



Ninth Patient Report of the National Emergency Laparotomy Audit

December 2021 to March 2023



October 2024

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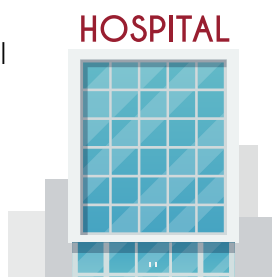
All enquiries in regard to this document should be addressed to: The National Emergency Laparotomy Audit, Royal College of Anaesthetists, Churchill House, 35 Red Lion Square, London WC1R 4SG
020 7092 1676 | nela@rcoa.ac.uk | data.nela.org.uk

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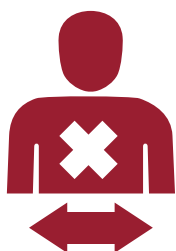
Executive Summary

Results from 2021–2023 – the Ninth Year of the National
Emergency Laparotomy Audit

1 **27,863 patients** who had emergency bowel surgery in England and Wales were included in the Year 9 audit from 173 hospitals.



2 Improvements in mortality have plateaued – **in-hospital mortality was 9.3%** compared to 9.2% in Year 8 and 9.1% in Year 7.



3 Preoperative assessment of risk **has dropped below target**, to 84.6% after peaking at 86.8% in Year 8.

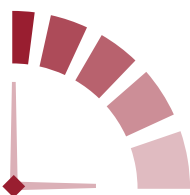


4 **86.1% of patients** with a high documented risk had **consultant surgeon** input before surgery.

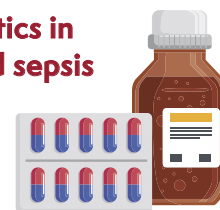
71.4% of patients with a high documented risk had **consultant anaesthetist** input before surgery.



5 **Patients with sepsis** suspected at time of arrival in hospital waited a median of **15.5 hours from time of admission** until surgery.



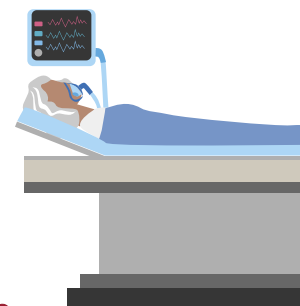
6 **Median time to antibiotics in patients with suspected sepsis** was 3.1 hours from arrival in hospital.



7 **91.1% of patients** received a preoperative CT scan **30.8% of patients** had their scan outsourced (26.3% in Year 8, 19.1% in Year 7).



8 Presence of both **anaesthetic and surgical consultants** during surgery in high-risk patients was **90.4% (91.3% in Year 8)**.



9 **80.3% of high-risk patients** were admitted to critical care postoperatively (79.1% in Year 8). **13.9% of high-risk patients** were admitted to a normal ward.



10 **33.2% of patients** aged 80 or over, or 65+ and frail, had geriatrician input (31.8% in Year 8).

11 Postoperative length of hospital stay (LOS) has not significantly changed over the last five years, **with a median in Year 9 of 11 days**.



Churchill House, 35 Red Lion Square, London WC1R 4SG
020 7092 1676 nela@rcoa.ac.uk data.nela.org.uk [@NELANews](https://twitter.com/NELANews)

Introduction

This is the ninth annual report of the National Emergency Laparotomy Audit (NELA) and examines care received by NHS patients in England and Wales undergoing emergency laparotomy (emergency bowel surgery) between 1 December 2021 and 31 March 2023. Year 9 of the audit was extended to align with the NHS financial year.

In several key areas within this report there has been a deterioration in performance since last year. In many others there has been insufficient improvement over repeated audit cycles and annual reports. Examples of a decline in performance include preoperative engagement with consultant anaesthetists and intensivists, and the proportion of patients who arrive in theatre within stated timescales from the time of decision to operate. Importantly, this report also shows a corresponding lack of further improvement of some key outcome measures including mortality and postoperative length of stay.

Key messages and recommendations

| | | |
|-------------------------|---|--|
| <p>Message 1</p> | <p>Patients with significant and time-sensitive intra-abdominal pathologies, including those with suspected sepsis, frequently did not receive timely care consistent with published guidance. For example, amongst those with suspected sepsis:</p> <ul style="list-style-type: none"> ■ only 20% received antibiotics within 1 hour ■ 25% waited at least 6.5 hours after arrival in hospital before receiving antibiotics ■ 50% waited for more than 15 hours before arrival in theatre ■ performance varied significantly between hospitals. <p>See Section Management of Patients with Intra-abdominal Infection.</p> | |
| <p>Recommendation 1</p> | <p>Royal Colleges of Emergency Medicine, Radiologists, Surgeons, and Anaesthetists.</p> | <p>Royal Colleges should work together to publish consensus pathways for patients presenting to hospital who might require emergency laparotomy. These pathways should include:</p> <ul style="list-style-type: none"> ■ diagnostic, radiological, and initial management phases of a patient’s presentation prior to a decision to operate ■ targets for timeliness of each pathway step. |
| <p>Message 2</p> | <p>The majority of older patients and those living with frailty do not receive expert multidisciplinary care after emergency laparotomy (33% receive input). There is compelling evidence of an association between geriatrician input and reduced mortality, supporting the case for improving this intervention.</p> | |
| <p>Recommendation 2</p> | <p>a Regional and local commissioners (Integrated Care Boards and Health Boards) in England and Wales.</p> <p>b Royal Colleges of Physicians, Anaesthetists and Surgeons.</p> | <p>a Commissioners should ensure that Trusts/hospitals provide adequate specialist care for older patients and those with frailty following emergency laparotomy, per guidance published by the Royal College of Surgeons of England, British Geriatrics Society, and the Centre for Perioperative Care.</p> <p>b To expand the pool of clinical staff with the requisite specialist skills, Royal Colleges of Physicians, Surgeons and Anaesthetists should consider working together to develop common competency-based training curriculae around optimising perioperative care for older patients and those living with frailty who undergo emergency surgery.</p> |

| | | |
|------------------|---|--|
| Message 3 | There is hospital-level variation in risk-adjusted mortality. Additionally, there is higher mortality amongst those from more deprived quintiles in each nation. Differences in outcomes between patients in different hospitals and from varying levels of deprivation need to be recognised and acknowledged. Reasons are likely multifactorial but must be explored further. | |
| Recommendation 3 | NHS England; Regional and local commissioners (Integrated Care Boards and Health Boards) in England and Wales | Healthcare services provided to those from more deprived backgrounds need to be matched to their greater need. This requires strategic planning. |
| Message 4 | 14% of high-risk patients did not receive immediate postoperative critical care contrary to published guidance. Instead, they were transferred to a normal ward following surgery; 7% of these patients subsequently died. See Section Postoperative Admission to Critical Care . | |

These key messages and recommendations are summarised in the Line of Sight table, [available here](#).

Who has an emergency laparotomy?

Year 9 data is available for 27,863 patients who underwent emergency laparotomy between 1 December 2021 and 31 March 2023. The number of cases expected and entered in Year 9 is higher than in previous years as the data collection period was extended by four months to align with the NHS financial year. The number of cases recorded during a comparable 12-month period between December 2021 and November 2022 is 94.9% of those registered in Year 8 (21,003 vs 22,132). Patients were heterogeneous in their characteristics, socioeconomic backgrounds, presenting physiology and underlying surgical pathology. 51.2% were female. 64.5% were aged 60 or over. 48.0% had a mortality risk of 5% or greater ([Supporting Table 1](#)).

Case ascertainment

Of 179 hospitals, 173 (96.6%) contributed data to this metric ([see Technical Appendix](#)). Overall case ascertainment was 72.1% ([Supporting Table 2](#)).

Main findings

Year 9 key standards and key process measures are [available here](#), as are the calculations used to determine compliance with these metrics. Individual hospital performance indicators rated Red, Amber, Green (RAG) are [available here](#).

Many key process measures show little or no improvement compared to previous years. See [Supporting Table 3](#). Further evidence of this trend can be found in [Supporting Figures A, B, and C](#), which show national aggregate performance over time against standards of care around formal preoperative calculation of mortality risk, direct admission to critical care, and specialist postoperative input for older patients.

QI Opportunity: The NELA dataset is a comprehensive record of the processes and outcomes of care in England and Wales over 10 years. This dataset provides rich insights into improving the care of patients. Efforts should be made to learn the lessons contained within this data to support and drive local quality and service improvements.

Radiology

91.1% of patients underwent CT scanning following arrival in hospital. See [Supporting Table 4](#).

The proportion of all NELA patients who had a preoperative CT reported by an in-house consultant radiologist fell compared to Year 8 (54.0% versus 58.3%; [Supporting Table 3](#)), with a corresponding further increase in the use of outsourcing of CT reporting services. Of those who had a preoperative CT scan, 30.8% had their reporting outsourced in Year 9 compared to 26.3% in Year 8, and 14.1% in Year 4. See [Supporting Figures D and E](#). Use of outsourced providers varies significantly by time of day and day of the week: around 5% of scan reports are outsourced on weekday afternoons, rising to around 65% after midnight ([Supporting Figure F](#)).

There is a chronic shortage of radiologists – the Royal College of Radiologists estimated a 29% shortfall in consultant radiologist numbers across the UK in 2021^[1]. Using an outsourced provider can help with ensuring seniority of CT reporting but brings other potential challenges including direct communication between requesting surgeon and reporting radiologist. Howlett *et al.* and previous NELA reports have highlighted findings of greater discrepancy rates amongst outsourced scan reports^[2,3]. Departments of radiology must quality assure reports including those provided by outsourcing services.

NELA does not collect data on the proportion of CT reports that are outsourced following scanning of elective patients such as those on cancer pathways, nor whether hospitals preferentially choose to outsource emergency rather than elective reporting, but the significant increase in outsourcing of reporting overnight suggests this is possibly the case.

Risk assessment

Formal assessment and recording of preoperative mortality risk has become firmly established, although is not universal. In Year 9 the standard was **not met** for the first time in three years (84.6% Year 9, 86.8% Year 8, 85.0% Year 7) ([Supporting Table 3](#)). A formal assessment of mortality risk remains critical in ensuring appropriate standards of care are delivered for patients, and a longitudinal plot covering NELA Years 1 to 9 emphasises how performance has plateaued ([Supporting Figure A](#)).

NELA audits against guidance from the Royal College of Surgeons of England which defines mortality risk of 5% or more as 'high-risk'^[4]. It is important to recognise that a value under 5% risk in an emergency setting does not necessarily imply 'low-risk,' rather simply describes a value of 'less than high-risk.' Many of these patients will be at a significantly greater mortality risk than most patients undergoing elective abdominal surgery.

Frailty is an important indicator of risk. A formal frailty assessment should be performed preoperatively for all patients aged 65 or older using validated scoring systems such as the Clinical Frailty Scale (CFS)^[5,6]. 84.8% of patients aged 65 or older had a formal assessment of frailty performed preoperatively ([Supporting Table 3](#)). Patients living with frailty are at increased risk of complications after surgery compared to their non-frail counterparts, including mortality and prolonged length of stay^[7] (see Section [Care of the Older Patient](#)). They should be considered 'high-risk' even in the absence of a calculated mortality risk of $\geq 5\%$.

Timeliness of arrival in theatre

Overall Timeliness from Arrival in Hospital to Arrival in Theatre

Many patients experience long delays between arriving at hospital and the point of making a decision to operate, including those with the most time critical pathologies. The median interval for patients arriving at hospital as an emergency and arrival in theatre was 10.3 hours, 17.3 hours and 34.0 hours respectively for those *subsequently* categorised as requiring surgery within two, six or 18 hours from decision to operate ([Supporting Table 5](#)).

Timeliness from Decision to Operate to Arrival in Theatre

Without taking into consideration delays in reaching a decision to operate, median intervals between decision to operate and arrival in theatre appear to reach timeliness targets as defined by National Confidential Enquiry into Patient Outcome and Death (NCEPOD) urgency categories ([Supporting Table 6](#)). This analysis however excludes cases with missing timeliness data, and when these are included, the proportion of patients arriving within a time recorded as appropriate for the NCEPOD urgency of surgery has fallen further in Year 9 (67.1% versus 71.8% in Year 8) ([Supporting Table 3](#)).

Management of patients with intra-abdominal infection

Patients with sepsis should undergo emergency control of the source of sepsis within three to six hours of diagnosis, consistent with current national and international guidelines from Academy of Medical Royal Colleges and National Institute for Health and Care Excellence [\[4,8,9,10\]](#). Current practice falls significantly short of these standards. For patients presenting with suspected sepsis, the median interval between arrival at hospital and arrival in theatre was 15.5 hours ([Supporting Table 7](#)).

Early recognition of suspected intra-abdominal infection and/or sepsis is essential in ensuring prompt initiation of broad-spectrum antimicrobials during the assessment and diagnostic phases of a patient's admission [\[8\]](#). In patients with a National Early Warning Score 2 (NEWS2) of ≥ 5 , and who are likely to require surgery or radiological intervention to control a source of sepsis, appropriate antimicrobials should be given within one hour [\[4,8\]](#).

5,330 patients were recorded as having sepsis suspected at the time of arrival in hospital (20.2% of all patients admitted as an emergency). Timings of antibiotic therapy were recorded for 3,688. Median time to administration of antibiotics in those with suspected sepsis on arrival was 3.1 hours. A large majority of patients with suspected sepsis at the time of arrival in hospital did not receive antibiotics within the recommended timeframe ([Supporting Table 8](#)). There was significant variation in performance between hospitals in median time to first antibiotic administration, but when analysed at hospital level, almost all units failed to meet the expected standard of care. See [Supporting Figure G](#).

QI Opportunity: Participating sites can make use of NELA data, including monthly reports, to track performance against this metric throughout the audit year.

Specific improvement approaches are listed in the [RCoA QI Compendium](#), Chapters 4.2 and 4.3.

NELA is working with THIS Institute on a national programme to improve the timeliness of care in the early pathway. Work began in Spring 2024. Trusts and Health Boards are encouraged to join this work as participants in the discovery and testing phases.

Consultant surgeon, anaesthetist and intensivist involvement

Consultant presence in theatre for high-risk patients remains consistently high for anaesthetists and surgeons at 93.6% and 96.0% respectively; presence of both consultants being in theatre is also high at 90.4% ([Supporting Table 3](#)). Compliance with this standard of care has increased since NELA's inception ([Supporting Figure H](#)) and has become firmly established during daylight hours. Performance declines overnight ([Supporting Figure I](#)).

Direct preoperative review and input into management decisions for high-risk patients by a consultant surgeon or anaesthetist is less consistently delivered at 86.1% and 71.4% respectively ([Supporting Table 3](#)). 34.2% of high-risk patients received input by a consultant intensivist ([Supporting Table 3](#)). NELA does not collect data on indirect involvement of consultants in management decisions.

Postoperative admission to critical care

80.3% of high-risk patients were admitted directly to critical care (excluding those receiving end of life care or who died in theatre), which **remains lower than pre-pandemic** ([Supporting Table 3](#), [Supporting Figure J](#)). This was partly offset by an increased availability of enhanced care and extended recovery resources ([Supporting Table 9](#) and [Supporting Figure J](#)). In some hospitals, increasing enhanced care capacity, ie Level 1 care, may enable more high-risk emergency laparotomy patients to be admitted to critical care^[11]. [Supporting Figure B](#) shows only a small overall improvement in this metric between NELA Years 1 and 9, despite many years of emphasising the importance of delivering high standards of care for high-risk patients as well as an enhanced [Best Practice Tariff](#) (BPT) being established in England.

13.9% of high-risk patients were discharged to a normal ward with no provision for enhanced care, contrary to accepted standards of care^[4] 29.4% of patients with a risk of less than 5% were admitted to critical care ([Supporting Table 9](#)).

QI Opportunity: Local hospitals can use their NELA data to review which emergency laparotomy patients were transferred to critical care and which patients to a general ward following surgery to review whether placement was appropriate. Increasing enhanced care capacity for some elective surgery patients might improve availability of critical care resources for emergency patients.

Suggested ways to improve the admission to critical care following emergency surgery are detailed in the [RCoA QI Compendium](#), Chapter 4.11.

Guidance on establishing enhanced care areas is provided by the [Faculty of Intensive Care Medicine](#) and the [Centre for Perioperative Care](#).

Bundle of care for high-risk patients

An enhanced Emergency Laparotomy BPT was nominally payable to hospitals in England during Year 9 of the audit if 80% of high-risk patients received direct consultant anaesthetist and consultant surgeon input in theatre and were admitted directly to critical care following surgery^[12]. The enhanced tariff was not payable in Wales. Composite standards of care for this high-risk group, analysed using combined NELA data from England and Wales, is reported in [Supporting Table 10](#) for Year 9 and compared to previous years. Overall, there has been no improvement in the last four years – 74.1% of high-risk patients in Year 9 received both direct consultant-delivered care in theatre and immediate postoperative admission to critical care.

NHS England amended the [Best Practice Tariff](#) in April 2023 to incentivise preoperative risk assessment and postoperative care for older patients living with frailty. This does not suggest that high standards of immediate perioperative care for high-risk patients is any less important.

Care of the older patient

In patients aged 65 years and older, prevalence and severity of frailty varies by age group ([Supporting Figure K](#)). Frailty (CFS ≥ 5) is associated with an increased mortality risk in patients undergoing emergency laparotomy^[7]. CFS data was recorded in 84.8% of patients aged 65 years and older ([Supporting Table 3](#)). 39.7% were living with frailty (CFS ≥ 5) ([Supporting Table 1](#)), with an increasing prevalence with greater age ([Supporting Figure K](#)). Performance of a formal frailty assessment has been adopted as a NELA key standard of care from [Year 10](#) as recommended by the Royal College of Surgeons of England and the Centre for Perioperative Care^[4,6].

33.2% of patients aged 65 or older and living with frailty, or aged 80 or older regardless of frailty status, received multidisciplinary perioperative input by members of a geriatrician-led team, compared to 31.8% in Year 8. This clinical input is associated with a reduction in mortality as well as an increased length of stay when compared to those patients who did not undergo geriatrician review, even when early postoperative deaths are excluded ([Supporting Table 11](#)). Geriatrician-led input remains the worst performing metric of NELA despite compelling data to suggest significant benefit to patients ([Supporting Table 3](#)).

QI Opportunity: The British Geriatrics Society has a [frailty hub](#), and a number of publications and resources to help Trusts/Health Boards to establish services, including [specific resources](#) produced with the Centre for Perioperative Care covering emergency surgery.

Service Improvement Opportunities: The 2023 Emergency Laparotomy [Best Practice Tariff](#) financially incentivises improved specialist care for older patients and those living with frailty.

Outcomes

Postoperative length of hospital stay (LOS) has not significantly changed over the last five years, with a median in Year 9 of 11 days ([Supporting Figure L](#)). LOS increases with greater patient age, comorbidity, and mortality risk, and is significantly increased if the patient suffers a complication requiring an unplanned return to theatre or admission to critical care ([Supporting Table 12](#)).

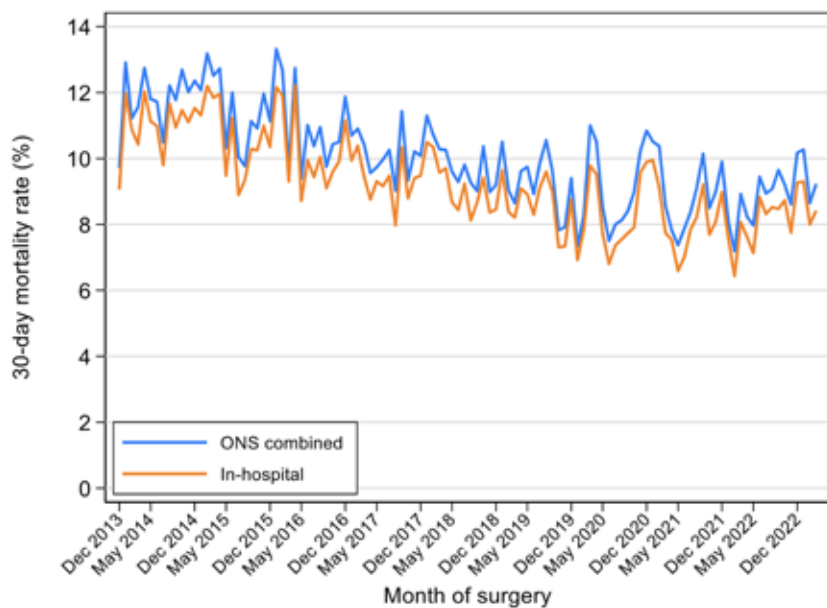
5.5% of all patients have an unplanned return to theatre, which has remained static over the last five years ([Supporting Table 3](#)).

Overall in-hospital mortality was 9.3%, and largely unchanged compared with previous years ([Supporting Figure M](#)). This lack of improvement is noteworthy alongside findings that key process measures of care such as preoperative consultant assessment, timeliness of arrival in theatre and direct admission to critical care have declined. In-hospital, unadjusted mortality was lower in England than in Wales ([Supporting Figure M](#)).

Risk-adjusted mortality and outlier analysis

Unadjusted 30-day mortality in Year 9 was 9.0%, similar to Year 8. Risk-adjusted mortality is based on risk factors contained in the NELA risk prediction model^[13], as well as the presence or absence of confirmed SARS-Cov2 infection. This is the same methodology as has been used in the last two annual reports. Figure 1 shows the trend in mortality over time since NELA's inception.

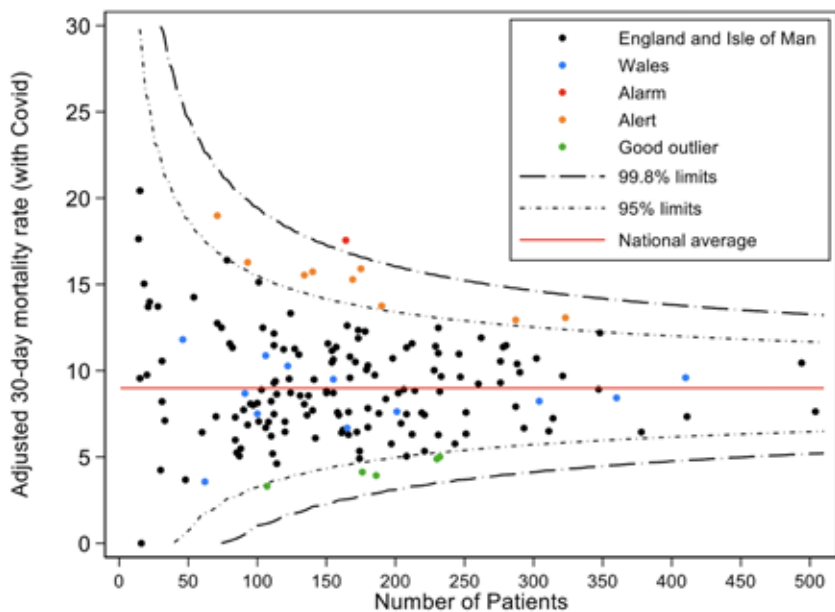
Figure 1 Monthly 30-day in-hospital and ONS unadjusted mortality



Outlier analysis

The funnel plot for outlier identification was based on 167 hospitals in England, Wales, and the Isle of Man who submitted data on at least ten operations. Seven hospitals with fewer than ten reported operations were excluded from the funnel plot and outlier identification analyses. The funnel plot using hospitals' risk-adjusted mortality rates is shown in Figure 2 below.

Figure 2 Funnel plot of risk-adjusted mortality by number of operations (NELA risk model plus adjustment for patient COVID-19 status)



Hospital level mortality

The NELA [outlier policy](#) defines three different categories of potential outliers based on mortality:

- Alert-level: hospitals with a risk-adjusted mortality rate above the 95% control limit
- Alarm-level: hospitals with a risk-adjusted mortality rate above the 99.8% control limit
- Double-alert level: hospitals flagged as alert for the current year, and also an alert or alarm in either of the previous two consecutive reporting cycles.

Hospitals that trigger alarm- or double-alert status are required to undergo formal review of performance. In NELA Year 9, of the 167 hospitals included in the outlier identification analysis (funnel plot), nine hospitals triggered alert status and one triggered alarm status. All ten of these hospitals were in England. No hospitals were flagged as potential double-alert-level outliers. The one hospital that triggered alarm status undertook a review of their cases. After review, alarm status was confirmed for this hospital. All hospitals that triggered alerts have been notified in advance of publication of this report and in accordance with NELA's outlier policy. Individual hospital outcomes are shown via the NELA website.

Alarm-Level Outlier

- Cumberland Infirmary.

Hospitals with the best outcomes

There were five hospitals with a risk-adjusted mortality between the lower 95% and 99.8% control limits. All five were located in England. NELA considers those hospitals with both a case ascertainment greater than 90% and a risk-adjusted mortality below the 95% control limit to be positive outliers. In NELA Year 9, St Thomas' Hospital met these criteria, indicating that this hospital has some of the best outcomes in England and Wales.

Deprivation

Deprivation indices have been used to analyse the NELA population by quintiles for both England and Wales ([Supporting Figure N](#)). There are associations in both nations of decreasing age profiles with increasing deprivation ([Supporting Figure O](#)). A breakdown of CFS scores and age by quintile can be found in [Supporting Figures P and Q](#).

Median NELA risk scores vary by quintile, and there are differences between nations, with higher risk scores in most quintiles in Wales compared to England ([Supporting Figure R](#)).

Risk assessment is performed in hospitals consistently well across all quintiles, with a pattern of the strongest performance in Wales ([Supporting Figure S](#)). A high-risk BPT was not payable in Wales (see Section [Bundle of Care for High-Risk Patients](#)); composite process measures relating to this high-risk group were more strongly delivered in England ([Supporting Figure T](#)). The proportion of high-risk patients admitted to critical care postoperatively is unchanged between quintiles but is lower in Wales than England ([Supporting Figure U](#)). Similarly, the proportion of high-risk patients who received direct consultant-delivered care is unchanged between quintiles but is lower in Wales than in England across most quintiles ([Supporting Figure V](#)).

Median length of stay is consistent across quintiles and in both nations ([Supporting Figure W](#)).

NELA has previously published extensive analysis demonstrating the association of increasing deprivation with higher crude and risk-adjusted mortality^[14], and this finding is demonstrated once again within the current analysis ([Supporting Figure X](#)). This important association should be recognised and appreciated by front-line clinical staff. The current NELA risk algorithm does not adjust for patient deprivation indices.

National Emergency Laparotomy Audit (NELA)

Royal College of Anaesthetists, Churchill House, 35 Red Lion Square, London WC1R 4SG
020 7092 1676 | nela@rcoa.ac.uk

data.nela.org.uk



Information correct as at October 2024