National Bowel Cancer Audit

Detection and management of outliers: Clinical Outcomes Publication

November 2017

National Bowel Cancer Audit (NBOCA)

Detection and management of outliers – Clinical Outcomes Publication

Purpose
A potential outlier is a result that is further from the overall average value than would usually occur by chance alone.

This policy sets out the actions that NBOCA takes when data indicate that results for a trust or consultant significantly deviate from the expected value.

This policy is based on the Outlier Management Checklist in HQIP's Clinical Outcomes Publication Technical Manual which is accessible from:
https://www.hqip.org.uk/resources/clinical-outcomes-publication-technical-manual/

Key information
The Clinical Outcomes Publication (COP) is a national programme of comparative patient outcomes reported by hospital trust and by consultant. This policy relates to the measures used for outlier reporting by NBOCA as part of COP.

Potential outliers are assessed on the following quality indicators:

- ***Consultant level measures:***

90 day post-operative mortality
The outcome measure associated with this publication is the 90-day mortality rate following planned removal of bowel cancer – that is the proportion of patients undergoing elective or scheduled surgery who die from whatever cause within 90 days of their operation.

- ***Trust level measures:***

90 day post-operative mortality
The outcome measure assessed for this publication is the 90-day mortality rate following planned removal of a bowel cancer – that is the proportion of patients undergoing elective or scheduled surgery who die from whatever cause within 90 days of their operation.

30 day unplanned readmission
Following discharge a number of patients will develop complications that can only be managed in secondary care, and require admission to hospital. This metric reflects this and is the proportion of patients undergoing surgery to remove their bowel cancer who have an emergency readmission to hospital within 30 days.

Data quality review process
Each year the NBOCA team work with trusts to support them to review their data quality and completeness. Following linkage of the audit data to Hospital Episode Statistics data, each trust is sent summaries of their data and initial results along with guidance on areas to check. They have the opportunity to improve completeness of data (e.g. staging data) before the final data submission deadline. Where trusts are 2 standard deviations above the

mean in the 90 day mortality measures (either for the trust as a whole or an individual surgeon), the NBOCA team writes to them specifically to flag this and recommends that they review their data before the final submission deadline. This effectively provides trusts with an alert that they could be an outlier in one of these measures.

Following this data quality review process and the final submission deadline, the NBOCA team extracts the final dataset for use in the COP measures. At this point outliers which are at the alarm level are identified.

Definition of an Alarm:
An estimate more than three standard deviations above the mean is deemed to be an alarm. This will trigger the process set out below.

Process and Timeframes
The following actions and timeframes are actioned in the application of this policy:

Action	**Timescale**
NBOCA detect outliers at individual consultant and/or trust level	
NBOCA notify lead clinician by phone and send letter to individual consultant, Clinical Lead and Medical Director and CEO of Trust to notify of potential outlier status	5 days
Clinical Lead responds to the letter	25 days
NBOCA review response and confirm outlier status (where applicable)	30 days
NBOCA confirm outlier status by phone and by letter to Clinical Lead, CEO and Medical Director to confirm outlier status (where applicable)	5 days
Clinical Lead and CEO/ Medical Director acknowledge receipt of letter	10 days
Publication of data on NHS Choices	

Contact us
If you have any feedback or questions about this policy please contact the NBOCA Project Team via email: bowelcancer@nhs.net

Appendix: Risk adjustment and inclusion information

1. Risk-adjustment

1.1 Which risk-factors are outcomes adjusted for?

Age (modelled as age plus age-squared), sex, ASA grade, T-stage, N-stage, M-stage, cancer site, mode of admission (from HES), number of comorbidities (Charlson Score from HES), and the interaction between age and distant metastases are included in the risk adjustment model.

1.2 How is risk-adjustment carried out?

The adjusted outcomes are estimated using indirect standardisation. The observed number of events for a trust or consultant is divided by the number expected on the basis of the multivariable regression model. The adjusted rate is then estimated by multiplying this ratio by the average rate in all patients included in the analysis. If a provider tends to treat patients who are lower risk than the national average, their adjusted outcomes will be higher than their observed outcomes. If a provider tends to treat patients who are higher risk than the national average, their adjusted outcomes will be lower than their observed outcomes.

1.3 If a surgeon/ trust has an unusual distribution of a risk-factor, how will this affect their adjusted outcome?

If a trust/surgeon has unusually low-risk patients compared to all patients nationally, for example they tend to be younger, or have lower ASA grade, or less advanced cancer, the adjusted outcomes for the trust/surgeon will be higher than the observed outcomes. Conversely, if a trust/surgeon has unusually high-risk patients compared to all patients nationally, the adjusted outcomes for the trust/surgeon will be lower than the observed outcomes.

1.4 How is the Charlson Comorbidity Score defined?

The Charlson Comorbidity Score is calculated using HES. A comorbidity is defined as any hospital admission with one of the following diagnoses in the last year, including the current admission: congestive cardiac failure, peripheral vascular disease, cerebrovascular disease, dementia, rheumatological disease, liver disease, diabetes, hemiplegia/paraplegia, AIDS/HIV; or any of the following diagnoses at a previous hospital admission in the last year: myocardial infarction, chronic pulmonary disease or chronic renal disease. Note that the patient does not have to have been admitted for the comorbidity for it to be included. The comorbidity needs to be included in the patient notes and from there, to make its way into HES, to be included. This can be recorded in the notes at the admission for the bowel cancer resection.

See British Journal of Surgery 2010; 97: 772–781 for more details.

1.5 How is missing information on risk-factors dealt with?

Patients with missing date of surgery are excluded, and multiple imputation, with 10 imputed datasets, is used to fill in any missing information on the risk factors. The method, known as Multiple Imputation using Chained Equations, uses a patient's other risk-factors to predict their missing information, whilst taking into account the uncertainty due to their missing information. In addition to the data items in the risk-adjustment model, and the outcomes, the following items are used to predict missing risk-factors: mode of admission according to NBOCA, surgical procedure, number of lymph nodes extracted, number of positive lymph nodes extracted, Index of Multiple Deprivation, length of hospital stay, and days from diagnosis to surgery.

1.6 If a trust/surgeon has very incomplete data on some risk-factors is this likely to affect their adjusted outcomes?

Where patients are missing any risk factors, values are imputed based on their other risk factors and the variables listed in 1.5. This only leads to unbiased estimates of the outcome if there is no systematic difference between patients with a risk factor missing and those with it recorded, after taking into account all of the data items used in the multiple imputation. Multiple imputation cannot produce estimates which are as accurate as those based on complete data, and it is therefore very important to provide complete information on all of the risk-factors used for adjustment. The strongest of the risk-factors that come from NBOCA are age, ASA grade and TNM stage, and it is particularly important that these are complete.

1.7 Is TNM staging radiological or histological?

Histological staging is used to categorise T and N staging, where data is available. Radiological staging is used for M staging, and to categorise T and N staging when histological data is not available. NBOCA no longer collects information about Dukes Staging, therefore is no longer able to update missing M-stage data from Dukes stage.

1.8 Why are surgical access and procedure not included in the risk adjustment?

The aim is to adjust for patient factors which reflect frailty of the patient and which cannot be influenced by the provider, so that apart from random variation, any remaining differences in outcomes between providers should reflect differences in quality of care. Providers have influence, to some extent, over the type of surgical procedure and whether laparoscopic techniques are used, and these factors should not, therefore, be adjusted for.

2. Inclusion criteria

2.1 Which patients were included in the estimate of 90-day mortality?

All patients diagnosed with bowel cancer between 1 April 2011 and 31 March 2016 who, according to NBOCA, underwent an elective or scheduled major resection regardless of

curative intent. Patients under 18, those with cancer of the appendix, those with missing date of surgery or date of surgery after date of death and those for whom ONS mortality data was unavailable (mostly due to type-2 opt-out) were excluded.

See http://content.digital.nhs.uk/article/7092/Information-on-type-2-opt-outs for further details about type-2 opt out

2.2 Which patients were included in the estimate of 30-day unplanned readmissions?

All patients diagnosed between 1 April 2015 and 31 March 2016 who, according to NBOCA, underwent a major resection, regardless of surgical urgency or curative intent. Patients under 18, those with cancer of the appendix, those with a missing date of surgery or whose readmission status could not be determined from HES were excluded.

3. Outcomes

3.1 How is 90-day mortality defined?

90-day mortality is defined from date of death (ONS data) and date of surgery from NBOCA.

3.2 Why report 90-day mortality rather than 30-day mortality?

From a patient's perspective the risk of postoperative death at 3 months is just as significant an outcome as death within 1 month of surgery. Postoperative death at 3 months captures those deaths that occur after prolonged critical care support which is now a much more common feature of colorectal cancer resection and adds significantly to the procedure associated death rate. A previous study showed that the vast majority of deaths occurring within 90 days of surgery were as a result of complications of the surgery [Archives of Surgery 2009; 144: 1021-1027].

4. Procedure codes

4.1 Which procedures are included as a major resection?

- Right Hemicolectomy
- Extended right hemicolectomy
- Transverse Colectomy
- Left Hemicolectomy
- Sigmoid colectomy
- Anterior Resection
- APER including Extenteration of Pelvis
- Hartmann's procedure
- Total Colectomy and ileorectal anastomosis
- Total excision of colon and rectum
- Total excision of colon and rectum + anastomosis of ileum to anus + create pouch