,058*	*48.9*	*18.1*	*33.1*

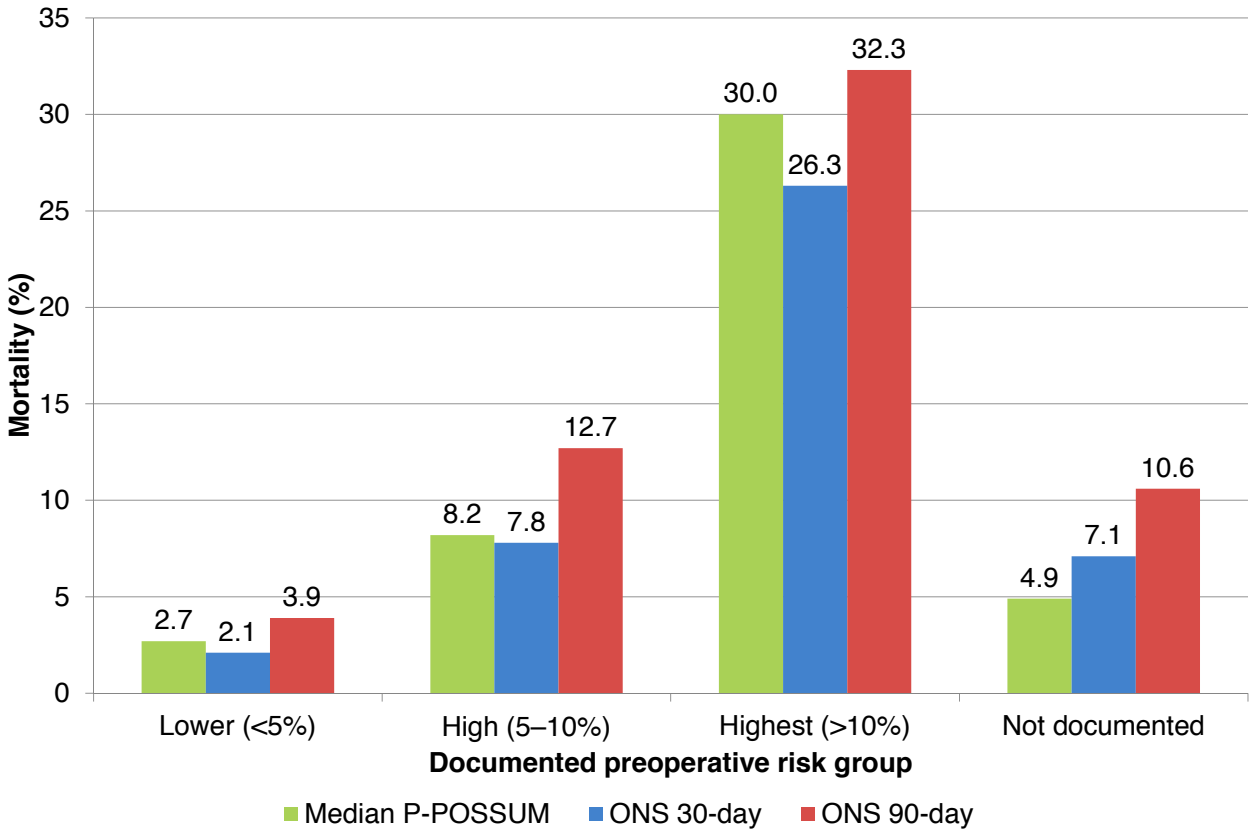
Table 48
Relative proportions of patients in each risk category when preoperative documented risk is compared to preoperative calculated P-POSSUM risk of death

Documented preoperative risk category risk	Total number of patients	Proportion of patients by calculated P-POSSUM risk of death (%)		
		Lower risk (P-POSSUM risk of death <5%)	High risk (P-POSSUM risk of death 5–10%)	Highest risk (P-POSSUM risk of death >10%)
Lower (<5%)	7,192	77.2	14.0	8.8
High (5–10%)	4,150	24.9	35.8	39.3
Highest (>10%)	6,265	5.8	8.9	85.4
Not documented	7,290	50.8	17.8	31.4
Overall	**24,897**	**42.8**	**17.4**	**39.8**

Table 49
Proportion of patients for whom risk was documented before surgery – by patient characteristics

	Total number of patients	Proportion of patients who had risk documented before surgery (%)
Age (years)		
18–39	2,762	62.7
40–49	2,426	64.4
50–59	3,507	67.9
60–69	5,144	70.6
70–79	6,226	73.8
80–89	4,248	76.4
≥90	584	78.8
ASA		
1	2,548	67.0
2	8,786	67.0
3	8,790	69.7
4	4,264	80.8
5	509	87.8
Admission type		
Emergency	23,263	71.0
Elective	1,634	66.1
Urgency of surgery		
<2 hours	2,873	78.6
2–6 hours	9,604	73.6
6–18 hours	8,127	67.7
18–24 hours	4,208	65.2
Data missing	*85*	*44.7*
Overall	24,897	70.7

Figure 73
Median calculated preoperative P-POSSUM risk of death, and observed ONS 30-day and 90-day mortality – by documented preoperative risk category



Consultant anaesthetist and surgeon working patterns

Table 50
Policy requiring consultant anaesthetists to formally hand over to one another in person

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
	16 (37%)	14 (33%)	13 (30%)	12 (28%)	55 (32%)

Table 51
Consultant surgeon on-call rotas

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
Hospitals where the consultant surgeon is free from all non-acute commitments when covering the emergency workload					
	37 (86%)	39 (91%)	39 (91%)	41 (95%)	156 (91%)
Number of consultant surgeons participating in EGS rota					
Range	3–14	6–15	6–15	6–22	3–22
Median (IQR)	7 (6–8)	8 (7–10)	10 (8–11)	12 (10–15)	9 (7–11)
Consultant surgeon free from planned elective care the day after a night on-call					
	21 (49%)	20 (47%)	21 (49%)	25 (58%)	87 (51%)

Table 52
Four-tier rota covering the general surgical workload

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
At all times	14 (33%)	16 (37%)	30 (70%)	32 (74%)	92 (53%)
Only during the daytime	19 (44%)	19 (44%)	11 (26%)	6 (14%)	55 (32%)

Table 53
General surgical consultant on-call structure

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
24-hours – one week	12 (28%)	7 (16%)	2 (5%)	1 (2%)	22 (13%)
24-hours – split week	19 (44%)	18 (42%)	22 (51%)	18 (42%)	77 (45%)
24-hours – one day	10 (23%)	8 (19%)	9 (21%)	11 (26%)	38 (22%)
Split day/night	10 (23%)	12 (28%)	15 (35%)	17 (40%)	54 (31%)

Table 54
Surgical care practitioners or advanced nurse practitioners covering part of the emergency general surgery workload

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
	11 (26%)	11 (26%)	13 (30%)	18 (42%)	53 (31%)

Table 55
More than one consultant surgeon covering the emergency general surgery workload

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
All the time	2 (5%)	2 (5%)	3 (7%)	9 (21%)	16 (9%)
Day only	5 (12%)	6 (14%)	10 (23%)	14 (33%)	35 (20%)
Night only	0 (0%)	2 (5%)	0 (0%)	0 (0%)	2 (1%)
No	36 (84%)	33 (77%)	30 (70%)	20 (47%)	119 (69%)

Table 56
Consultant surgeon covers emergency general surgery cases at more than one hospital site

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
	3 (7%)	5 (12%)	7 (16%)	11 (26%)	26 (15%)

Table 57
Dedicated morning and evening consultant ward rounds for surgical admissions

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
	27 (63%)	28 (65%)	24 (56%)	28 (65%)	107 (62%)

Table 58
Admitting consultant retains responsibility for acute general surgical admissions

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
	27 (63%)	26 (60%)	31 (72%)	26 (60%)	110 (64%)

Consultant surgeon review within 14 hours of admission

Table 59
Proportion of patients reviewed by a consultant surgeon within 14 hours of admission to hospital – by time-of-day and day-of-week of emergency hospital admission

Time of emergency admission to hospital	Monday–Friday		Saturday–Sunday	
	Total number of patients	Proportion of patients reviewed by consultant surgeon within 14 hours of admission (%)	Total number of patients	Proportion of patients reviewed by consultant surgeon within 14 hours of admission (%)
08.00–11.59	2,394	58.4	740	50.4
12.00–17.59	5,081	40.4	1,373	33.4
18.00–23.59	3,721	63.7	1,259	66.2
00.00–07.59	2,603	71.5	969	69.2
Overall	13,799	55.7	4,341	53.8

Table 60
Proportion of patients who were reviewed by a consultant surgeon within 14 hours of emergency admission to hospital. Data presented for patients admitted as an emergency and for whom the time of consultant review had been entered into the NELA web tool

	Total number of patients	Proportion of patients reviewed by consultant surgeon within 14 hours of admission (%)
Age (years)		
18–39	1,986	53.8
40–49	1,788	54.9
50–59	2,533	55.7
60–69	3,660	57.4
70–79	4,490	55.9
80–89	3,219	53.6
≥90	464	49.1
ASA		
1	1,890	60.2
2	6,526	56.7
3	6,372	52.9
4	3,017	53.4
5	335	60.0
Documented risk		
Lower	5,586	55.8
High	3,061	56.8
Highest	4,539	56.4
Not documented	2,610	52.7
Overall	18,140	55.3

Consultant preoperative assessment, decision making and presence in theatre for high-risk patients.

Table 61
Proportions of patients receiving input before surgery by a consultant surgeon and a consultant anaesthetist – by patient characteristics

	Total number of patients	Proportion of patients (%)			
		Decision to operate made in person by a consultant surgeon and patient reviewed preoperatively by a consultant anaesthetist	Decision to operate made in person by a consultant surgeon	Preoperative review by a consultant anaesthetist	Decision to operate not made in person by a consultant surgeon and patient not reviewed preoperatively by a consultant anaesthetist
Age (years)					
18–39	2,762	52.7	74.5	66.7	11.9
40–49	2,426	55.2	76.1	70.1	9.5
50–59	3,507	55.2	77.3	69.7	8.8
60–69	5,144	56.9	76.9	71.3	9.1
70–79	6,226	56.8	77.1	71.5	8.6
80–89	4,248	59.7	78.3	74.0	7.8
≥90	584	62.5	80.6	75.7	6.4
ASA					
1	2,548	50.3	72.6	64.8	13.3
2	8,786	54.3	78.3	67.2	9.3
3	8,790	58.0	78.3	72.1	8.1
4	4,264	61.3	74.8	79.0	7.8
5	509	63.9	72.1	84.7	7.3
Admission type					
Emergency	23,263	56.3	76.8	70.7	9.2
Elective	1,634	61.0	79.5	75.3	6.6
Overall	**24,897**	**56.6**	**77.0**	**71.0**	**9.0**

Table 62
Proportions of patients whose care during surgery was directly supervised by a consultant surgeon and a consultant anaesthetist – by patient characteristics

	Total number of patients	Proportion of patients (%)			
		Both consultants present in theatre	Consultant surgeon present	Consultant anaesthetist present	Neither consultant present in theatre
Age (years)					
18–39	2,762	69.6	88.4	75.6	5.5
40–49	2,426	72.4	88.8	79.4	4.2
50–59	3,507	75.2	90.0	81.5	3.8
60–69	5,144	74.9	88.8	82.4	3.8
70–79	6,226	75.9	89.1	83.2	3.6
80–89	4,248	77.1	88.3	85.6	3.3
≥90	584	76.9	88.2	86.0	2.7
ASA					
1	2,548	64.6	85.1	72.6	6.9
2	8,786	70.5	87.5	78.4	4.6
3	8,790	76.2	89.5	83.3	3.4
4	4,264	84.8	92.2	90.7	1.8
5	509	91.6	94.7	96.5	0.4
Admission type					
Emergency	23,263	74.4	88.5	81.9	4.0
Elective	1,634	80.9	94.5	84.3	2.1
Overall	**24,897**	**74.8**	**88.9**	**82.0**	**3.9**

Table 63
Proportion of all patients receiving input before surgery by consultant surgeons and consultant anaesthetists – by time-of-day and day-of-week of arrival in theatre

Time of arrival in operating theatre	Monday–Friday (%)			Saturday–Sunday (%)		
	Both consultants	Consultant surgeon	Consultant anaesthetist	Both consultants	Consultant surgeon	Consultant anaesthetist
08.00–11.59	63.3	82.5	75.7	54.7	81.0	66.6
12.00–17.59	64.9	84.7	76.0	57.0	82.2	68.5
18.00–23.59	52.4	75.0	67.5	45.0	65.4	65.2
00.00–07.59	24.2	38.1	55.0	29.8	41.1	55.8
Overall	**58.0**	**78.0**	**72.1**	**50.8**	**73.7**	**66.0**

Table 64
Proportions of all patients whose care during surgery was directly supervised by consultant surgeons and consultant anaesthetists – by day of arrival in theatre

Day of arrival in operating theatre	Total number of patients	Proportion of patients (%)			
		Both consultants present in theatre	Consultant surgeon present	Consultant anaesthetist present	Neither consultant present in theatre
Monday	3,017	76.0	88.7	83.4	3.9
Tuesday	3,815	77.9	89.8	85.2	2.9
Wednesday	4,010	77.6	89.4	84.9	3.3
Thursday	3,979	76.9	89.5	84.2	3.2
Friday	3,865	75.5	88.0	83.3	4.2
Saturday	3,194	69.8	88.9	76.4	4.5
Sunday	3,017	67.4	87.7	74.2	5.5
Overall	24,897	74.8	88.9	82.0	3.9

Table 65
Proportion of patients receiving input before surgery by consultant surgeons and consultant anaesthetists – by documented preoperative risk category

Process measure	Patients with available data	Documented risk category				Overall (%)
		Lower risk (<5%) (%)	High risk (5-10%) (%)	Highest risk (>10%) (%)	Risk not documented (%)	
Decision to operate made in person by a consultant surgeon, and patient reviewed preoperatively by a consultant anaesthetist	24,242	58.2	62.4	61.5	47.4	56.6
Decision to operate made in person by a consultant surgeon	24,023	79.9	80.3	75.2	73.6	77.0
Preoperative review by a consultant anaesthetist	24,897	69.8	75.6	78.4	63.3	71.0
Decision to operate not made in person by a consultant surgeon, and patient not reviewed preoperatively by a consultant anaesthetist	24,678	8.8	6.8	8.2	11.1	9.0

Table 66
Proportion of patients receiving input before surgery by consultant surgeons and consultant anaesthetists – by calculated preoperative P-POSSUM risk of death

Risk category by calculated preoperative P-POSSUM risk of death	Total number of patients	Proportion of patients (%)			
		Decision to operate made in person by a consultant surgeon and patient reviewed preoperatively by a consultant anaesthetist	Decision to operate made in person by a consultant surgeon	Preoperative review by a consultant anaesthetist	Decision to operate not made in person by a consultant surgeon, and patient not reviewed preoperatively by a consultant anaesthetist
Lower (<5%)	7,192	54.7	78.4	67.4	9.5
High (5–10%)	4,150	57.2	78.0	71.1	8.5
Highest (>10%)	6,265	58.3	75.0	75.0	8.7
(All patients with risk ≥ 5%)	(10,415)	(58.0)	(75.9)	(73.8)	(8.6)
Overall	24,897	56.6	77.0	71.0	9.0

Table 67
Proportion of patients whose care during surgery was directly supervised by a consultant surgeon and a consultant anaesthetist – by documented preoperative risk category

Process measure	Patients with available data	Documented risk category				Overall (%)
		Lower risk (<5%) (%)	High risk (5-10%) (%)	Highest risk (>10%) (%)	Risk not documented (%)	
Both consultants present in theatre	24,897	70.0	76.9	83.8	70.6	74.8
Consultant surgeon present	24,897	86.4	90.0	92.4	87.8	88.9
Consultant anaesthetist present	24,897	78.3	84.0	89.4	78.3	82.0
Neither consultant present in theatre	24,897	5.3	2.9	2.0	4.6	3.9

Table 68
Proportion of patients whose care during surgery was directly supervised by consultant surgeons and consultant anaesthetists – by calculated preoperative P-POSSUM risk of death

Risk category by calculated preoperative P-POSSUM risk of death	Total number of patients	Proportion of patients (%)			
		Both consultants present in theatre	Consultant surgeon present	Consultant anaesthetist present	Neither consultant present in theatre
Lower (<5%)	7,192	68.9	86.3	77.2	5.4
High (5–10%)	4,150	74.2	88.9	81.6	3.6
Highest (>10%)	6,265	81.4	91.7	87.4	2.3
(All patients with risk ≥ 5%)	(10,415)	(79.2)	(90.9)	(85.6)	(2.7)
Overall	24,897	74.8	88.9	82.0	3.9

Table 69
Proportion of all patients whose care during surgery was directly supervised by consultant surgeons and consultant anaesthetists – by time-of-day and day-of-week of arrival in operating theatre

Time of arrival in operating theatre	Monday–Friday (%)			Saturday–Sunday (%)		
	Both consultants	Consultant surgeon	Consultant anaesthetist	Both consultants	Consultant surgeon	Consultant anaesthetist
08.00–11.59	83.0	90.7	90.8	72.7	91.8	78.2
12.00–17.59	82.8	91.4	89.8	72.0	89.8	78.8
18.00–23.59	69.5	87.1	76.7	66.5	86.5	73.9
00.00–07.59	55.9	77.7	66.0	55.3	77.0	63.5
Overall	77.4	89.1	84.9	69.2	88.2	75.9

Table 70
Proportion of patients with a calculated preoperative P-POSSUM risk of death ≥5% whose care during surgery was directly supervised by consultant surgeons and consultant anaesthetists – by time-of-day and day-of-week of arrival in operating theatre

Time of arrival in operating theatre	Monday–Friday (%)			Saturday–Sunday (%)		
	Both consultants	Consultant surgeon	Consultant anaesthetist	Both consultants	Consultant surgeon	Consultant anaesthetist
08.00–11.59	86.0	92.2	93.1	78.3	93.1	84.0
12.00–1759	86.4	93.4	91.8	77.3	91.9	83.4
18.00–23.59	76.9	90.2	83.0	74.2	89.9	80.6
00.00–07.59	62.7	81.4	73.2	64.1	81.7	72.1
Overall	81.2	91.0	87.8	75.1	90.4	81.4

Timeliness of care for peritonitis

Table 71
Intervals between key milestones in the care of patients admitted as an emergency who were scheduled for emergency laparotomy within six hours and underwent surgery within 24 hours of admission to hospital for suspected peritonitis

	Number of hours from admission to first antibiotics Median (IQR)	Number of hours from admission to arrival in theatre Median (IQR)	Number of hours from decision to operate to arrival in theatre Median (IQR)
Age (years)			
18–39	3.4 (1.8–6.0)	7.3 (5.0–11.6)	2.0 (1.0–3.0)
40–49	3.1 (1.3–6.5)	7.5 (5.0–12.0)	1.8 (1.0–3.0)
50–59	3.1 (1.3–6.5)	7.8 (5.3–12.3)	1.8 (1.3–3.0)
60–69	3.2 (1.6–6.2)	7.9 (5.0–12.7)	1.8 (1.3–3.0)
70–79	3.5 (1.5–6.8)	8.0 (5.5–13.4)	1.8 (1.3–3.0)
80–89	4.0 (1.6–6.8)	8.9 (5.8–14.3)	2.0 (1.3–3.3)
≥90	3.0 (1.3–6.4)	9.1 (6.2–14.5)	1.8 (1.3–3.5)
ASA			
1	3.5 (1.7–6.3)	7.3 (5.3–11.2)	2.0 (1.3–3.3)
2	3.7 (1.8–7.0)	8.1 (5.5–13.3)	2.0 (1.3–3.0)
3	3.6 (1.8–6.4)	8.0 (5.5–13)	2.0 (1.3–3.0)
4	3.0 (1.3–6.0)	8.3 (5.1–13.5)	1.8 (1.0–3.0)
5	1.9 (0.8–4.7)	5.4 (3.7–8.4)	1.5 (0.8–2.0)
Documented risk			
Lower	4.5 (2.0–7.5)	8.0 (5.5–12.0)	1.8 (1.3–3.3)
High	3.1 (1.5–6.5)	8.1 (5.4–14.6)	2.0 (1.3–3.0)
Highest	3.0 (1.3–5.8)	7.5 (5.1–12.3)	1.8 (1.3–2.8)
Not documented	3.4 (1.6–6.6)	8.4 (5.5–13.2)	2.0 (1.3–3.3)
Operative urgency			
<2 hours	3.0 (1.3–6.0)	6.4 (4.2–10.7)	1.5 (1.0–2.0)
2–6 hours	3.5 (1.6–6.6)	8.4 (5.8–13.8)	2.0 (1.3–3.3)
Overall	**3.3 (1.5–6.4)**	**8.0 (5.3–12.8)**	**2.0 (1.3–3.0)**

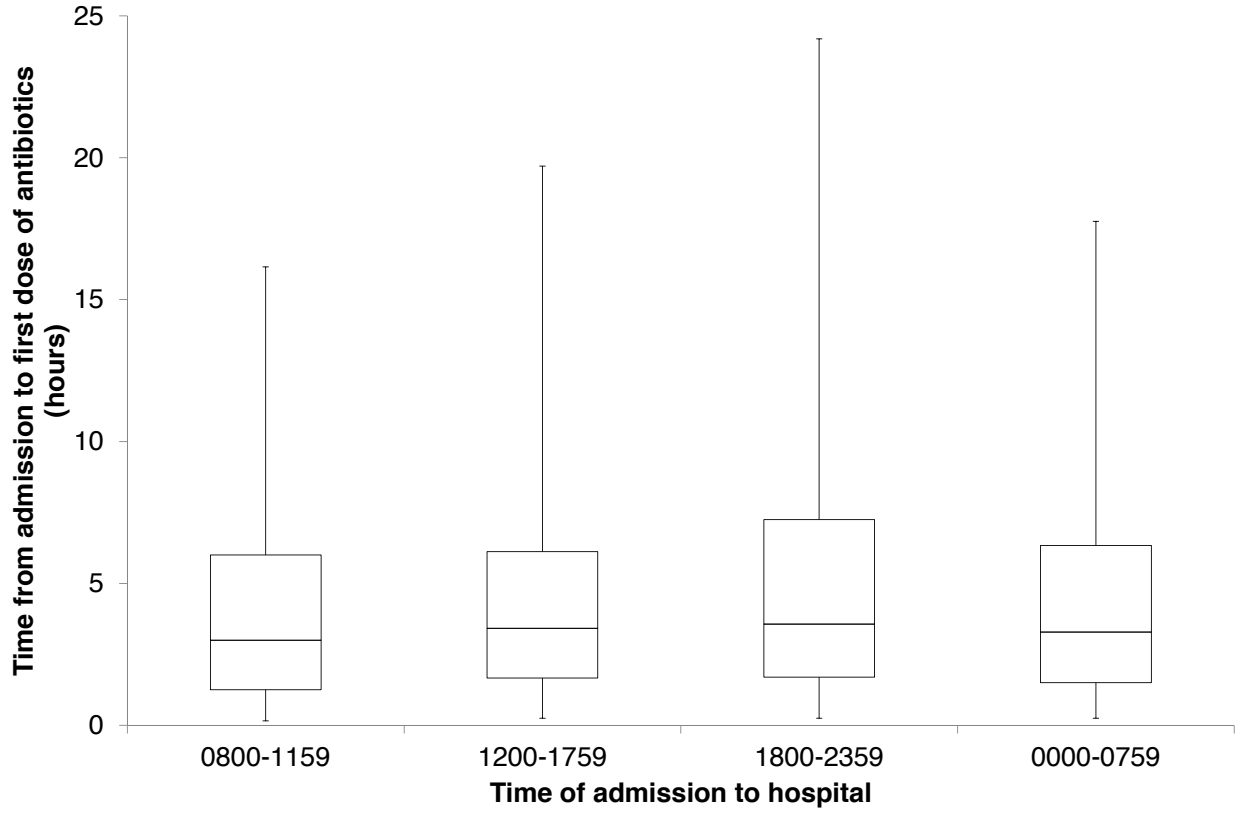
Table 72
Interval between admission to first dose of antibiotics for patients admitted as an emergency with suspected peritonitis – by time-of-day and day-of-week of emergency hospital admission (limited to patients who were scheduled for emergency laparotomy within six hours and underwent surgery within 24 hours of admission to hospital)

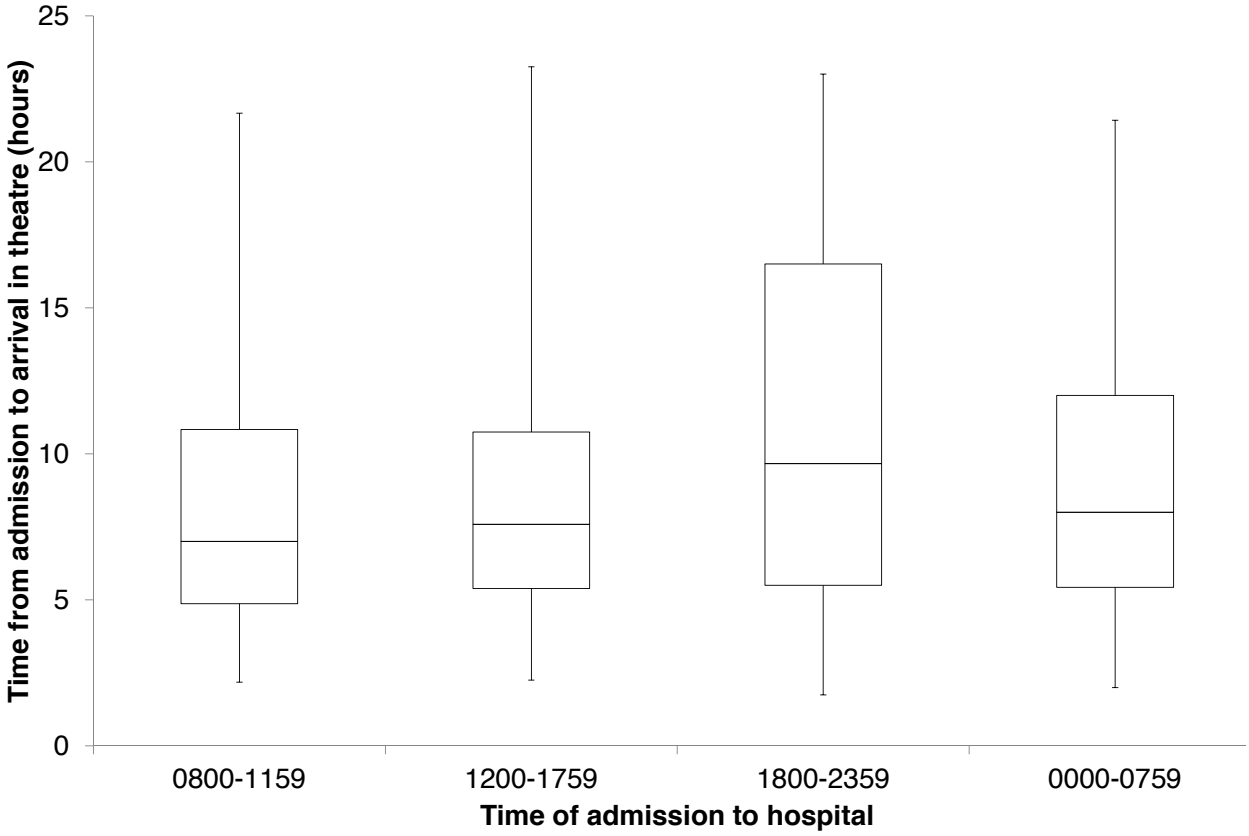
Time of emergency admission to hospital	Number of hours from admission to first antibiotics	
	Monday–Friday Median (IQR) time (hours)	Saturday–Sunday Median (IQR) time (hours)
08.00–11.59	3.0 (1.3–5.8)	3.3 (0.9–6.5)
12.00–17.59	3.5 (1.8–6.3)	3.3 (1.4–6.0)
18.00–23.59	3.6 (1.6–7.1)	3.5 (1.9–8.0)
00.00–07.59	3.3 (1.4–6.2)	3.3 (1.6–7.0)
Overall	3.3 (1.5–6.3)	3.3 (1.5–6.6)

Table 73
Interval between admission to arrival in theatre, and decision to operate to arrival in theatre, for patients admitted as an emergency with suspected peritonitis – by time-of-day and day-of-week of emergency hospital admission (limited to patients who were scheduled for emergency laparotomy within six hours and underwent surgery within 24 hours of admission to hospital)

Time of emergency admission to hospital	Monday–Friday Median (IQR) time (hours)		Saturday–Sunday Median (IQR) time (hours)	
	Number of hours from admission to arrival in theatre	Number of hours from decision to operate to arrival in theatre	Number of hours from admission to arrival in theatre	Number of hours from decision to operate to arrival in theatre
08.00–11.59	7.2 (5.0–11.0)	1.8 (1.2–3.0)	6.7 (4.0–9.5)	1.5 (1.0–2.8)
12.00–17.59	7.8 (5.5–11.0)	2.0 (1.2–3.0)	7.3 (5.1–9.8)	1.8 (1.2–2.8)
18.00–23.59	10.0 (5.8–16.7)	2.0 (1.2–3.0)	8.9 (4.815.5)	1.8 (1.1–2.8)
00.00–07.59	8.0 (4.9–11.8)	1.8 (1.2–3.2)	8.3 (6.0–12.5)	2.2 (1.5–3.0)
Overall	8.0 (5.3–13.0)	1.8 (1.2–3.0)	7.7 (5.2–12.3)	2.0 (1.2–3.0)

Figure 74
Breakdown of timing of antibiotics and surgery according to time-of-day of admission





Timeliness of arrival in theatre

Table 74
Number of operating theatres

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
Operating theatres					
Range	4–16	6–16	6–23	8–38	4–38
Median (IQR)	8 (6–10)	11 (9–13)	13 (10–15)	21 (17–26)	12 (9–17)
Operating theatres per 100 hospital beds					
Range	1.6–18.4	1.4–4.1	0.9–4.1	0.9–3.5	0.9–18.4
Median (IQR)	2.6 (2.2–3.1)	2.4 (2.0–3.0)	2.4 (1.8–2.7)	2.6 (2.1–2.8)	2.5 (2.1–2.8)
One or more fully staffed operating theatres available for adult EGS cases at all times					
	21 (49%)	36 (84%)	43 (100%)	42 (98%)	142 (83%)
One or more fully staffed operating theatres reserved exclusively for adult EGS cases at all times					
	12 (28%)	14 (33%)	9 (21%)	9 (21%)	44 (26%)

Table 75
Ability to book Expedited cases at short notice onto planned lists

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
	18 (42%)	13 (30%)	18 (42%)	16 (37%)	65 (38%)

Table 76
Emergency list stopped in the last three months due to workload pressures elsewhere

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
	26 (60%)	34 (79%)	32 (74%)	27 (63%)	119 (69%)

Table 77
Proportion of patients who arrived in theatre in a timescale appropriate to their operative urgency category – by time-of-day and day-of-week of arrival in an operating theatre. Expedited surgery has been excluded from this analysis

Time of arrival in operating theatre	Monday–Friday (%)			Saturday–Sunday (%)		
	Surgery required within 2 hours	Surgery required within 2–6 hours	Surgery required within 6–18 hours	Surgery required within 2 hours	Surgery required within 2–6 hours	Surgery required within 6–18 hours
08.00–11.59	81.7	80.5	75.2	75.2	80.6	75.4
12.00–17.59	74.5	85.3	79.9	67.3	87.4	78.8
18.00–23.59	71.3	86.8	93.9	73.5	87.4	90.6
00.00–07.59	82.9	89.0	94.9	80.8	88.2	98.0
Overall	**76.7**	**85.4**	**81.9**	**73.6**	**86.3**	**80.7**

Table 78
Proportion of patients who arrived in theatre in a timescale appropriate to their operative urgency after the decision was made to perform surgery (or from time of booking if time of decision unavailable). Expedited surgery has been excluded from this analysis

	Surgery required within 2hours		Surgery required within 2–6 hours		Surgery required within 6–18 hours		All patients assessed	
	n=	%	n=	%	n=	%	n=	%
Age (years)								
18–39	223	82.6	784	86.3	572	82.0	1,579	84.2
40–49	205	79.8	721	87.6	524	81.4	1,450	84.1
50–59	282	76.4	976	86.2	802	80.9	2,060	82.7
60–69	459	75.3	1,429	84.3	1,104	81.1	2,992	81.6
70–79	507	75.3	1,783	85.9	1,392	81.6	3,682	82.7
80–89	264	70.4	1,291	84.8	952	82.8	2,507	82.3
≥90	29	72.5	157	85.3	159	82.0	345	82.5
ASA								
1	156	83.9	790	88.1	637	86.3	1,583	86.9
2	373	76.1	2,271	84.4	2,292	82.2	4,936	82.7
3	440	68.22	2,429	84.3	2,019	79.7	4,888	80.7
4	741	76.6	1,540	88.0	538	81.9	2,819	83.6
5	259	84.6	111	93.3	19	79.2	389	86.6
Admission type								
Emergency	1,727	75.5	6,563	85.5	5,251	81.3	13,541	82.5
Elective	242	79.3	578	87.3	254	88.8	1,074	85.7
Documented risk								
Lower	211	78.2	1,905	84.4	2,032	81.5	4,148	82.7
High	243	70.6	1,268	87.0	953	81.6	2,464	83.0
Highest	1,111	75.9	2,275	87.4	891	82.8	4,277	83.2
Not documented	404	78.1	1,693	83.7	1,629	81.2	3,726	82.0
Overall	**1,969**	**75.9**	**7,141**	**85.6**	**5,505**	**81.6**	**14,615**	**82.7**

Critical care

Table 79
Proportion of patients admitted directly to a critical care bed after surgery – by patient characteristics (excluding 79 patients who died intraoperatively and 504 patients with an active decision not to admit to critical care)

	Total number of patients	Proportion of patients admitted directly to a critical care bed after surgery (%)
Age (years)		
18–39	2,745	42.8
40–49	2,399	50.2
50–59	3,448	55.6
60–69	5,020	63.1
70–79	6,044	70.4
80–89	4,098	74.6
≥90	560	72.5
ASA		
1	2,535	34.9
2	8,722	47.2
3	8,603	70.6
4	4,041	91.6
5	413	98.1
Admission type		
Emergency	22,713	61.6
Elective	1,601	75.0
Overall	**24,314**	**62.4**

Table 80
Proportion of patients admitted directly to a critical care bed after surgery – by operative urgency (excluding 79 patients who died intraoperatively and 504 patients with an active decision not to admit to critical care)

Urgency of surgery	Total number of patients	Proportion of patients admitted directly to a critical care bed after surgery (%)
<2 hours	2,707	88.5
2–6 hours	9,395	69.3
6–18 hours	8,015	53.8
18–24 hours	4,116	46.5
Overall	**24,233**	**62.4**
(Data missing)	*81*	*65.4*

Table 81
Proportion of all patients admitted directly to a critical care bed after surgery – by time-of-day and day-of-week that surgery was commenced (excluding 79 patients who died intraoperatively and 504 patients with an active decision not to admit to critical care)

Time of arrival in operating theatre	Monday–Friday		Saturday–Sunday	
	Total number of patients	Proportion of patients admitted directly to a critical care bed after surgery (%)	Total number of patients	Proportion of patients admitted directly to a critical care bed after surgery (%)
08.00-11.59	4,271	55.9	1,446	59.7
12.00-17.59	7,505	58.8	2,363	60.7
18.00-23.59	4,261	67.6	1,436	69.2
00.00-07.59	1,442	78.9	557	77.2
Overall	**17,479**	**61.9**	**5,802**	**64.1**
(Data missing)	*763*	*61.5*	*270*	*61.9*

Table 82
Proportion of patients admitted directly to a critical care bed after surgery based on calculated postoperative P-POSSUM risk of death (excluding 79 patients who died intraoperatively and 504 patients with an active decision not to admit to critical care)

Risk category by calculated postoperative P-POSSUM risk of death	Total number of patients	Proportion of patients admitted directly to a critical care bed after surgery (%)
Lower (<5%)	10,353	39.9
High (5–10%)	4,379	62.7
Highest (>10%)	9,582	86.6
(All patients with risk ≥ 5%)	(13,961)	(79.1)
Overall	**24,314**	**62.4**

Table 83
Proportion of all patients admitted directly to a critical care bed after surgery – by the day-of-week that surgery was commenced (excluding 79 patients who died intraoperatively and 504 patients with an active decision not to admit to critical care)

Day of arrival in operating theatre	Total number of patients	Proportion of patients admitted directly to a critical care bed after surgery (%)
Monday	2,957	61.5
Tuesday	3,727	64.4
Wednesday	3,932	60.9
Thursday	3,871	60.8
Friday	3,755	61.9
Saturday	3,118	63.8
Sunday	2,954	64.3
Overall	24,314	62.4

Table 84
Critical care service provision

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
Funded critical care beds available to adult general-surgical patients					
Range	4–23	7–34	10–66	11–69	4–69
Median (IQR)	9 (7–11)	12 (9–14)	15 (12–16)	22 (15–33)	13 (10–18)
Funded critical care beds available to adult general-surgical patients per 100 hospital beds					
Range	1.9–16.3	1.6–8.6	1.5–12.3	1.2–7.3	1.2–16.3
Median (IQR)	2.8 (2.5–3.5)	2.7 (2.2–3.5)	2.5 (2.1–3.0)	2.6 (1.9–4.0)	2.7–13.5)
24-hour critical care unit covered by a named consultant with regular critical care sessions					
	33 (77%)	40 (93%)	42 (98%)	43 (100%)	158 (92%)
24 hour critical care outreach service					
	16 (37%)	23 (53%)	27 (63%)	26 (60%)	92 (53%)

Table 85
Proportion of all patients admitted directly to a critical care bed after surgery – by the time that surgery was commenced (excluding 79 patients who died intraoperatively and 504 patients with an active decision not to admit to critical care)

Time of arrival in operating theatre	Total number of patients	Proportion of patients admitted directly to a critical care bed after surgery (%)
08 00–11 59	5,717	56.9
12 00–17 59	9,868	59.3
18 00–23 59	5,697	68.0
00 00–07 59	1,999	78.4
Overall	23,281	62.5
(Data missing)	*1,033*	*61.6*

Table 86
Enhanced monitoring facilities

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
Area outside critical care offering enhanced monitoring, cardiovascular support, ventilation, enhanced staffing ratios					
	11 (26%)	15 (35%)	23 (53%)	27 (63%)	76 (44%)
If yes: Able to offer ventilation					
	6 (55%)	5 (33%)	10 (43%)	8 (30%)	29 (38%)
If yes: Able to administer vasoactive medications					
	9 (82%)	13 (87%)	12 (52%)	19 (70%)	53 (70%)
If yes: Able to offer ventilation and administer vasoactive medications					
	6 (55%)	5 (33%)	9 (39%)	8 (30%)	28 (37%)

Table 87
Proportion of patients admitted directly to a critical care bed after surgery – based on documented preoperative risk category (excluding 79 patients who died intraoperatively and 504 patients with an active decision not to admit to critical care)

Documented preoperative risk category	Total number of patients	Proportion of patients admitted directly to a critical care bed after surgery (%)
Lower (<5%)	7,154	41.8
High (5–10%)	4,076	73.6
Highest (>10%)	5,911	91.4
Not documented	7,173	52.8
Overall	24,314	62.4

Table 88
Proportion of patients with a calculated postoperative P-POSSUM risk of death >10% admitted directly to a critical care bed after surgery – by time-of-day and day-of-week that surgery was commenced (excluding 79 patients who died intraoperatively and 504 patients with an active decision not to admit to critical care)

Time of arrival in operating theatre	Monday–Friday		Saturday–Sunday	
	Total number of patients	Proportion of patients admitted directly to a critical care bed after surgery (%)	Total number of patients	Proportion of patients admitted directly to a critical care bed after surgery (%)
08.00–11.59	1,504	82.8	502	86.5
12.00–17.59	2,685	84.1	870	83.7
18.00–23.59	1,910	89.2	653	90.7
00.00–07.59	820	93.8	304	93.4
Overall	**6,919**	**86.4**	**2,329**	**87.5**
(Data missing)	*261*	*84.3*	*73*	*91.8*

Table 89
Proportion of patients with a calculated postoperative P-POSSUM risk of death >10% admitted directly to a critical care bed after surgery – by the day-of-week that surgery was commenced (excluding 79 patients who died intraoperatively and 504 patients with an active decision not to admit to critical care)

Day of arrival in operating theatre	Total number of patients	Proportion of patients admitted directly to a critical care bed after surgery (%)
Monday	1,157	87.3
Tuesday	1,563	87.0
Wednesday	1,479	85.6
Thursday	1,503	85.6
Friday	1,478	86.2
Saturday	1,263	87.4
Sunday	1,139	87.9
Overall	**9,582**	**86.6**

Diagnostics: radiology, endoscopy and laboratory services

Table 90
24-Hour availability of on-site diagnostic facilities

	Number of hospitals (%) n = 172
Imaging modality	
X-ray	172 (100%)
Ultrasound	83 (48%)
Computed tomography	171 (99%)
24-hour CT reporting	
Contemporaneous CT reporting by a radiologist	167 (97%)
Contemporaneous CT reporting by a radiologist with gastrointestinal specialisation	0 (0%)

Table 91
Preoperative CT scanning and reporting by a consultant radiologist – by documented urgency of surgery

Urgency of surgery	CT scan performed		CT scan reported	
	Total number of patients	CT scan before surgery (%)	Total number of patients	CT scan reported by a consultant radiologist before surgery (%)
<2 hours	2,848	75.9	2,719	64.4
2–6 hours	9,533	86.7	9,048	77.9
6–18 hours	8,057	88.5	7,685	84.8
18–24 hours	4,151	85.5	4,002	83.1
Overall	**24,589**	**85.8**	**23,454**	**79.5**
(Data missing)	*65*	*81.5*	*59*	*76.3*

Table 92
Preoperative CT scanning and reporting by a consultant radiologist – by time-of-day and day-of-week of emergency hospital admission

Time of emergency admission to hospital	Monday–Friday		Saturday–Sunday	
	CT scan before surgery (%)	CT scan reported by a consultant radiologist before surgery (%)	CT scan before surgery (%)	CT scan reported by a consultant radiologist before surgery (%)
08.00–11.59	84.5	79.9	86.7	78.2
12.00–17.59	86.1	80.8	87.2	79.3
18.00–23.59	86.5	79.8	87.4	78.8
00.00–07.59	84.5	79.1	84.5	74.0
Overall	**85.6**	**80.0**	**86.6**	**77.9**

Table 93
Preoperative CT scanning and reporting – by patient characteristics

	CT scan performed		CT scan reported	
	Total number of patients	Proportion who had a CT scan before surgery (%)	Total number of patients	Proportion who had a CT scan reported by a consultant radiologist before surgery (%)
Age (years)				
18–39	2,733	74.8	2,616	67.7
40–49	2,392	84.5	2,294	77.2
50–59	3,474	86.5	3,293	79.4
60–69	5,090	87.4	4,875	81.2
70–79	6,181	87.6	5,878	81.7
80–89	4,210	88.2	4,004	82.6
≥90	574	89.4	553	84.6
ASA				
1	2,529	82.1	2,421	74.4
2	8,694	86.5	8,288	81.0
3	8,706	87.1	8,298	81.2
4	4,220	85.7	4,021	78.0
5	505	72.3	485	62.5
Admission type				
Emergency	23,041	86.6	21,974	80.3
Elective	1,613	74.5	1,539	68.0
Documented risk				
Lower	6,162	86.3	6,822	80.8
High	3,643	88.4	3,955	81.5
Highest	5,411	87.0	5,962	79.6
Not documented	5,942	82.9	6,774	77.0
Overall	**24,654**	**85.8**	**23,513**	**79.5**

Table 94
24-hour availability of other on-site diagnostic and interventional services

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
Interventional radiology					
	4 (9%)	11 (26%)	15 (35%)	30 (70%)	60 (35%)
Diagnostic endoscopy					
	28 (65%)	27 (63%)	31 (72%)	37 (86%)	123 (72%)
Interventional endoscopy					
	26 (60%)	33 (77%)	34 (79%)	35 (81%)	128 (74%)

Table 95
Hospital access to laboratory services

	Small hospitals 49–60 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
Biochemistry, haematology, and blood bank laboratories					
	41 (95%)	42 (98%)	42 (98%)	43 (100%)	168 (98%)
Consultant advice for biochemistry, haematology, and blood bank					
	34 (79%)	43 (100%)	37 (86%)	43 (100%)	157 (91%)
Microbiology laboratories					
	36 (84%)	37 (86%)	38 (88%)	40 (93%)	151 (88%)
Consultant advice for microbiology					
	43 (100%)	43 (100%)	43 (100%)	43 (100%)	172 (100%)

Emergency laparotomy and the care of older patients

Table 96
Policies for the routine assessment of older patients undergoing emergency laparotomy

	Number of hospitals (%) n = 172
Frailty – score used	51 (30%)
Frailty – no score used	21 (12%)
Nutritional status – score used	120 (70%)
Nutritional status – no score used	11 (6%)
Cognitive function – score used	102 (59%)
Cognitive function – no score used	18 (10%)
Functional status – score used	71 (41%)
Functional status – no score used	37 (22%)

Table 97
Proportion of patients aged 70 years or over assessed after surgery by a care of the older person specialist following emergency laparotomy – by patient age

	Total number of patients	Proportion of patients assessed after surgery by a care of the older person specialist (%)
70–79	4,739	15.0
80–89	3,233	23.9
≥90	450	31.8
Overall	**8,422**	**19.4**

Table 98
Proportion of patients aged 70 years or over who were assessed after surgery by a care of the older person specialist following emergency laparotomy – by patient characteristics

	Total number of patients	Proportion of patients assessed after surgery by a care of the older person specialist (%)
ASA		
1	201	14.9
2	2,318	15.5
3	3,762	20.4
4	1,954	22.7
5	187	15.5
Admission type		
Emergency	7,890	19.6
Elective	532	15.6
Documented risk		
Lower	1,656	15.4
High	1,747	22.3
Highest	3,021	22.1
Not documented	1,998	15.9
Overall	**8,422**	**19.4**

Table 99
Input by care of the older person specialists

	Number of hospitals (%) n = 172
Preoperative input by care of the older person specialist	
Proactive	6 (3%)
On request only	130 (76%)
No formal service	36 (21%)
Postoperative input by care of the older person specialist	
Proactive	18 (10%)
On request only	141 (82%)
No formal service	13 (8%)

Clinical governance, pathways and policies

Table 100
Specialties providing input into reviews of mortality after emergency general surgery

	Small hospitals 49–360 beds n = 43	Medium hospitals 362–502 beds n = 43	Large hospitals 506–653 beds n = 43	Very large hospitals 666–1,183 beds n = 43	All hospitals n = 172
Surgery	42 (98%)	42 (98%)	40 (93%)	39 (91%)	163 (95%)
Anaesthesia	26 (60%)	20 (47%)	24 (56%)	24 (56%)	94 (55%)
Critical care	24 (56%)	21 (49%)	22 (51%)	26 (60%)	93 (54%)
Radiology	6 (14%)	9 (21%)	4 (9%)	6 (14%)	25 (15%)
Care of the older person	7 (19%)	6 (14%)	4 (9%)	6 (14%)	23 (13%)
Surgery, anaesthesia, and critical care	24 (56%)	16 (37%)	20 (47%)	23 (53%)	83 (48%)

Table 101
Full wording of Organisational Audit question related to perioperative care

'At your trust, are there formal written pathways/protocols/policies applicable to the emergency general surgical patient incorporating the following: ***These may exist within pathways/protocols, or be incorporated into a single policy relevant to the unscheduled adult surgical patient.'***	
3.1	Monitoring plan compliant with NICE CG50 pathway ('Acutely ill patients in hospital')?
3.2	Formalised provision for the deferment of elective activity in order to give adequate priority to unscheduled admissions?
3.3	A formal pathway for the identification of patients with signs of sepsis, and prompt prescription and administration of antibiotics?
3.4	Referral of patients for general-surgery review if they have been admitted under non-surgical specialties?
3.5	A pathway for the identification and escalation of care of patients who would benefit from the opinion of a consultant surgeon before the next scheduled ward round?
3.6	A formal pathway for the rapid request, conduct, and reporting of CT scans for emergency general surgical patients?
3.7	Timing of surgery according to clinical urgency?
3.8	A formal calculation of risk that provides an estimation of perioperative mortality?
3.9	Seniority of anaesthetist present in theatre according to patient's risk of death?
3.10	Seniority of surgeon present in theatre according to patient's risk of death?
3.11	Location of postoperative care according to patient's risk of death such that high-risk patients are allocated to critical care?
3.12	Explicit arrangements with Elderly Medicine for review of selected patients?
3.13	A formal pathway for the enhanced recovery of the emergency surgical patient?
3.14	Do you have a single pathway/policy for the care of the unscheduled Adult General Surgical patient?

Additional data

Table 102
Proportions of patients receiving goal-directed fluid therapy and method of provision – by patient characteristics

	Total number of patients	Proportion of patients (%)		
		Cardiac output monitor	Other method	Overall
Age (years)				
18–39	2,762	30.3	14.2	44.5
40–49	2,426	33.8	15.3	49.1
50–59	3,507	35.5	16.6	52.1
60–69	5,144	38.6	16.8	55.4
70–79	6,226	39.4	17.4	56.8
80–89	4,248	40.6	18.6	59.2
≥90	584	38.7	15.4	54.1
ASA				
1	2,548	28.8	14.0	42.9
2	8,786	33.1	15.4	48.5
3	8,790	39.4	17.5	56.9
4	4,264	45.8	19.5	65.3
5	509	46.4	18.5	64.8
Admission type				
Emergency	23,263	37.2	16.7	53.9
Elective	1,634	39.1	17.6	56.7
Documented risk				
Lower	7,192	34.1	15.4	49.5
High	4,150	43.1	17.8	60.8
Highest	6,265	47.7	18.7	66.4
Not documented	7,290	28.3	15.8	44.1
Overall	**24,897**	**37.3**	**16.8**	**54.1**

Table 103
Proportions of patients receiving goal-directed fluid therapy and method of provision – by documented urgency of surgery

Urgency of surgery	Total number of patients	Proportion of patients (%)		
		Cardiac output monitoring	Other method	Overall
<2 hours	2,873	45.1	18.3	63.4
2–6 hours	9,604	40.4	16.9	57.3
6–18 hours	8,127	34.2	16.9	51.2
18–24 hours	4,208	30.9	15.0	46.0
Overall	**24,812**	**37.3**	**16.8**	**54.1**

15.4 Standards of care and summary of recommendations

ASGBI EGS
Emergency General Surgery: the future, a consensus statement. *ASGBI*, 2007
http://bit.ly/2wuPPYr

ASGBI IPP
Issues in professional practice: emergency general surgery. *ASGBI*, 2012
http://bit.ly/2vsRaCN

ASGBI PS
Patient safety: a consensus statement. *ASGBI*, 2009
http://bit.ly/2wuPPYr

GMC
Good Medical Practice. *GMC*, 2013
http://bit.ly/1cNq7UM

NCEPOD Age
An Age Old problem: a review of the care received by elderly patients undergoing surgery. *NCEPOD*, 2010

http://bit.ly/1hMktB0

NCEPOD EA
Emergency Admissions: a journey in the right direction. *NCEPOD*, 2007
http://bit.ly/2wuDL9x

NCEPOD KTR
Knowing the risk: a review of the perioperative care of surgical patients. *NCEPOD*, 2011
http://bit.ly/1hMkTY8

NHS 7 Day Services
Seven day services clinical standards. *NHS Improvement*, 2017.
http://bit.ly/2xmOln9

NICE CG50
Clinical Guideline 50: acutely ill patients in hospital. *NICE*, 2007
http://bit.ly/2wuQDg0

NICE MTG3
Medical Technologies Guidance MTG3: CardioQ-ODM. *NICE*, 2011
http://bit.ly/2wuE2cz

NICE NG51
Sepsis: recognition, diagnosis and early management. *NICE*, 2016
http://bit.ly/2wuwoyQ

NSF Older People
The National Service Framework for Older People. *DH*, 2001
http://bit.ly/1hMlljq

RCoA GPAS
Guidance on the provision of anaesthesia services for emergency surgery. *RCoA*, 2017
www.rcoa.ac.uk/gpas2017

RCS EESC
Separating emergency and elective surgical care: recommendations for practice. *RCSEng*, 2007
http://bit.ly/2x7xhBl

RCS HR
The Higher Risk General Surgical Patient: towards improved care for a forgotten group. *RCSEng & DH*, 2011
http://bit.ly/2wuC0Ju

RCS USC
Emergency Surgery Standards for unscheduled surgical care. *RCSEng*, 2011
http://bit.ly/2wuAWWh

SSC
International Guidelines for Management of Severe Sepsis and Septic Shock. *Surviving Sepsis Campaign*, 2016
http://bit.ly/2wumFJd

NELA
National Emergency Laparotomy Audit

KEY STANDARDS AGAINST WHICH CARE IS REPORTED IN THIS REPORT

Chapter 9.1

An assessment of mortality risk should be made explicit to the patient and recorded clearly on the consent form and in the medical record.
NCEPOD KTR

Patients must be actively involved in shared decision making and supported by clear information from healthcare professionals to make fully informed choices about treatment and ongoing care that reflect what is important to them. This should happen consistently, seven days a week.
NHS Seven Day Services

We recommend that objective risk assessment become a mandatory part of the preoperative checklist to be discussed between surgeon and anaesthetist for all patients. This must be more detailed than simply noting the ASA score.
RCS HR

Chapter 9.2

You must contribute to the safe transfer of patients between healthcare providers and between health and social care providers. This means you must share all relevant information with colleagues involved in your patients' care within and outside the team, including when you hand over care as you go off duty, when you delegate care or refer patients to other health or social care.
GMC

Chapter 9.3

Patients admitted as an emergency should be seen by a consultant at the earliest opportunity. Ideally this should be within 12 hours and should not be longer than 24 hours.
NCEPOD EA

All emergency admissions must be seen and have a thorough clinical assessment by a suitable consultant as soon as possible, but at the latest within 14 hours from the time of arrival at hospital.
NHS 7 Day Services

Chapter 9.4

Each higher-risk case (predicted mortality ≥5%) should have the active input of consultant surgeon and consultant anaesthetist.
RCS HR

A consultant surgeon (CCT holder) and consultant anaesthetist are present for all cases with predicted mortality >10% and for cases with predicted mortality ≥5%, except in specific circumstances where adequate experience and manpower is otherwise assured.
RCS USC

Each higher-risk case (predicted mortality ≥5%) should have the active input of consultant surgeon and consultant anaesthetist. Surgical procedures with a predicted mortality of >10% should be conducted under the direct supervision of a consultant surgeon and a consultant anaesthetist unless the responsible consultants have actively satisfied themselves that junior staff have adequate experience and manpower and are adequately free of competing responsibilities.
RCS HR

Chapter 10.1

Those with septic shock require immediate broad-spectrum antibiotics with fluid resuscitation and source control.
RCS HR

We recommend that administration of IV antimicrobials be initiated as soon as possible after recognition and within one hour for both sepsis and septic shock.
SSC

Trusts should ensure emergency theatre access matches need, and ensure prioritisation of access is given to emergency surgical patients ahead of elective patients whenever necessary, as significant delays are common and affect outcomes.
RCS HR

Chapter 10.2

Trusts should ensure emergency theatre access matches need, and ensure prioritisation of access is given to emergency surgical patients ahead of elective patients whenever necessary, as significant delays are common and affect outcomes.
RCS HR

The time from decision to operate to actual time of operation is recorded in patient notes and audited locally.
RCS USC

Delays in surgery for the elderly are associated with poor outcome. They should be subject to regular and rigorous audit, and this should take place alongside identifiable agreed standards.
NCEPOD Age

Chapter 10.3

All high-risk patients should be considered for critical care, and, as a minimum, patients with an estimated risk of death of >10% should be admitted to a critical care location.
RCS HR

Intensive care requirements are considered for all patients needing emergency surgery. There is close liaison and communication between the surgical, anaesthetic and intensive-care teams perioperatively.–.with the common goal of ensuring optimal safe care in the best interests of the patient.
RCS USC

The outcome of high-risk general-surgical patients could be improved by the adequate and effective use of critical care in addition to a better preoperative risk stratification protocol.
ASGBI PS

Chapter 11.1

Hospitals which admit patients as emergencies must have access to both conventional radiology and CT scanning 24 hours per day, with immediate reporting.
NCEPOD EA

Consultant-directed diagnostic tests and completed reporting will be available seven days a week, within one hour for critical patients (i.e. those for whom the test will alter their management at the time).
NHS 7 Day Services

The delivery of quality clinical care is dependent on access to supporting facilities. Rapid access to CT imaging, ultrasound scanning and laboratory analyses are critical to the efficient diagnosis, resuscitation and prioritisation of these patients.
ASGBI EGS

Chapter 11.2

Clear protocols for the postoperative management of elderly patients undergoing abdominal surgery should be developed which include, where appropriate, routine review by an MCOP [medicine for care of older people] consultant and nutritional assessment.
NCEPOD Age

Co-morbidity, disability and frailty need to be clearly recognised as independent markers of risk in the elderly. This requires skill and multidisciplinary input, including early involvement of medicine for the care of older people specialists.
NCEPOD Age

All emergency inpatients must have prompt assessment by a multiprofessional team to identify complex or ongoing needs, unless deemed unnecessary by the responsible consultant.
NHS 7 Day Services

NELA
National Emergency Laparotomy Audit

SUMMARY OF RECOMMENDATIONS MADE IN THIS REPORT

Chapter 3 (High level recommendations)

Commissioners

Commissioners should ensure that there is adequate commissioning of:

- capacity to deliver consultant-delivered care, multidisciplinary specialist input, and reliable access to other services such as CT scanning and reporting, throughout the whole patient journey regardless of the time of the day or the day of the week
- theatre capacity to prevent delays for patients requiring emergency bowel surgery, particularly those requiring surgery within two hours
- critical-care capacity to match high-risk caseload, such that all high-risk emergency laparotomy patients can be cared for on a critical care unit after surgery – expected critical care capacity can be modelled from NELA data
- care of older people services to provide input for older patients
- formal networks to support smaller hospitals in providing acute diagnostic and interventional radiology and endoscopy services.

Providers (hospital chief executives and medical directors)

In order to deliver high-quality care that meets standards to high-risk emergency patients, attention should be directed at organisational change in the following areas, working towards:

- ensuring that care is delivered by consultant anaesthetists and consultant surgeons for high risk emergency laparotomy patients 24 hours per day, seven days per week. Rotas, job plans and staffing levels for surgeons and anaesthetists should reflect this
- ensuring that older patients undergoing emergency laparotomy receive care from geriatricians to the same extent as older patients undergoing hip-fracture repair, where it has been shown to improve outcomes. Consideration should be given to how to fund an increased input from geriatricians and care of the older person teams
- developing policies and supporting training in the use of individual patient risk assessment to guide allocation of resources (e.g. critical care) appropriate to the patient's needs. Policies constitute a clear statement of intent to deliver care that meets standards, and are associated with delivery of better care
- providing emergency theatre capacity that is sufficient to enable patients to receive emergency surgical treatment, particularly those who need surgery within two hours. Prioritisation of time-sensitive emergency surgery can be facilitated by policies for the deferral of elective activity
- adhering to national standards for postoperative critical care admission. This may require an increase in critical care capacity so that emergency and elective care can continue in parallel
- supporting and facilitating local NELA Leads and perioperative teams by ensuring adequate time and resources to support accurate data collection, review adverse patient outcomes and to feed this back to clinical teams and hospital management (including at Board level). Such resources include access to individuals with audit and quality improvement skills throughout the organisation, allocated (job-planned) time to support data collection and analysis, and protected time for presentation of data in departmental meetings
- ensuring that clinical coding of procedures is accurate, and embedding links between clinical-coding departments and clinicians to improve this.

Clinical directors and multidisciplinary teams

- In order to reduce unwarranted variation in care and minimise delays, hospitals should implement appropriate pathways for the care of emergency general surgical patients, starting at the time of admission to hospital or referral by another team. Where pathways of care do already exist, multidisciplinary teams (MDTs) should examine these in the light of audit data to determine their efficacy, and identify where and why standards are still not met. Care pathways help ensure that patients are admitted under the most appropriate specialty, aid communication within the MDT, and allow prioritisation of emergency resources; they aim to ensure that all processes of care are provided for each patient. Standardised pathways of care also facilitate audit and thereby highlight key areas for improvement. Pathways should cover the following areas:
  - referral of patients for general surgical review if they have been admitted under non-surgical specialties
  - identification of patients with signs of sepsis and ensuring the prompt prescription and administration of antibiotics there may be advantages to integrating this into the wider sepsis work ongoing within the NHS
  - identification and escalation of patients who would benefit from the early involvement of both consultant surgeons and consultant anaesthetists, to ensure that consistently high-quality care is delivered by expert teams, and to drive the delivery of timely care for patients
  - rapid request, conduct, and reporting of CT scans
  - routine documented assessment of the risk of complications and death from surgery
  - presence intraoperatively of a consultant surgeon and a consultant anaesthetist for high-risk patients with a predicted mortality ≥5%
  - consideration of admission to critical care for all high-risk patients with a predicted mortality ≥5%
  - identification of patients who would benefit from input from geriatricians in their perioperative care.
- Risk assessment is a useful guide to clinical decision making, and risk should be calculated for every emergency laparotomy patient. NELA strongly advises that care must not be provided purely on the basis of a predicted risk score, but that the risk score should be utilised as part of the global assessment of a patient. It also aids identification and communication of the required pathway of care to the multidisciplinary team, and informs discussion with patients and their families.
- Multidisciplinary teams should hold regular joint meetings to continuously review essential processes of care (for instance, using the NELA Quality Improvement Dashboard) and perioperative morbidity (including unplanned returns to theatre and admissions to critical care) and mortality following emergency laparotomy. This should include formal collaboration with hospital mortality review panels in order to bring about greater understanding of where improvement is needed. Review of mortality following emergency laparotomy should follow NHS England's guidance for trusts, National Guidance on Learning from Deaths.
- Continuous quality improvement informed by local data should involve monitoring the impact of care-pathway and process changes with time-series data (run charts). The NELA web tool provides automated dashboards that can be used for this purpose. Multidisciplinary teams should ensure that they include members with a good understanding of quality improvement principles, such as the 'Model for Improvement'.[2] Consideration should also be given to good data-feedback practices.

NELA Leads

- NELA is producing a job description for NELA leads that sets out expected roles and behaviours. This job description should be used to ensure NELA work is supported locally.

NELA Leads should:

- review their local data to ensure case submission and data completeness
- consider designing care pathways that contain NELA data questions as prompts for clinicians to deliver good care to patients
- actively promote completion of P-POSSUM data fields to ensure that risk estimation is accurate and useful – in addition to aiding discussion with patients and their families, complete data fields also improves accuracy of risk-adjusted hospital mortality rates.

Professional stakeholder organisations

Professional stakeholders, such as Royal Colleges and specialist societies, should collaborate to:

- improve clarity and remove ambiguity in the wording of standards of care this would be particularly welcome for standards for admission to critical care
- bring together standards in a single, unified document
- highlight the issues to their members to ensure appropriate engagement
- ensure that there are joint education and training programmes across specialties and disciplines to develop an equipped workforce.

Patients, families and public

- Patients and families should ask to have the 'risk' of surgery clearly explained to them by their clinical teams to help them understand the possible outcomes of their emergency bowel surgery.
- Patients who are identified as high risk should expect consultant-delivered intraoperative care.
- Patients and their families should expect to receive daily reviews by their surgical teams and to have a clear explanation of the surgery, the timing of their surgery, and the rationale behind clinical decisions made.
- Patients should expect to be cared for in an appropriately staffed area that can provide the appropriate level of expertise and monitoring after high-risk emergency laparotomy surgery.

Chapter 6.3 Unplanned return to theatre

Clinical teams

Consultant-level care is required for postoperative emergency surgical patients who require a return to theatre, because they are at increased risk of dying. Quality improvement work should focus upon the rapid recognition, escalation and access to theatre of these patients.

Chapter 7

Hospital characteristics

Commissioners and providers

Organisational and structural changes to the acute surgical admissions service, including staffing and care pathways, should be tailored to reflect the demands upon individual hospitals. The effects of any changes should be monitored by robust collection and assessment of hospital-level NELA data, to ensure that standards of care are met.

Chapter 9.1 Documentation of risk

Clinical teams

All patients should receive an assessment of risk, not just those perceived to be at high risk. All members of the clinical team should be encouraged to use risk assessment when communicating with colleagues, between disciplines and with patients.

Risk-prediction tools must not be used in isolation to decide on a patient's care, and should be used to guide and support clinical judgement and other information.

Chapter 9.2 Consultant anaesthetist and surgeon working patterns

Clinical directors and multidisciplinary teams

Rotas, job plans, and staffing levels for surgeons and anaesthetists should allow an uninterrupted consultant-delivered service 24 hours a day, seven days per week.

Chapter 9.3 Consultant surgeon review within 14 hours of admission

Clinical directors and multidisciplinary teams

Patients should be seen in a time frame dictated by their clinical urgency seven days per week. Rota patterns and job plans should be reviewed to ensure that a consultant surgeon of the appropriate specialty is free from routine commitments, and therefore always available to see all acute surgical patients, particularly those who require emergency laparotomy, in a timely fashion. A scheduled twice-daily ward round ensures that the care standards are met for all acute surgical patients, including those who do not require emergency laparotomy.

Quality improvement work should be undertaken, which looks at the implementation of pathways for the identification and escalation of care of patients who would benefit from an urgent opinion from a consultant surgeon.

Chapter 9.4 Consultant preoperative assessment, decision making and presence in theatre for high-risk patients

Clinical directors and multidisciplinary teams

There should be robust escalation processes and pathways in place to identify patients requiring emergency bowel surgery who will require early care from a consultant surgeon and anaesthetist.

Particular effort should be directed at improving consultant presence for surgery after 6.00pm and at weekends.

Chapter 10.1 Timeliness of care for peritonitis

Clinical directors and multidisciplinary teams

Hospitals should audit and review their cases of peritonitis to assess their own performance and pathways, benchmarking their processes and structures against recognised standards for administration of antibiotics for sepsis, and for timely access to theatres.

Teams should review their own admission and referral pathways to prioritise unwell patients and, in particular, the management of out-of-hours admissions.

The few hospitals still without policies for identification of sepsis and for antibiotic administration should address this promptly.

Hospitals should utilise induction of new staff, both senior and junior, to publicise sepsis and antibiotic pathways.

Chapter 10.2 Timeliness of arrival in theatre

Commissioners and providers

Commissioners and providers should work together to ensure that adequate theatre capacity is available to meet emergency surgical workload. This can be modelled from estimated caseload provided to individual hospitals by NELA.

Policies should be developed for:

- defining the timeline to surgery and prioritisation of emergency cases according to risk and surgical urgency
- deferral of elective work if theatre space is unavailable to meet surgical urgency.

Clinical directors and multidisciplinary teams

Unified pathways should be designed and implemented to standardise care for unscheduled general surgical admissions requiring emergency laparotomy.

Chapter 10.3 Critical care

Professional stakeholder organisations

Current recommendations are that all emergency laparotomy patients with an estimated risk of death greater than 10% **must** be admitted to a critical care bed postoperatively, and that those with a risk ≥ 5% **should** be considered for critical care. Royal Colleges and specialist societies should review their guidance to consider how to bring these recommendations into line with those regarding other aspects of emergency laparotomy care, and changes in the evidence base.

Commissioners and providers

Provision of critical care beds should be audited to determine whether there is sufficient capacity to provide critical care after surgery, and take appropriate steps to ensure its delivery.

Hospitals that are unable to deliver consultant-led care by clinicians with appropriate experience and competences in critical care must explore how to provide this service.

The NELA Organisational Report highlighted variation in the provision of critical care outreach teams and critical care consultant support. Clinical teams and managers should examine their local structures and service provision to ensure that emergency laparotomy patients receive the level of care appropriate to their risk of deterioration or death.

Clinical teams

All patients undergoing emergency laparotomy surgery should have a formal risk assessment performed, discussed and documented. This should be used to identify patients who will need postoperative care on a critical care unit.

NELA Leads

We encourage hospitals to examine their own data to check local compliance and, if applicable, to understand the reasons why some of the highest-risk patients may not be admitted to critical care after surgery. This is particularly important in the 25% of hospitals that did not meet standards for highest-risk patients and the 45% of hospitals that did not achieve 80% compliance for patients with predicted 30-day mortality risk ≥5%.

Chapter 11.1 Diagnostics: radiology, endoscopy and laboratory services

Commissioners and providers

Hospitals should ensure that they have a comprehensive interventional radiology service on site or available through a defined network arrangement.

Clinical directors and multidisciplinary teams

Pathways should be implemented to facilitate rapid access to CT scanning with reporting by a consultant radiologist for patients who may require emergency laparotomy.

Chapter 11.2 Emergency laparotomy and the care of older patients

Commissioners and providers

Commissioning should support care of the older person services for emergency general surgical patients.

Providers should review their local data urgently regarding the provision of care of the older person services for emergency general surgical patients. They should support the involvement of care of the older person teams in the care of older emergency laparotomy patients, and respond to their need for time to do this.

Clinical directors and multidisciplinary teams

Proactive pathways to facilitate the review of patients aged 70 and over requiring an emergency laparotomy should be developed and implemented.

NELA Leads

NELA Leads should develop a local system that utilises the NELA database to alert specialists in care of the older person to patients aged 70 and over who are listed for emergency laparotomy.

NELA Leads should work with care of the older person physicians to incorporate assessment tools for frailty, malnutrition, cognitive dysfunction, and functional impairment into the clerking pro-forma for all patients aged 70 and over.

Chapter 11.3 Clinical governance, pathways and policies

Commissioners and providers

Commissioners should promote the principles defined by the National Quality Board, working with hospitals to ensure that there is sufficient resource allocated to support the delivery of safe, high-quality care, as defined by this NELA report, for emergency surgical services.

Hospitals should ensure that NELA data are used as part of the suite of quality-assurance metrics available to governance teams.

Senior Leadership Teams should embed regular multidisciplinary case reviews or MDTs that include all relevant disciplines, with active learning from cases to improve future outcomes and processes.

Consultants in anaesthesia and critical care should take ownership, alongside surgeons, of outcomes of emergency laparotomy patients.

Clinicians should support the process of accurate clinical coding of emergency surgical cases (for example, through good notekeeping by junior doctors) to ensure that centrally held datasets, such as HES, will be clinically relevant, accurate and useful for national projects such as NELA.

Clinical teams

Clinical teams should develop patient-specific pathways of care for emergency surgery patients.

Teams should monitor the efficacy of these pathways by analysis of the expected standards of care against their locally measured performance captured by the Audit.

Where variation from the care described in the pathway exist, teams should use quality improvement methodology to analyse and address the discrepancies.

Clinical teams should regularly (two-monthly) review their morbidity and mortality associated with emergency general surgery using a structured methodology. These teams should comprise all relevant clinical services involved in the case as a minimum, surgery, anaesthesia and critical care.

Anaesthetic departments should ensure that suitable time and resource is given to these governance requirements, and co ordinate their efforts with surgical and other teams to allow multidisciplinary discussion of performance, in addition to regular timely review of local NELA data (available via data export or visualised as time-series run charts on the NELA QI dashboard).

NELA Leads

NELA Leads should make NELA site data available to departmental and hospital governance teams as part of ongoing quality assurance reporting structures.

NELA Leads should ensure that protocols and pathways for the early identification and management of sepsis in emergency laparotomy patients are routinely available at every hospital performing emergency laparotomy.

Chapter 12 Quality improvement

Commissioners and providers

Commissioners should work with providers to ensure that there is sufficient quality improvement capacity and capability to make best use of NELA data to improve care locally.

Providers should ensure that NELA teams have access to quality improvement skills training to enable local use of national data.

Providers should ensure that local leads have the correct time and support allocated to allow continued data collection, and that they have time for multidisciplinary working on pathway improvements.

Clinical teams

Clinical teams should appraise their local performance, and use QI methodology to plan and execute improvements informed by their data.

NELA Leads

NELA Leads should seek to use their own data for improvement and provide regular feedback of data to others as part of iterative improvement cycles.

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15.5 Hospital data providing detail on each individual hospital's facilities, broken down according to geographical region Hospital size: 1=smallest quartile, 4 =largest

Region	Hospital Code	Health Boards	Hospital Name	Operating theatre available 24/7	Operating theatre available 24/7, exclusively for EGS patients	Emergency surgical unit	Minimum four tier surgical rota at all times	Contemporaneous CT reporting 24/7	Formal rota for on-site interventional radiology 24/7	Formal rota for on-site diagnostic endoscopy 24/7	Formal rota for on-site interventional endoscopy 24/7	Consultant pathology advice 24/7	Critical care unit with 24/7 cover by consultant intensivist	Critical care outreach availability 24/7	Policy for formal calculation of risk of perioperative mortality	Policy for anaesthetic seniority according to risk	Policy for surgical seniority according to risk	Policy for location of post-op care according to risk	Explicit arrangements for review by Elderly Medicine	Policy for deferment of elective activity to prioritise emergencies	Pathway for the management of patients with sepsis	Pathway for enhanced recovery of EGS patients	Single pathway for adult EGS patients	At least bi-monthly reviews of all EGS deaths	Pre-op input by Elderly Medicine for EGS patients (Key 2)	Post-op input by Elderly Medicine for EGS patients (Key 2)	Peri-op input by general medicine for EGS patients (Key 2)	Quartile (based on total number of hospital beds)
London - North Central	BNT	Royal Free London NHS Foundation Trust	Barnet Hospital	↓							↓				↑		↑	↑					↓	↓		↑			1
London - North Central	NMH	North Middlesex University Hospital NHS Trust	North Middlesex University Hospital		↑	↑	↓		↑					↑	↑		↓		↓				↓							3
London - North Central	RFH	Royal Free London NHS Foundation Trust	Royal Free Hospital																↑				↑				↑			2
London - North Central	UCL	University College London Hospitals NHS Foundation Trust	University College Hospital		↓		↑								↑				↓				↓							3
London - North Central	WHT	Whittington Health	Whittington Hospital	↑	↑		↑					↑			↑								↑		↓	↓			1
London - North East	HOM	Homerton University Hospital NHS Foundation Trust	Homerton Hospital	↓						↓					↑	↑	↑	↑		↓									2
London - North East	KNG	Barking Havering & Redbridge Univ Hosps NHS Trust	King George Hospital	↓	↓			↑			↑				↓				↑	↓			↑						1
London - North East	LON	Barts Health NHS Trust	The Royal London Hospital												↑						↑				↑				3
London - North East	NWG	Barts Health NHS Trust	Newham University Hospital	↑						↓			↑						↓						↑				2
London - North East	QHR	Barking Havering & Redbridge Univ Hosps NHS Trust	Queen's Hospital - Romford		↑	↓		↑		↓					↓				↑	↓			↑						4
London - North East	WHC	Barts Health NHS Trust	Whipps Cross University Hospital			↑	↑			↑					↑				↑	↓			↓						2
London - North West	EAL	London North West Healthcare NHS Trust	Ealing Hospital																										1
London - North West	HIL	The Hillingdon Hospitals NHS Foundation Trust	Hillingdon Hospital										↑		↑		↑												2
London - North West	NPH	London North West Healthcare NHS Trust	Northwick Park/St Marks Hospital			↓		↓						↑		↑	↑		↑							↓			4
London - North West	STM	Imperial College Healthcare NHS Trust	St Mary's Hospital						↓	↓					↑	↑	↑				↑					↓			1
London - North West	WMU	Chelsea and Westminster Hosp NHS Foundation Trust	West Middlesex University Hospital			↓								↑	↑	↑	↑	↑	↑										1
London - South East	BRO	King's College Hospital NHS Foundation Trust	The Princess Royal University Hospital		↓	↑					↑				↑	↑	↑	↑	↑	↑		↑	↑						2
London - South East	KCH	King's College Hospital NHS Foundation Trust	King's College Hospital			↓									↑	↑	↑	↑			↑								4
London - South East	LEW	Lewisham and Greenwich NHS Trust	University Hospital Lewisham						↑	↑	↑								↓				↓	↓		↓			2
London - South East	QEL	Lewisham and Greenwich NHS Trust	Queen Elizabeth Hospital (Lewisham and Greenwich NHS Trust)				↑		↑	↑	↑			↓	↑		↑												2
London - South East	STH	Guy's and St Thomas' NHS Foundation Trust	St Thomas' Hospital			↓	↓								↑			↑					↓	↑					3
London - South West	CHX	Imperial College Healthcare NHS Trust	Charing Cross						↓	↓					↑			↑	↑					↑		↑	↑		3
London - South West	GEO	St George's Healthcare NHS Trust	St George's Hospital		↑	↑										↑	↑	↑						↑	↓	↓	↓	↓	4
London - South West	KTH	Kingston Hospital NHS Trust	Kingston Hospital		↓		↑		↓						↑	↑	↑	↑	↑	↑		↑	↑				↑		3
London - South West	MAY	Croydon Health Services NHS Trust	Croydon University Hospital			↓	↑			↑					↑					↑			↓	↓			↓		2
London - South West	SHC	Epsom and St Helier University Hospitals NHS Trust	St Helier Hospital		↓				↓											↑			↓						1
London - South West	WES	Chelsea and Westminster Hosp NHS Foundation Trust	Chelsea and Westminster Hospital				↓			↓	↑				↑	↑				↓			↑	↓		↑			2
Central - East Midlands	CHE	Chesterfield Royal Hospital NHS Foundation Trust	Chesterfield Royal Hospital								↓				↑							↑			↓				3
Central - East Midlands	DER	Derby Hospitals NHS Foundation Trust	Royal Derby Hospital		↓									↓	↑								↑				↑			4
Central - East Midlands	KGH	Kettering General Hospital NHS Foundation Trust	Kettering General Hospital		↓			↑							↑	↑	↑	↑		↑			↓		↑	↑	↑		3
Central - East Midlands	KMH	Sherwood Forest Hospitals NHS Foundation Trust	Kings Mill Hospital		↑											↑	↑	↑	↑	↑				↓					3
Central - East Midlands	LEI	University Hospitals of Leicester NHS Trust	Leicester General Hospital	↑		↑																							1
Central - East Midlands	LER	University Hospitals of Leicester NHS Trust	Leicester Royal Infirmary																				↑			↓	↓		4
Central - East Midlands	LIN	United Lincolnshire Hospitals NHS Trust	Lincoln County Hospital				↑					↓			↑	↑	↑	↑		↓					↓				3
Central - East Midlands	NOT	Nottingham University Hospitals NHS Trust	Nottingham City Hospital																										n/a
Central - East Midlands	NTH	Northampton General Hospital NHS Trust	Northampton General Hospital							↑	↑										↑								3
Central - East Midlands	NUN	George Eliot Hospital NHS Trust	George Eliot Hospital			↑	↓		↓				↓								↓								1
Central - East Midlands	PIL	United Lincolnshire Hospitals NHS Trust	Pilgrim Hospital																		↓			↑					1
Central - East Midlands	QMC	Nottingham University Hospitals NHS Trust	Queens Medical Centre - Nottingham			↑								↑					↑		↓			↑		↑			4

2016 Audit Results

Key 1

- Yes
- No
- No comparison available

Key 2

- Proactive
- On demand
- None
- No comparison available

Change since 2013 Audit

Key

- ↑ Improvement in service offered
- ↓ Deterioration in service offered
- No change

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Region	Hospital Code	Health Boards	Hospital Name	Operating theatre available 24/7	Operating theatre available 24/7, exclusively for EGS patients	Emergency surgical unit	Minimum four tier surgical rota at all times	Contemporaneous CT reporting 24/7	Formal rota for on-site interventional radiology 24/7	Formal rota for on-site diagnostic endoscopy 24/7	Formal rota for on-site interventional endoscopy 24/7	Consultant pathology advice 24/7	Critical care unit with 24/7 cover by consultant intensivist	Critical care outreach availability 24/7	Policy for formal calculation of risk of perioperative mortality	Policy for anaesthetic seniority according to risk	Policy for surgical seniority according to risk	Policy for location of post-op care according to risk	Explicit arrangements for review by Elderly Medicine	Policy for deferment of elective activity to prioritise emergencies	Pathway for the management of patients with sepsis	Pathway for enhanced recovery of EGS patients	Single pathway for adult EGS patients	At least bi-monthly reviews of all EGS deaths	Pre-op input by Elderly Medicine for EGS patients (Key 2)	Post-op input by Elderly Medicine for EGS patients (Key 2)	Peri-op input by general medicine for EGS patients (Key 2)	Quartile (based on total number of hospital beds)
Central - East of England	ADD	Cambridge University Hosps NHS Foundation Trust	Addenbrookes Hospital																										4
Central - East of England	BAS	Basildon and Thurrock University Hospitals NHS Foundation Trust	Basildon University Hospital																										3
Central - East of England	BED	Bedford Hospital NHS Trust	Bedford Hospital																										1
Central - East of England	BFH	Mid Essex Hospital Services NHS Trust	Broomfield Hospital																										3
Central - East of England	COL	Colchester Hospital University NHS Foundation Trust	Colchester General Hospital																										3
Central - East of England	HIN	Hinchingbrooke Health Care NHS Trust	Hinchingbrooke Hospital																										1
Central - East of England	IPS	Ipswich Hospital NHS Trust	Ipswich Hospital																										3
Central - East of England	JPH	James Paget University Hosps NHS Foundation Trust	James Paget University Hospital																										2
Central - East of England	LDH	Luton and Dunstable Hospital NHS Foundation Trust	Luton & Dunstable Hospital																										3
Central - East of England	LIS	East and North Hertfordshire NHS Trust	Lister Hospital																										3
Central - East of England	NOR	Norfolk and Norwich University Hospitals NHS Foundation Trust	Norfolk and Norwich University Hospital																										4
Central - East of England	PAH	The Princess Alexandra Hospital NHS Trust	Princess Alexandra Hospital																										3
Central - East of England	PET	Peterborough & Stamford Hosps NHS Foundation Trust	Peterborough City Hospital																										3
Central - East of England	QKL	The Queen Elizabeth Hospital King's Lynn NHS Foundation Trust	The Queen Elizabeth Hospital - King's Lynn																										2
Central - East of England	SEH	Southend University Hospital NHS Foundation Trust	Southend University Hospital																										3
Central - East of England	WAT	West Hertfordshire Hospitals NHS Trust	Watford General Hospital																										3
Central - East of England	WSH	West Suffolk NHS Foundation Trust	West Suffolk Hospital																										2
Central - West Midlands	BRT	Burton Hospitals NHS Foundation Trust	Queen's Hospital - Burton																										2
Central - West Midlands	EBH	Heart of England NHS Foundation Trust	Birmingham Heartlands Hospital																										3
Central - West Midlands	GHS	Heart of England NHS Foundation Trust	Good Hope Hospital																										2
Central - West Midlands	HCH	Wye Valley NHS Trust	Hereford County Hospital																										1
Central - West Midlands	NCR	The Royal Wolverhampton Hospitals NHS Trust	New Cross Hospital																										4
Central - West Midlands	QEB	University Hosp Birmingham NHS Foundation Trust	Queen Elizabeth Hospital Birmingham																										4
Central - West Midlands	RSH	University Hospitals of North Midlands NHS Trust	Royal Stoke University Hospital																										4
Central - West Midlands	RSS	The Shrewsbury and Telford Hospital NHS Trust	Royal Shrewsbury Hospital																										3
Central - West Midlands	RUS	The Dudley Group NHS Foundation Trust	Russells Hall Hospital																										4
Central - West Midlands	SAN	Sandwell & West Birmingham Hospitals NHS Trust	Sandwell General Hospital																										1
Central - West Midlands	UHC	University Hospitals Coventry & Warwickshire NHS Trust	University Hospital, Coventry																										4
Central - West Midlands	WAW	South Warwickshire NHS Foundation Trust	Warwick Hospital																										2
Central - West Midlands	WMH	Walsall Healthcare NHS Trust	Walsall Manor Hospital																										2
Central - West Midlands	WRC	Worcestershire Acute Hospitals NHS Trust	Worcestershire Royal Hospital																										2
North - North East	DAR	County Durham & Darlington NHS Foundation Trust	Darlington Memorial Hospital																										1
North - North East	DRY	County Durham & Darlington NHS Foundation Trust	University Hospital North Durham																										2
North - North East	NSH	Northumbria Healthcare NHS Foundation Trust	Northumbria Specialist Emergency Care Hospital																										1
North - North East	NTG	North Tees & Hartlepool NHS Foundation Trust	University Hospital of North Tees																										3
North - North East	QEG	Gateshead Health NHS Foundation Trust	Queen Elizabeth Hospital - Gateshead																										3
North - North East	RVN	The Newcastle upon Tyne Hospitals NHS Foundation Trust	Royal Victoria Infirmary																										4
North - North East	SCM	South Tees Hospitals NHS Foundation Trust	The James Cook University Hospital																										4
North - North East	STD	South Tyneside NHS Foundation Trust	South Tyneside District Hospital																										1
North - North East	SUN	City Hospitals Sunderland NHS Foundation Trust	Sunderland Royal Hospital																										4

2016 Audit Results

Key 1

- Yes
- No
- No comparison available

Key 2

- Proactive
- On demand
- None
- No comparison available

Change since 2013 Audit

Key

- Improvement in service offered
- Deterioration in service offered
- No change

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Region	Hospital Code	Health Boards	Hospital Name	Operating theatre available 24/7	Operating theatre available 24/7, exclusively for EGS patients	Emergency surgical unit	Minimum four tier surgical rota at all times	Contemporaneous CT reporting 24/7	Formal rota for on-site interventional radiology 24/7	Formal rota for on-site diagnostic endoscopy 24/7	Formal rota for on-site interventional endoscopy 24/7	Consultant pathology advice 24/7	Critical care unit with 24/7 cover by consultant intensivist	Critical care outreach availability 24/7	Policy for formal calculation of risk of perioperative mortality	Policy for anaesthetic seniority according to risk	Policy for surgical seniority according to risk	Policy for location of post-op care according to risk	Explicit arrangements for review by Elderly Medicine	Policy for deferment of elective activity to prioritise emergencies	Pathway for the management of patients with sepsis	Pathway for enhanced recovery of EGS patients	Single pathway for adult EGS patients	At least bi-monthly reviews of all EGS deaths	Pre-op input by Elderly Medicine for EGS patients (Key 2)	Post-op input by Elderly Medicine for EGS patients (Key 2)	Peri-op input by general medicine for EGS patients (Key 2)	Quartile (based on total number of hospital beds)
North - North West	AEI	Wrightington, Wigan & Leigh NHS Foundation Trust	Royal Albert Edward Infirmary			↑																			↑				1
North - North West	BLA	East Lancashire Hospitals NHS Trust	Royal Blackburn Hospital							↑					↑	↑	↑	↑					↑	↑	↑				3
North - North West	BOL	Bolton NHS Foundation Trust	Royal Bolton Hospital						↓										↓							↓	↓			3
North - North West	CMI	North Cumbria University Hospitals NHS Trust	Cumberland Infirmary		↑		↓			↑	↑				↑	↑	↑	↑		↑					↑			↑	1
North - North West	COC	Countess of Chester Hospital NHS Foundation Trust	Countess of Chester Hospital		↓				↑						↑	↑	↑	↑			↑			↑					3
North - North West	FAZ	Aintree University Hospitals NHS Foundation Trust	Aintree University Hospital		↓															↑									4
North - North West	FGH	University Hospitals of Morecambe Bay NHS Foundation Trust	Furness General Hospital												↑	↑	↑	↑			↑		↓						1
North - North West	LEG	Mid Cheshire Hospitals NHS Foundation Trust	Leighton Hospital				↓	↑						↑				↑		↓									3
North - North West	MAC	East Cheshire NHS Trust	Macclesfield District General Hospital							↑	↑															↑	↑		1
North - North West	MRI	Central Manchester University Hospitals NHS Foundation Trust	Manchester Royal Infirmary			↓			↑					↑						↑				↓	↓				4
North - North West	NMG	The Pennine Acute Hospitals NHS Trust	North Manchester General Hospital	↓		↓					↑			↑					↑	↑									2
North - North West	OHM	The Pennine Acute Hospitals NHS Trust	The Royal Oldham Hospital			↓				↓	↑			↑					↑	↑				↑					2
North - North West	RLI	University Hospitals of Morecambe Bay NHS Foundation Trust	Royal Lancaster Infirmary									↑			↑				↑			↑		↑				1
North - North West	RLU	Royal Liverpool and Broadgreen Univ Hospitals NHS Trust	Royal Liverpool University Hospital		↓									↓	↑				↑	↑									4
North - North West	RPH	Lancashire Teaching Hospitals NHS Foundation Trust	Royal Preston Hospital			↑	↑		↑	↑					↑			↑		↑			↑	↓	↑	↑			4
North - North West	SHH	Stockport NHS Foundation Trust	Stepping Hill Hospital	↑	↑	↓	↓		↓	↑					↑	↑	↑	↑		↑	↑		↓						4
North - North West	SLF	Salford Royal NHS Foundation Trust	Salford Royal Hospital			↓									↑	↑	↑		↑					↓		↑			4
North - North West	SPD	Southport & Ormskirk Hospital NHS Trust	Southport District General Hospital							↓	↓									↓									1
North - North West	TGA	Tameside Hospital NHS Foundation Trust	Tameside General Hospital		↑		↓			↑										↓				↑					2
North - North West	VIC	Blackpool Teaching Hospitals NHS Foundation Trust	Blackpool Victoria Hospital											↓	↑	↑	↑	↑		↑									4
North - North West	WDG	Warrington & Halton Hospitals NHS Foundation Trust	Warrington Hospital		↓									↓						↑	↑			↑					2
North - North West	WHI	St Helens & Knowsley Teaching Hospitals NHS Trust	Whiston Hospital																					↑					4
North - North West	WIR	Wirral University Teaching Hospital NHS Foundation Trust	Arrowe Park Hospital				↑		↑						↑	↑	↑	↑											4
North - North West	WYT	University Hospital of South Manchester NHS Foundation Trust	Wythenshawe Hospital												↑	↑		↑	↑		↑							↑	4
North - Yorkshire and Humber	AIR	Airedale NHS Foundation Trust	Airedale General Hospital	↓									↑																1
North - Yorkshire and Humber	BAR	Barnsley Hospital NHS Foundation Trust	Barnsley Hospital												↑							↑							1
North - Yorkshire and Humber	BRD	Bradford Teaching Hospitals NHS Foundation Trust	Bradford Royal Infirmary			↑			↓		↑				↓		↓												3
North - Yorkshire and Humber	DDH	The Mid Yorkshire Hospitals NHS Trust	Dewsbury and District Hospital																										n/a
North - Yorkshire and Humber	DID	Doncaster and Bassetlaw Hosps NHS Foundation Trust	Doncaster Royal Infirmary							↑	↑			↓	↓				↓					↓					2
North - Yorkshire and Humber	FRR	South Tees Hospitals NHS Foundation Trust	Friarage Hospital												↑														1
North - Yorkshire and Humber	GGH	Northern Lincolnshire and Goole Hospitals NHS Foundation Trust	Diana Princess of Wales Hospital		↑	↑				↓	↓			↑					↑	↑	↓	↓							1
North - Yorkshire and Humber	HAR	Harrogate and District NHS Foundation Trust	Harrogate District Hospital		↓																								1
North - Yorkshire and Humber	HUD	Calderdale & Huddersfield NHS Foundation Trust	Huddersfield Royal Infirmary			↑			↑			↑		↑	↑	↑	↑	↑		↑			↓	↓					3
North - Yorkshire and Humber	HUL	Hull and East Yorkshire Hospitals NHS Trust	Hull Royal Infirmary									↑				↑	↑	↑	↓	↑			↑	↑					4
North - Yorkshire and Humber	NGS	Sheffield Teaching Hospitals NHS Foundation Trust	Northern General Hospital			↑			↑							↑		↓	↑				↓	↑	↓	↓			4
North - Yorkshire and Humber	PIN	The Mid Yorkshire Hospitals NHS Trust	Pinderfields Hospital		↓			↓							↑					↑			↑						4
North - Yorkshire and Humber	ROT	The Rotherham NHS Foundation Trust	Rotherham Hospital		↓		↑			↑					↑	↑	↑	↑		↑	↑		↑	↓					2
North - Yorkshire and Humber	SCA	York Teaching Hospital NHS Foundation Trust	Scarborough Hospital			↑							↓		↑		↓	↑		↑		↓							1
North - Yorkshire and Humber	SCU	Northern Lincolnshire and Goole Hospitals NHS Foundation Trust	Scunthorpe General Hospital				↑	↑								↓		↓		↓									1
North - Yorkshire and Humber	SJH	The Leeds Teaching Hospitals NHS Trust	St James's University Hospital			↑								↑						↑				↑					4
North - Yorkshire and Humber	YDH	York Teaching Hospital NHS Foundation Trust	York Hospital												↑			↑		↓									3
South - South Central	MIW	Isle of Wight NHS Trust	St Mary's Hospital - IOW										↑							↑			↓	↓		↓	↓		1
South - South Central	MKH	Milton Keynes Hospital NHS Foundation Trust	Milton Keynes Hospital		↓									↑	↑					↑				↓					2
South - South Central	NHH	Hampshire Hospitals NHS Foundation Trust	Basingstoke & North Hampshire Hospital		↑				↑						↑	↑				↑	↑	↑				↑			2
South - South Central	QAP	Portsmouth Hospitals NHS Trust	Queen Alexandra Hospital					↓						↑	↑		↑	↑				↓							4
South - South Central	RAD	Oxford University Hospitals NHS Trust	John Radcliffe Hospital												↑						↑	↑		↑	↑			↑	4
South - South Central	RBE	Royal Berkshire NHS Foundation Trust	Royal Berkshire Hospital		↓		↓				↓													↑				↑	4
South - South Central	RHC	Hampshire Hospitals NHS Foundation Trust	Royal Hampshire County Hospital		↑									↓		↑	↑	↑						↓		↑			1
South - South Central	SGH	University Hospital Southampton NHS Foundation Trust	Southampton General Hospital												↑	↑	↑	↑			↑			↑					4
South - South Central	SMV	Buckinghamshire Healthcare NHS Trust	Stoke Mandeville Hospital							↓					↑											↑	↑		3
South - South Central	WEX	Frimley Health NHS Foundation Trust	Wexham Park Hospital							↓				↓	↑	↑	↑	↑	↑	↑						↑			3

2016 Audit Results

Key 1

- Yes
- No
- No comparison available

Key 2

- Proactive
- On demand
- None
- No comparison available

Change since 2013 Audit

Key

- ↑ Improvement in service offered
- ↓ Deterioration in service offered
- No change

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South - South East Coast	CON	East Sussex Healthcare NHS Trust	Conquest Hospital		↑									↑										↑					4
South - South East Coast	DVH	Dartford & Gravesham NHS Trust	Darent Valley Hospital		↑			↑					↑	↑	↑	↑	↑												2
South - South East Coast	ESU	Surrey & Sussex Healthcare NHS Trust	East Surrey Hospital		↓			↓			↑				↑			↑	↓						↓				3
South - South East Coast	FRM	Frimley Health NHS Foundation Trust	Frimley Park Hospital			↓								↑	↑	↑	↑	↑				↓	↓						4
South - South East Coast	MDW	Medway NHS Foundation Trust	Medway Maritime Hospital		↑		↑			↑	↑				↑	↑	↑	↑				↓							3
South - South East Coast	MST	Maidstone and Tunbridge Wells NHS Trust	Maidstone Hospital																										n/a
South - South East Coast	QEQ	East Kent Hospitals University NHS Foundation Trust	Queen Elizabeth The Queen Mother Hospital			↓		↑					↓	↑	↑				↓	↓									2
South - South East Coast	RSC	Brighton and Sussex University Hospitals NHS Trust	Royal Sussex County Hospital				↓				↑			↑	↑						↑					↑			2
South - South East Coast	RSU	Royal Surrey County Hospital NHS Foundation Trust	Royal Surrey County Hospital					↑	↑							↓	↓	↓	↑			↑					↑		2
South - South East Coast	SPH	Ashford & St Peter's Hospital NHS Foundation Trust	St Peter's Hospital		↓					↑	↑			↑	↑	↑	↑	↑	↑		↑		↓	↑		↑	↑		2
South - South East Coast	STR	Western Sussex Hospitals NHS Trust	St Richards Hospital		↓	↑	↑		↑					↑	↑					↓	↓		↑						2
South - South East Coast	TUN	Maidstone and Tunbridge Wells NHS Trust	Tunbridge Wells Hospital		↓							↑	↑	↑	↑	↑	↑	↑				↑		↑					2
South - South East Coast	WHH	East Kent Hospitals University NHS Foundation Trust	William Harvey Hospital							↑			↑		↑			↑											2
South - South East Coast	WRG	Western Sussex Hospitals NHS Trust	Worthing Hospital							↑	↑				↑	↑	↑	↑	↑	↑		↑							3
South - South West	BAT	Royal United Hospital Bath NHS Trust	Royal United Hospital		↓	↑			↓		↓					↑	↑		↑	↑		↓		↑		↑			3
South - South West	BRI	University Hospitals of Bristol NHS Foundation Trust	Bristol Royal Infirmary			↑											↓			↑				↑					2
South - South West	BTH	The Royal Bournemouth and Christchurch Hosps NHS Foundation Trust	The Royal Bournemouth Hospital		↑											↑	↑							↑					4
South - South West	CGH	Gloucestershire Hospitals NHS Foundation Trust	Cheltenham Hospital											↑	↑	↑	↑	↑						↑					1
South - South West	GLO	Gloucestershire Hospitals NHS Foundation Trust	Gloucestershire Royal Hospital											↑	↑	↑	↑	↑						↑			↓		3
South - South West	MPH	Taunton & Somerset NHS Foundation Trust	Musgrove Park Hospital			↑				↓		↑		↓	↑			↑											3
South - South West	NDD	Northern Devon Healthcare NHS Trust	North Devon District Hospital	↑	↑					↑				↑	↑	↑	↑	↑		↑						↑			1
South - South West	PGH	Poole Hospital NHS Foundation Trust	Poole Hospital			↑									↑	↑	↑	↑		↑		↓				↓			2
South - South West	PLY	Plymouth Hospitals NHS Trust	Derriford Hospital												↑	↑	↑	↑			↑			↑					4
South - South West	PMS	Great Western Hospitals NHS Foundation Trust	The Great Western Hospital												↑	↑	↑	↑	↑	↑	↑	↑					↑		2
South - South West	RCH	Royal Cornwall Hospitals NHS Trust	Royal Cornwall Hospital		↓	↓									↑					↓				↑					3
South - South West	RDE	Royal Devon & Exeter NHS Foundation Trust	Royal Devon & Exeter Hospital	↑	↑	↑	↓							↑				↑				↓	↓			↑			4
South - South West	SAL	Salisbury NHS Foundation Trust	Salisbury District Hospital							↑	↑				↑	↑	↑	↑				↓	↑			↓	↓		2
South - South West	SMH	North Bristol NHS Trust	Southmead Hospital																										4
South - South West	TOR	South Devon Healthcare NHS Foundation Trust	Torbay District General Hospital									↓		↑	↓					↓	↑	↑							3
South - South West	WDH	Dorset County Hospital	Dorset County Hospital	↓					↓							↑			↑										1
South - South West	WGH	Weston Area Health NHS Trust	Weston General Hospital										↓	↑	↑	↑	↑	↑		↑	↑			↑		↓			1
South - South West	YEO	Yeovil District Hospital NHS Foundation Trust	Yeovil District Hospital			↓						↓	↑		↓	↓	↓	↓	↓				↓					↓	1
Wales	BRG	Hywel Dda Health Board	Bronglais General Hospital	↑				↑								↑	↑	↑	↑					↑		↑	↑	↑	1
Wales	CLW	Betsi Cadwaladr University Health Board	Glan Clwyd District General Hospital			↑									↑			↑				↓			↑				2
Wales	GLG	Hywel Dda Health Board	Glangwili General Hospital			↓	↑										↑	↑	↑	↓	↓	↓							1
Wales	GWE	Aneurin Bevan Health Board	Royal Gwent Hospital		↓	↑			↓	↑	↑										↓			↑					3
Wales	GWY	Betsi Cadwaladr University Health Board	Ysbyty Gwynedd Hospital		↑	↓									↑						↑			↓		↓			2
Wales	MOR	Abertawe Bro Morgannwg University Health Board	Morriston Hospital			↓									↑		↑				↓			↓					4
Wales	NEV	Aneurin Bevan Health Board	Nevill Hall Hospital			↓	↑			↑	↑					↑							↓						2
Wales	PCH	Cwm Taf Health Board	Prince Charles Hospital										↓		↑	↑	↑	↑			↑		↓	↑					1
Wales	POW	Abertawe Bro Morgannwg University Health Board	Princess of Wales Hospital				↑							↓	↑	↑	↑	↑											1
Wales	RGH	Cwm Taf Health Board	Royal Glamorgan					↑	↓				↑	↑	↑	↑	↑	↑			↑			↑					1
Wales	UHW	Cardiff and Vale University Health Board	University Hospital of Wales	↑						↑					↑	↑	↑	↑			↑		↑	↑	↑	↓			4
Wales	WRX	Betsi Cadwaladr University Health Board	Wrexham Maelor Hospital		↓					↓	↓				↓	↓	↓	↓	↓		↓	↓							2
Wales	WYB	Hywel Dda Health Board	Withybush General Hospital												↑	↑	↑	↑											1

2016 Audit Results

Key 1

- Yes
- No
- No comparison available

Key 2

- Proactive
- On demand
- None
- No comparison available

Change since 2013 Audit

Key

- ↑ Improvement in service offered
- ↓ Deterioration in service offered
- No change

15.6 NELA governance and organisational arrangements

Project Board

The Project Board oversees the strategic direction and is responsible for monitoring all aspects of delivery of the project by the Project Team and sub-contractors. It is accountable to the stakeholder organisations.

Chair

Mr John Moorehead – Association of Surgeons of Great Britain and Ireland

Members

Mr John Abercrombie – Royal College of Surgeons of England
Professor David Cromwell – NELA Project Team Methodologist; Royal College of Surgeons of England
Professor Mike Grocott, Anaesthetic Advisor
Dr Sarah Hare, NELA Project Team Clinical Lead
Ms Tasneem Hoosain, Healthcare Quality Improvement Partnership
Dr Jeremy Langton, Royal College of Anaesthetists
Dr Dave Murray, NELA Project Team Chair
Mr Tim Russell, Intensive Care National Audit & Research Centre
Dr Yvonne Silove, Healthcare Quality Improvement Partnership
Ms Lynne Smith, Patient Representative
Miss Gillian Tierney, Association of Surgeons of Great Britain and Ireland
Ms Sharon Drake, RCoA, Director of Clinical Quality and Research
Mr James Goodwin, RCoA, Head of Research
Mr Jose Lourtie, RCoA, NELA Project Manager
Ms Susan Warren, RCoA, Audit and Research Administrator

Project Team

The NELA Project Team is responsible for the ongoing delivery of the project.

Chair

Dr Dave Murray, NELA Chair

Members

Dr Sarah Hare, NELA Clinical Lead
Mr Iain Anderson, NELA Surgical Advisor
Professor Mike Grocott, NELA Anaesthetic Advisor
Mr Paul Cripps, NetSolving
Professor David Cromwell, Methodologist, RCS CEU
Ms Natalie Eugene, Statistician
Dr Carolyn Johnston, NELA QI Lead
Dr Angela Kuryba, Statistician
Ms Sonia Lockwood, NELA Surgical Lead
Dr Ramani Moonesinghe, HSRC Director
Dr Matt Oliver, NELA Research Advisor
Professor Carol Peden, NELA QI Advisor
Dr Tom Poulton. NELA Research Fellow
Dr Tom Salih, UCL Fellow
Dr Kate Walker, Statistician
Ms Sharon Drake, RCoA, Director of Clinical Quality and Research
Mr James Goodwin, RCoA, Research Manager
Mr Jose Lourtie, NELA Project Manager
Ms Susan Warren, NELA Administrator

NELA
National Emergency Laparotomy Audit

Clinical Reference Group

All relevant clinical professional and specialty stakeholders have direct input into the design and conduct of this Audit. The Clinical Reference Group (CRG) consists of representatives from partner organisations as well as from other stakeholders, including patients. The CRG acts in an advisory capacity to the Project Team, providing specialty-specific advice, and lay advice as appropriate. CRG meetings are chaired by Professor Mike Grocott and are attended by members of the Project Team.

Chair

Professor Mike Grocott, Chair, NELA Clinical Reference Group

Members

Mr John Abercrombie, Royal College of Surgeons of England
Mrs Jenny Abraham, Association for Perioperative Practice
Mr Iain Anderson, Association of Surgeons of Great Britain and Ireland
Mrs Joyce Colston, Patient Representative Elderly
Ms Anna Crossley, Royal College of Nursing
Dr Jugdeep Dhesi, British Geriatric Society
Dr Richard Griffiths, Association of Anaesthetists of Great Britain and Ireland
Dr Irwin Foo, Age Anaesthesia Association
Dr Antony Higginson, Royal College of Radiologists
Dr Hywel Jones, Royal College of Anaesthetists
Dr Jeremy Langton, Royal College of Anaesthetists
Mr Nicholas Lees, Royal College of Surgeons of England
Dr Diane Monkhouse, Faculty of Intensive Care Medicine
Dr Mike Nevin, UK Clinical Director Network, National Lead
Dr Andy Rhodes, Intensive Care Society
Mr Tim Russell, Intensive Care National Audit & Research Centre
Dr David Saunders, Age Anaesthesia Association
Ms Marylynne Smith, Patient Representative Anaesthesia
Dr Mark Spencer, Commissioning
Dr Simon Varley, Emergency Laparotomy Network
Dr Sally-Anne Wilson, Royal College of Emergency Medicine

15.7 An overview of the Hospital Episodes Statistics (HES) dataset

Further information is provided in the Technical Documents that accompany this Report (www.nela.org.uk/reports).

The Hospital Episode Statistics (HES) database contains information about all patients admitted to (NHS) hospitals in England. It was first established in 1989 and collects data on more than 12 million hospital admissions each year. A unique patient identifier allows admissions by the same patient to be linked. This enables the hospital care profile prior to, or after, an admission for emergency laparotomy to be described for each patient.

Records within HES contain information about the patient demographics, the hospital of treatment, the mode of arrival (elective, emergency, transfer) and the specialty of treatment, as well as the dates of admission/discharge. Diagnostic information can be entered in up to 24 fields, and is coded according to the International Classification of Diseases, 10th revision (ICD-10). The type (and date) of up to 20 procedures can also be entered, and are coded according to the Office of Population Censuses and Surveys classification, 4th revision (OPCS-4). Each record describes a Finished Consultant Episode (or episode), which corresponds to the time a patient is under the care of a particular consultant. An admission can be made up of more than one episode.

One advantage of using HES for evaluations of surgery is that it includes all admissions to English NHS hospitals, and this should minimise the risk of selection bias in any study. The use of a unique patient identifier also means that there should be minimal loss of follow up, especially in relation to short-term outcomes (complications, readmissions).

There are various limitations in using an administrative health database like HES to describe surgical practice and outcomes. First, there are limitations due to the coding classifications. The OPCS classification may not distinguish between subtypes of a procedure or describe them in a way that is incompatible with current medical terminology (e.g. oesophageal resections). Second, coding may be incomplete. Some procedures may not be coded, although the risk of this is small for major operations. It is more common for HES data to lack information on minor procedures that were performed at the same time as the major operation. HES can capture the surgical approach (open/laparoscopic) by using additional OPCS codes, e.g. Y751= laparoscopically assisted approach to abdominal cavity, but to date hospitals have not uniformly entered these codes for all operations. Similarly, while OPCS codes for investigative procedures such as CT scans are available, they are not uniformly used. Third, there may be coding inconsistencies (errors) in the type of procedure and the diagnosis.

The impact of these limitations can be reduced by a careful review of coding within hospitals and the triangulation of information, including treatment specialty, mode of arrival, and diagnostic and procedure information.

There are various ways to identify patients who undergo emergency laparotomy in HES. To date, there have been three studies that have used HES to examine issues related to this surgery, and each has taken a different approach.[3,4,33] None of these studies defined a cohort that matches the NELA selection criteria, partly due to their different aims.

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