The Royal College of Anaesthetists

NIAA HSRC Health Services Research Centre

RCS ADVANCING SURGICAL STANDARDS

HQIP Healthcare Quality Improvement Partnership

NELA National Emergency Laparotomy Audit

THE FIRST PATIENT REPORT OF THE NATIONAL EMERGENCY LAPAROTOMY AUDIT

June 2015

EXECUTIVE SUMMARY

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We would also like to acknowledge the Emergency Laparotomy Network (ELN) and its members for their enthusiasm in carrying out the first multicentre Audit of outcome following emergency laparotomy.[1] This was instrumental in raising awareness of the variation in mortality following emergency laparotomy, and provided valuable information that contributed to the commissioning of the National Emergency Laparotomy Audit.

1 EXECUTIVE SUMMARY

1 Overview

1.1 The National Emergency Laparotomy Audit (NELA) was established to describe and compare inpatient care and outcomes of patients undergoing emergency bowel surgery in England and Wales in order to promote quality improvement. NELA was commissioned by the Healthcare Quality Improvement Partnership (HQIP) and funded by NHS England and the Welsh government.

1.2 The majority of patients undergoing emergency bowel surgery have potentially life-threatening conditions that require prompt investigation and management. Emergency laparotomy and emergency bowel surgery are terms used to describe the group of surgical procedures that are performed at short notice to treat these conditions. Unlike elective (planned) care, there is often limited time to investigate and prepare these patients before surgery.

1.3 More than 30,000 patients undergo an emergency laparotomy each year in NHS hospitals within England and Wales.[2,3] These procedures are associated with high rates of postoperative complications and death; recent studies have reported that overall 15% of patients die within one month of having an emergency laparotomy but that this rate varies between hospitals and patient groups.[1,2,4,5] The clinical pathway for patients undergoing emergency bowel surgery is complex, and requires input from clinicians from several specialties. This creates challenges in the delivery of care on a day-to-day basis and in bringing about long-term service improvement.

1.4 A number of recommendations and Standards have already been developed to safeguard and improve the quality of care of all patients undergoing emergency laparotomy. This NELA report compares each hospital's performance against these Standards (presented alongside abbreviated document names in Appendix 1), as well as the findings and recommendations of the NELA Organisational Audit of hospital infrastructure published in May 2014 (Appendix 5).

1.5 Standards and recommendations cover the following elements of care:

i Before surgery

- Clinical review and formulation of a care plan by a consultant surgeon soon after admission to hospital.
- Ready availability of diagnostic investigations to help define the need for and type of surgery.
- Formal assessment of a patient's risk of death and complications.
- Prompt administration of antibiotics where there is evidence of infection.
- Prompt access to an operating theatre.

ii During surgery

- Direct care by a consultant surgeon and consultant anaesthetist.

iii After surgery

- Planned admission to critical care for patients when the estimated risk of death exceeds 5%.
- Review of patients older than 70 years by specialists in Medicine for Care of the Older Person (MCOP).

1.6 The Audit results provide each hospital with an individual breakdown of performance against these Standards. This allows the best performing hospitals to be identified in order that good practice can be disseminated. It also allows hospitals to see areas in which they can bring about improvement through local Quality Improvement initiatives. Differences between hospitals mean that it is unlikely that generic solutions will be applicable to all hospitals. Each hospital should examine its own circumstances to identify reasons for their current situation and solutions that can be implemented to bring about improvement.

1.7 Some Standards are only applicable to particularly urgent surgery or to patients at high risk of complications and death. Consequently, 100% compliance is not expected for all Standards because of the range of urgency and risk in patients undergoing emergency bowel surgery.

1.8 The aim of this executive summary is to:

- Provide an overview of findings from the 1st year of patient data collection (December 2013 to November 2014).
- Summarise generic themes.
- Make recommendations for commissioners, hospitals and clinicians.

1.9 Detailed comparative data for individual hospitals is presented throughout the main report and in Appendix 2.

2 Patient characteristics

2.1 Data were provided on over 20,000 patients (83% of eligible patients) during the first year of data collection (1 December 2013 to 30 November 2014). Data were submitted from 192 of the 195 eligible NHS hospitals in England and Wales.

3 Patient outcomes

3.1 Mortality

Thirty-day inpatient mortality was 11%. This estimate is based on data provided directly by local reporters in each hospital. This may reflect a real reduction in mortality compared to mortality of around 15% reported by previous studies; however, it is possible that mortality was under-reported in our data. Independently verified mortality data from the Office for National Statistics are not yet available; therefore caution is required in interpreting these results. We will be able to report more fully in this area when this information becomes available.

3.2 Notwithstanding these caveats, it is evident that the mortality rate for emergency bowel surgery remains up to five times greater than in high-risk elective surgery such as cardiac, cancer and vascular surgery.[6,7]

3.3 Length of hospital stay

The time that patients spent in hospital after surgery varied substantially with patient age. While more than half of patients who survived to leave hospital were in hospital for less than 12 days after surgery, more than a quarter had yet to leave 20 days after surgery.

4 Key themes

4.1 Timeliness of Care

For patients undergoing emergency bowel surgery, survival is improved if delays to diagnosis and treatment are minimised. The urgency with which consultations and treatments should be provided before, during and after surgery is related to the nature and severity of an individual patient's condition.

i Early input by senior clinicians

- Early consultant input allows the sickest patients to benefit from experienced decision making. Standards state that a consultant surgeon should review patients who may require emergency bowel surgery within 12 hours of hospital admission.
- Half (48%) of patients who were admitted as an emergency and underwent emergency bowel surgery were reviewed within 12 hours of admission by a consultant surgeon.
- Two-thirds (68%) of patients admitted to hospital between midnight and 8.00 am were reviewed by a consultant surgeon within 12 hours of admission, but only a third (34%) were reviewed within this time if they had been admitted between mid-day and 6.00 pm.
- There was variation between hospitals. A consultant surgeon reviewed more than 80% of patients within 12 hours at only one hospital; in contrast less than 40% of patients were reviewed within 12 hours at 49 hospitals (28%).

ii Prompt administration of antibiotics in patients admitted with peritonitis

Some patients requiring emergency bowel surgery will have peritonitis (severe infection within the abdomen) and sepsis. These are life-threatening conditions, in which survival is improved when antibiotics are given and necessary surgical treatment carried out without delay.

- Many patients at high risk of sepsis did not receive timely antibiotic therapy.
- For patients who were admitted as an emergency with peritonitis and had surgery within 24 hours.
  - Almost half waited more than four hours for their first dose of antibiotics.
  - A quarter waited more than seven hours.

4.2 Assessment and Appreciation of Risk

The risk of death and complications varies between individuals. Standards state that an objective assessment of risk should be made and documented before surgery. This helps patients and their relatives appreciate the implications of different treatment options. Assessment of risk also aids communication between clinicians, so that plans can be made by the multidisciplinary team to provide appropriate levels of care based on each patient's risk.

- Risk of death was documented before surgery in just over half (56%) of all patients.
- Risk was documented for at least 80% of patients at only 14% of hospitals, and at 22% of hospitals risk was documented for less than 40% of patients.

Where risk was documented before surgery, more patients received the required standards of care:

- Two-thirds of high-risk patients were reviewed before surgery by both a consultant surgeon and a consultant anaesthetist, but only half of similarly high-risk patients were reviewed by both consultants if risk had not been documented before surgery.
- Two-thirds of high-risk patients were admitted directly to a critical care unit following surgery if risk had been documented, but half of similarly high-risk patients were cared for on a general ward directly after surgery if risk had not been documented before surgery.

4.3 Resources

Mortality following emergency bowel surgery is up to five times greater than that seen in patients undergoing major elective surgery (cardiac, cancer, vascular). It is well established that these high-risk elective patients benefit from consultant-delivered care and admission to critical care following surgery, but what is less well appreciated is that the same applies to patients undergoing high-risk emergency surgery, including emergency bowel surgery. These key resources also need to be available without delay in order to maximise the chances of survival, due to the time sensitive nature of the surgery.

i Input by consultant surgeons, anaesthetists and radiologists

Patients who need emergency bowel surgery often require complex management decisions. Standards state that any patient with a predicted risk of death of 5% or more should have active input from a consultant surgeon and consultant anaesthetist.

- Overall, two thirds of operations were directly supervised by both a consultant surgeon and a consultant anaesthetist.
- Both consultants were present for at least 80% of operations at only a quarter (27%) of hospitals; and at ten hospitals at least 20% of operations were performed without either consultant being present.
- More high- and highest-risk patients had emergency bowel surgery 'out of hours'. Despite this both consultants were present for just 41% of operations carried out after midnight and 61% of operations started in the evenings and at weekends , whereas 'in hours' (8.00 am to 6.00 pm, Monday to Friday) both were present for 75% of operations.

Preoperative CT scanning and reporting by a consultant radiologist aids diagnosis and treatment planning and is associated with improved survival. The majority of patients received a CT scan, but not all were reported by a consultant radiologist.

- Two-thirds (68%) of patients had a CT scan which had been reported by a consultant radiologist before surgery.
- More than 80% of patients had a CT scan that was reported by a consultant radiologist before surgery at a quarter (26%) of hospitals. This was achieved in less than 40% of patients at 4% of hospitals.

ii Access to theatres

Many operations are time sensitive and survival is increased if delays to arrival in theatre can be minimised. For patients with peritonitis, delay of a few hours can substantially increase the risk of death. Clinicians typically categorise patients according to urgency. When the time between decision to operate and arrival in theatre was compared with operative urgency, the Audit found:

- Overall, one in six patients did not arrive within the appropriate timeframe.
- 80% of patients arrived in theatre within a timescale appropriate to their operative urgency at 75% of hospitals.
- Clinicians had the greatest difficulty getting the most urgent patients to theatre; 77% of patients requiring surgery within two hours reached theatre within the recommended timeframe, compared with those patients who required surgery within either six or 18 hours (86% and 84% of patients respectively).

iii Critical care after surgery

Critical care allows close observation of those at risk of deterioration following surgery, and, when necessary, offers advanced treatments or organ support. It is well established that high-risk elective surgical patients should not be nursed on a general ward immediately after surgery, and the same standards of care should be provided for patients undergoing emergency bowel surgery.

- 60% of all patients were admitted directly to a critical care unit following emergency bowel surgery.
- There was variation between hospitals. At 12% of hospitals more than 80% of patients were admitted directly to a critical care unit after surgery, whereas at 9% of hospitals fewer than 40% were.

5 Older people

5.1 Almost half of patients undergoing emergency laparotomy were over 70 years of age. One in five patients over the age of 70 died within 30 days of surgery, making their mortality rate six times greater than that of patients aged 50 and under. They also had a longer length of stay. Comorbidity, disability and frailty are common and older people tolerate acute surgical illness less well. Recommendations state that there should be early involvement of a Medicine for Care of the Older Person (MCOP) specialist in the care of older patients.

- Provision of MCOP support was generally poor. Only one in ten (10%) of patients over the age of 70 and one in five (21%) of patients over the age of 90 had an assessment by an MCOP specialist after surgery.
- At 94% of hospitals fewer than 40% of individuals aged 70 years or older were assessed postoperatively by an MCOP specialist.

6 Seven-day services

6.1 There was little variation in provision of care by day of week or time of day for the following measures:

- Preoperative CT scanning and reporting by a consultant radiologist.
- Time to delivery of antibiotics after emergency hospital admission.
- Time to arrival in theatre for surgery after a decision was made to operate.
- Direct admission to a critical care unit after surgery.

However, variation in the delivery of the following processes of care was seen by time of day of admission and if surgery was started 'in-hours' rather than 'out-of-hours':

- Review by a consultant surgeon within 12 hours of emergency hospital admission.
- A decision to operate made in person by a consultant surgeon and preoperative review by a consultant anaesthetist.
- Presence of consultant surgeons and consultant anaesthetists in theatre for emergency laparotomy.

7 Bringing about improvement

7.1 This is the first time that emergency laparotomy care has been investigated in a consistent fashion across all providers. Compared to the data published by the Emergency Laparotomy Network (ELN), there have been improvements in care.[1] Consultant presence during surgery has increased such that perioperative care is now largely consultant driven, a substantial change from historical practice. Some hospitals are consistently delivering very high levels of service, meeting Standards for over 80% of their patients; therefore these standards are achievable within the NHS. Examples of good practice have been collated within this report and on the NELA website so that hospitals can adapt them for their own use.

7.2 However, variation exists between hospitals. With regard to future improvement, many hospitals currently meet standards of care for 60–70% of patients. Clinicians, hospital managers and commissioners need to determine why Standards are met on some occasions, but not others. The existence of a hospital policy does not guarantee that the patient will actually receive the intended care. Multidisciplinary teams should be collecting data to ensure that Standards of care are being provided to all patients. Clinicians should aim to study and improve local practice to reduce variability and to ensure that every patient's care meets recognised Standards. The NELA dataset facilitates this, since it collects data on key processes and outcomes, and provides hospitals with the facility to explore their own data (via the NELA website) to support local Quality Improvement initiatives. However, if data are missing, hospitals cannot properly evaluate their own care.

7.3 In order to reduce variation in care, hospitals should implement appropriate pathways for the care of emergency general surgical patients, starting at the time of admission to hospital or of referral by another team. Care pathways should prioritise emergency resources and ensure that **all** processes of care are provided for every patient. Standardised pathways of care also facilitate audit and thereby highlight key areas for improvement.

7.4 Several hospitals have made their pathways available to NELA. These are provided on the NELA website: www.nela.org.uk/Pathway-Examples.

2 RECOMMENDATIONS

Emergency laparotomy carries a higher overall mortality than any adult elective surgery. The following 24 recommendations are based on published Standards and our findings of wide variation in the provision of care between hospitals. They are aimed at addressing the themes outlined above and described in this NELA Report.

For Commissioners and provider Chief Executives

There is inter-hospital variation in the provision of important elements of care, and in many cases provision falls short of that provided for high-risk elective patients. Commissioners and Chief Executives should review the Audit results for their hospital to assure themselves of the quality of care provided to patients undergoing emergency laparotomy.

1 Hospital-level audit data should be examined to determine if national Standards for **postoperative critical care admission** are being adhered to. Where compliance is poor, a change of local policies and reconfiguration of services should be considered to enable all high-risk emergency laparotomy patients to be cared for on a critical care unit after surgery (Chapter 14).

2 Increased **Medicine for Care of the Older Person** input may require service level agreements with other hospitals if expertise is not available on site (Chapter 15).

For Medical and Clinical Directors

Medical and clinical directors should review the Audit data for their own hospitals to ensure that sufficient resources and personnel are available and appropriately allocated to provide high-quality care for this high-risk surgical population.

3 Local protocols should be developed which ensure a **consultant-delivered service** for emergency laparotomy patients. This includes consultant-delivered preoperative decision making and direct intraoperative management. Rotas, job plans and staffing levels for surgeons and anaesthetists should allow a consultant-delivered service 24 hours per day, seven days per week (Chapter 7 and 12).

4 **Consultant surgeon rota patterns and job plans** should be reviewed to ensure a consultant surgeon is always available to see patients within 12 hours of emergency admission, seven days per week (Chapter 7).

5 Departments of surgery should use local NELA data to determine if the **availability of on-call consultant surgeons** could be improved by relieving them of elective duties (Chapters 7 and 12).

6 Any areas of the hospital that admit emergency general surgical patients need to have robust mechanisms in place to **identify patients with signs of sepsis and ensure prompt prescription and administration of antibiotics** (Chapter 10).

7 **Pathways 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 should be implemented. In almost all units, this will require duty consultant surgeons to be freed of routine commitments such as clinics or elective operating lists (Chapter 7).

8 Policies should be developed and implemented which use **individual risk assessment to allocate resources** (e.g. critical care) appropriate to the patient's need (Chapter 9).

9 Pathways should be developed locally which require **consultant anaesthetist and surgeon presence for all high-risk patients undergoing emergency laparotomy**, 24 hours per day, seven days per week (Chapter 12).

10 Facilitating a **consultant-delivered anaesthetic service** 24 hours per day, seven days per week may require an increase in the number of consultants available for emergency operating theatre work. This may be of particular relevance to hospitals in which on-call anaesthetists also cover other busy emergency services such as trauma, maternity or critical care (Chapter 12).

11 Medical and clinical directors should examine their **emergency theatre provision** in the context of their local Audit results, in order to determine whether sufficient resources are available to enable patients to receive emergency surgical treatment without undue delay (Chapters 10 and 11).

For Multidisciplinary Teams

Improved communication within multidisciplinary teams (MDTs) and implementation of protocols which cover the entire patient pathway can help to improve compliance with established Standards for emergency laparotomy patients.

12 Pathways should be implemented which facilitate rapid **request and conduct of CT scans** for patients who may require emergency laparotomy. These pathways should also support contemporaneous reporting by consultant or senior radiologists with expertise in interpreting emergency abdominal CT scans, so as not to delay subsequent treatment (Chapter 8).

13 Any areas of the hospital that admit emergency general surgical patients need to have robust mechanisms in place to **identify patients with signs of sepsis and ensure prompt prescription and administration of antibiotics** (Chapter 10).

14 Multidisciplinary Teams should review their pathways of care for the **administration of antibiotics** in order to identify why delays occur (Chapter 10).

15 Pathways should be developed locally which require **consultant anaesthetist and surgeon presence for all high-risk patients undergoing emergency laparotomy**, 24 hours per day, seven days per week (Chapter 12).

16 When surgery is contemplated, a **formal assessment of the risk of death and complications** should be undertaken by a clinician and documented in the patient record. This information should be communicated to all members of the MDT in order to prioritise care and allocate appropriate resources. If surgery is undertaken, this risk assessment should be documented on the patient consent form (Chapters 9 and 14).

17 **Multidisciplinary pathways** should be established to prevent inappropriate delays in a patient undergoing surgery, especially once a consultant decision has been made. This will require cross disciplinary cooperation between surgeons, anaesthetists, radiological and laboratory services and theatre and critical care staff (Chapters 8 and 11).

18 All patients aged over 70 years should undergo an **assessment of multimorbidity, frailty and cognition** to guide further input from MCOP (Chapter 15).

19 Pathways should be implemented to ensure that **all patients aged over 70 years who undergo an emergency laparotomy receive postoperative screening and assessment by an MCOP consultant** (Chapter 15).

20 **Clinicians should regularly review Audit data** on timing of administration of antibiotics and time to theatre in order to ensure that aims are being achieved (Chapter 10).

21 **Multidisciplinary teams should hold regular joint meetings** to continuously review essential processes of care (using the NELA Quality Improvement Dashboard[❞]) and review perioperative morbidity and mortality in emergency laparotomy.

For NELA Leads

We are grateful to NELA participants for ensuring that data completeness was generally good. However, 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 (including time of consultant surgeon review, decision to operate and arrival in theatre) were poorly completed by many hospitals (Chapter 17).

22 NELA leads should review their local data to ascertain **case-submission and data completeness** (Chapter 17)**.**

23 NELA Leads should actively promote **completion of P-POSSUM data fields** to ensure that risk estimation is accurate and avoid falsely elevated risk adjusted hospital mortality rates (Chapter 17).

24 **Where data completeness is a problem**, NELA Leads should work with clinical teams to improve this, to facilitate future audit and quality improvement (Chapter 17).

[❞]Available on the NELA website https://data.nela.org.uk/Reports.aspx.

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