The National Emergency Laparotomy Audit (NELA): Summary of Methods

Summary of methods

Identification of sites undertaking emergency laparotomy

All NHS hospitals that perform emergency laparotomy in England and Wales must take part in NELA as per the NHS Standard Contract. Since the start of patient data collection in December 2013, the number of hospitals that perform emergency laparotomies has altered as NHS trusts/health boards have merged or reconfigured their services. Hospitals are identified each year through analysis of national data from NHS England and Digital Health and Care Wales. Any hospital with more than 10 cases identified is an eligible hospital for inclusion in NELA.

Inclusion and exclusion criteria

Generally, NELA includes all adult patients (aged 18+) treated in England and Wales undergoing an emergency abdominal procedure on the gastrointestinal tract. This includes:

- Open, laparoscopic, or laparoscopically-assisted procedures
- 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 – excluded, see below)
- Washout/evacuation of intra-peritoneal haematoma
- Bowel resection/repair due to incarcerated incisional, umbilical, inguinal and femoral hernias (but not hernia repair without bowel resection/repair), e.g. Large incisional hernia repair with bowel resection
- Bowel resection/repair due to obstructing/incarcerated incisional hernias provided the presentation and findings were acute. This will include large incisional hernia repair with division of adhesions.
- Laparotomy/laparoscopy with inoperable pathology (e.g.. peritoneal/hepatic metastases) where the intention was to perform a definitive procedure. This does not include purely diagnostic procedures.
- Laparoscopic/Open adhesiolysis
- Return to theatre for repair of substantial dehiscence of major abdominal wound (i.e., “burst abdomen”)
- Return to theatre for complications that require the assistance of a general surgeon following either an interventional radiology procedure or following gynaecological oncology surgery.
- Any reoperation/return to theatre for complications of elective or non-elective general/upper GI surgery meeting the criteria above is included. Returns to theatre (apart from those interventional radiology or gynaecology-oncology complications described immediately above this point), for complications following non-GI surgery are excluded (see exclusion criteria below).

There are a number of abdominal procedures that are outside the scope of NELA.

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

Standards of Care

NELA audits care for emergency laparotomy patients against standards set by national organisations, including the Royal College of Surgeons of England, the Academy of Medical Royal Colleges, the Royal College of Anaesthetists, and the National Confidential Enquiry into Patient Outcomes and Death. The decision over whether to include certain standards is guided by consideration of its role in improving outcomes for patients, quality assurance and quality improvement, balanced against burden of data collection. Advice is also taken from NELA’s Clinical Reference Group (CRG) which includes lay members. Current audit standards can be found here: https://www.nela.org.uk/Standards-Documents#pt

The key outcome measure that NELA reports against is risk-adjusted 30-day mortality, which forms the basis of our formal outlier reporting process, described here: https://www.nela.org.uk/NELADocs#pt

Dataset design

The NELA dataset is reviewed on an annual basis. Data items in the dataset are chosen based on their relevance to measuring practice against 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 receive:

- Patient age, gender, region/location 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 care specialists where appropriate
- Length of postoperative hospital stay

The dataset is drafted in collaboration with the NELA CRG and approved by the NELA Project Board before implementation.

Data Collection

Data is collected on an annual cycle. In years 1-8 of the audit, the annual data collection cycle ran from 1st December until 30th November the following year. Year 9 of the audit saw the data collection cycle extended to include data from 1st December until 31st March so as to better align Year 10 data collection with the financial year. Clinical teams have 60 days from the end of the data collection period to submit/lock all of their cases for inclusion in the audit year.

Data is entered by clinical teams via an online data collection portal. To ensure high quality data, the portal has built in validations and checks on certain data points. Only authorised users at each hospital have access to the system to enter cases. The NELA administrative team also have access to support queries and export data for annual analysis.

Data Analysis for Annual Reporting

As noted above, participating hospitals have 60 days from the end of the data collection period to submit all cases to the audit. An export of the data is then taken by the NELA administrative team. The exported data is cleaned using R statistical software.

The cleaned data is sent to NHS England for linkage to Hospital Episode Statistics (HES) and Office for National Statistics (ONS) data via their secure portal. HES data contains information needed to compute annual case ascertainment for each hospital, a marker of data completeness. Survival data from ONS is used to compute risk-adjusted 30-day mortality following emergency laparotomy, a key outcome for the audit.

Data is also obtained from Digital Health and Care Wales from their Patient Episode Database for Wales (PEDW) for similar purposes for Welsh patients.

HES and PEDW data are sent securely from the RCoA to the RCS for case ascertainment analysis. A description of the algorithm used to determine case ascertainment can be found here: https://www.nela.org.uk/downloads/NELA%20HES%20Algorithm%20OPCS%20(June%202019).pdf

Risk-adjusted 30-day mortality is computed using a risk-adjustment model. The current risk-adjustment model is described here: https://doi.org/10.1111/anae.16096; it has been updated and recalibrated over time.

Other audit metrics are computed per the calculations that can be found here: https://www.nela.org.uk/Standards-Documents#pt. This document outlines numerators and denominators for each metric, as well as outlining how missing data is dealt with.