

Background

It is important for the users of NELA findings to understand how many of the emergency laparotomy procedures performed within the NHS are captured by the audit. The NELA team estimate case ascertainment, both nationally and for individual NHS organisations, by comparing the number of cases submitted to the Audit with the number of cases found in the national administrative hospital datasets for the same time period. The source of this national hospital data for England is the Hospital Episode Statistics (HES) dataset; for Welsh patients, it is the Patient Episode Dataset Wales (PEDW).

This document describes how potential NELA cases are found in HES and PEDW. It is written for sites so that they can understand how NELA calculates the number of cases it expects to be submitted by the NHS organisation.

What are the HES and PEDW datasets?

When patients are admitted to an English or Welsh NHS hospital, some basic information about their stay in hospital is extracted from their medical notes.

For English NHS hospitals, this is collated as part of the Commissioning Data Set (CDS) and is returned by the organisations as the Secondary Uses Service (SUS) dataset; an equivalent dataset (HES) available for other organisations for research/planning purposes.

For further details see <https://digital.nhs.uk/data-and-information/data-tools-and-services/data-services/hospital-episode-statistics>.

For Welsh NHS hospitals, the information is collated into the PEDW dataset. This is aligned with HES data to allow comparison. For further details see

<http://www.infoandstats.wales.nhs.uk/page.cfm?orgid=869&pid=40977>.

Both datasets contains similar information about the patient. This includes:

- Their age and sex
- The NHS organisation, dates of admission and discharge, the speciality managing the patient's care, and whether the admission was as an emergency or elective patient (known as mode of admission)
- Diagnosis fields (entered using ICD-10 codes) that describe the conditions suffered by the patient, including the principal reason for admission as well as comorbid conditions
- Procedure fields (entered using OPCS-4 codes) that describe what operative procedures were performed and on what date these occurred.

Finding cases in HES

The NELA team developed an algorithm that would identify patients in HES / PEDW data who meet the NELA inclusion criteria. In summary, NHS organisations should submit data to NELA on patients who are:

- aged 18 years or more and
- either underwent a major emergency abdominal procedure on the gastro-intestinal tract
- or who returned to theatre for an emergency laparotomy after an elective GI procedure

Some specific types of procedures / conditions are excluded (the precise criteria available from <https://www.nela.org.uk/NELADocs>).

As there is no single procedure code for an emergency laparotomy or laparoscopic procedure, the NELA team requests extracts of HES and PEDW data for patients whose data suggests they might have had an eligible emergency laparotomy based on OPCS (procedure) codes that correspond to the various types of procedures covered within NELA.

The extracts contain information about all admissions for the relevant patients within the requested time period. The algorithm makes use information from various parts of HES/PEDW including: mode of admission, ICD-10 diagnosis codes and the type (via OPCS codes) and date of procedures.

Each HES record represents a single episode of patient care under one speciality and English NHS hospitals can enter data on up to 24 procedures and 20 diagnoses in each HES record. Therefore a single admission can consist of multiple records. Each PEDW record represents a single hospital admission and Welsh NHS hospitals can enter data on up to 12 procedures and 14 diagnoses in each PEDW record.

The algorithm then evaluates these datasets by following a number of steps:

1. An admission is excluded if the procedure fields do not contain any OPCS procedures codes that corresponded to a potentially valid emergency laparotomy. *Admissions may not contain relevant OPCS codes as they are unrelated to NELA or may not contain any OPCS*
2. It flags admissions which contain eligible surgical procedure(s). The ICD-10 diagnosis codes listed as the primary diagnosis are used to distinguish between admissions that met the inclusion criteria and those that would be excluded. NB: A patient may have more than one emergency laparotomy (EL) over the time period included in the HES extract.
3. Within these flagged admission, the algorithm identifies the various types of potential EL procedures that a person had, and uses the date fields to distinguish between the earliest eligible procedure from possible subsequent procedures.

As the time of operation is not captured in HES/PEDW, it is assumed that all procedures that occurred on the same date were performed during the same theatre visit.

Determining which procedures are valid

It is possible for patients to have a combination of procedures during an emergency laparotomy. To differentiate between the different types of procedure, and determine if the admission meets the NELA inclusion criteria, a procedure is labelled as one of four tiers (A, B, C and D):

- A: procedures involving excision of all/part of an organ (stomach/ bowel) or repair of a perforation
- B: procedures involving some form of bowel incision
- C: any other procedure in the EL OPCS code list eg drainage, washout
- D: procedure codes consistent with an EL but which occur with a procedure that is outside the scope of NELA, eg repair of an Abdominal Aortic Aneurysm.

HES/PEDW records were allocated to the most major of the EL category listed above given the combination of OPCS codes. For example, records that contained OPCS codes for tier A and tiers B and/or C on the same date were allocated according to their tier A procedure; tiers B and C on the same date were allocated to their tier B procedure.

The recorded mode of admission was used to classify the initial procedure as elective or emergency. The earliest procedure in an emergency admission was classified as an emergency laparotomy if it met the above OPCS criteria. For elective procedures, only eligible procedures on dates after the original procedure were eligible.

Details of the potentially valid OPCS codes and ineligible ICD-10 diagnosis codes are available from the NELA website <https://www.nela.org.uk/Audit-info-Documents#pt>

Things to consider if large difference in case ascertainment numbers

Audit data submission

- Are all eligible cases being entered onto the NELA database and locked prior to data deadline?

HES submission

- Is the admission method coded appropriately in your local hospital systems
 - Are the same number of fields/clicks needed to admit elective and emergency patients onto the system? If not, the quicker method may be used inappropriately.
- Are OPCS procedure codes and their date, and ICD-10 diagnosis codes being
 - Accurately recorded in patient notes?
 - Accurately coded at hospital/trust level so that accurate information is included in HES?

It's not unusual for patient admissions in HES to have no procedures recorded or invalid dates for procedures.

Limitations of HES data

Due to the nature of HES data, the algorithm requires the following assumptions:

- Elective/emergency admissions are coded appropriately¹
- The initial procedure during an emergency admission was performed as an emergency procedure²
- Subsequent procedures during an admission (either elective/emergency) are emergency procedures and not planned follow-up procedures³
- Multiple procedures listed on the same date occur during the same visit to theatre⁴
- Where multiple procedures with an equivalent tier group (see above) are listed on the same date, the one with the lowest operation number (most resource intensive) is defined as the most important procedure⁵
- The first ICD-10 diagnosis code listed in the diagnosis fields in the record containing an eligible procedure is an accurate description of the reason for the patient undergoing an emergency laparotomy⁶
- NELA is based on clinical diagnoses which may not be fully captured by OPCS/ICD10 coding

^{1, 2, 3,} the method used to find procedures varies between elective and emergency admissions

⁴ this means that a return to theatre on the same date as an initial operation cannot be found

^{5, 6} different procedures or diagnoses are allocated in different ways therefore this may affect whether a procedure is considered an emergency laparotomy by the algorithm.

NB. All procedures with appendicitis in any diagnosis code field is excluded, this includes those with peritonitis as their first ICD-10 diagnosis code.