

The Second Patient Report of the National Emergency Laparotomy Audit (NELA): Summary of Methods

July 2016

Summary of methods

Identification of sites undertaking emergency laparotomy

Since the start of patient data collection in December 2013, the number of hospitals that perform emergency laparotomies has altered as NHS trusts have merged or reconfigured their services. Analysis of Hospital Episode Statistics (HES) data has identified 191 hospitals at which emergency laparotomies were performed in Year 2 of the Patient Audit. All identified hospitals were invited to participate in data collection, with data received from 186 of these hospitals.

Inclusion and exclusion criteria

NELA was established to enrol the patients treated in NHS hospitals within England or Wales who were aged 18 years and over and who undergo an expedited, urgent or emergency (NCEPOD definitions) abdominal procedure on the gastrointestinal tract. The operations that NELA covers include:

- Procedures involving the stomach, small or large bowel, or rectum for conditions such as perforation, ischaemia, abdominal abscess, bleeding or obstruction.
- Washout/evacuation of intra-peritoneal abscess (unless due to appendicitis or cholecystitis).
- Bowel resection/repair due to incarcerated umbilical, inguinal and femoral hernias (but not hernia repair without bowel resection/repair).
- Return to theatre for repair of substantial dehiscence of a major abdominal wound or after patients underwent non-elective gastrointestinal surgery.

There are a number of abdominal procedures that are outside the scope of the Audit. Examples of these include:

- Uncomplicated appendicectomy or cholecystectomy.
- Non-elective hernia repair without bowel resection.
- Vascular surgery, including abdominal aortic aneurysm repair.
- Caesarean section, obstetric laparotomies or gynaecological laparotomy.
- Laparotomy/laparoscopy for pathology caused by blunt or penetrating trauma.

Full inclusion and exclusion criteria are available on the NELA website: www.nela.org.uk/Criteria.

Dataset design

The data items in the patient dataset were chosen based on their relevance to measuring practice against clinical recommendations and national standards of care, and the need to adjust for differences in the characteristics of patients and operations between hospitals. It is important that outcomes are adjusted for differences in the types of patients treated at individual hospitals because this ensures the results for each hospital are comparable.

The dataset contains data items covering various characteristics of the patient and the care they received:

- Patient age, gender, region of residence.
- Preoperative assessment and imaging.
- Preoperative patient risk factors.
- The type of procedures performed and the seniority of the surgeon and anaesthetist that performed it.
- Postoperative patient risk factors.
- Postoperative care, including the use of critical care and input from Elderly Medicine specialists where appropriate.

The design and implementation of the NELA Patient Audit dataset was overseen by the NELA Project Board with advice from the Clinical Reference Group.

Changes to the NELA dataset

Several enhancements of the NELA data collection web tool were implemented prior to the start of data collection for Year 2 of the Patient Audit in response to participant feedback. Details can be found on the NELA website (www.nela.org.uk/Year-2-Dataset-Changes#pt).

The questions asked via the web tool are kept under review and updated as required. This is in part to minimise the burden of data input on clinical teams, but is also a process of refinement as greater understanding of the patient cohort emerges. As such, further changes have been made in a number of areas of the Audit dataset for the third year of data collection, which is already underway. Additional changes for the fourth year are under discussion, which is due to start in December 2016.

The Year 2 NELA Patient Audit data extract

Patients were included in the analysis for the Second Patient Report if they entered an operating theatre for an emergency laparotomy between 1 December 2014 and 30 November 2015.

In order to give hospitals sufficient time to enter the data on patients that were eligible for inclusion in the Year 2 data extract, the data submission deadline was extended to 31 January 2016 and a full extract taken at 9:00 am on 01 February 2016. On this date, there were 26,127 locked cases.

A number of these cases were removed prior to analysis because they did not meet the NELA patient inclusion criteria.

Table 1
Cases excluded from analysis of the NELA Patient Audit dataset

Reason for exclusion	Cases excluded
Admitted to Scottish hospitals ¹	533
Under 18 at time of hospital admission	1
Documented age at time of admission implausible	1
Arrival in theatre after data collection period	122
Arrival in theatre before data collection period	1,610
Primary surgical procedure ineligible for inclusion	722

After exclusions, the Audit dataset contained 23,138 locked cases, submitted by 186 NHS hospitals across England and Wales.

Data processing

All analyses were performed in Microsoft Excel (2010) or STATA version 13 (StataCorp, Texas USA). The risk adjustment model was developed by the Clinical Effectiveness Unit of the Royal College of Surgeons of England. The results of the analysis was discussed and interpreted by the NELA Project Team, and oversight was provided by the NELA Project Board and Clinical Reference Group.

Patients with missing time and date variables were excluded from analyses unless another variable was available (e.g. time of decision to operate and time of booking for theatre). In the second year of data collection only the date and time of the decision to operate was required, with the date and time of booking recorded only if this could not be provided. Thus, only one time point was required in Year 2, compared to both time points in Year 1.

In line with accepted methodology², missing P-POSSUM variables were assigned the lowest risk category in order that patient-level estimates might be provided in real time via the web tool to guide treatment decisions.

Most analyses in the Second NELA Patient Report are descriptive, and presented as simple tables, run charts and bar charts. The statistical significance of differences across patient subgroups was tested using:

- Kruskal-Wallis one-way analysis of variance: to assess for differences in non-parametric distributions of continuous data between multiple groups.
- Pearson's χ^2 test: to assess for associations between categorical variables, including multi-option categorical variables.

¹ Five Scottish NHS hospitals submitted patient data to the NELA web tool during Year 2 of patient data collection as part of their participation in the EPOCH trial: www.epochtrial.org/epoch.php. Only data from English and Welsh hospitals are included in the Second Patient Report.

² Copeland GP, Jones D, Walters M. POSSUM: a scoring system for surgical audit. *Br J Surg* 1991;**78**(3):355-360