Capturing transfer from theatre to critical care in linked national clinical datasets

For colorectal cancer patients undergoing emergency surgery in England and Wales between 01/12/2016 to 30/11/2019

NBOCA: Methodological report

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Contents

Executive Summary

Around one fifth of patients diagnosed with colorectal cancer (CRC) will present as an emergency and, as a result, many of these will require emergency abdominal surgery. Patients undergoing emergency CRC surgery are well-recognised as having a higher risk of post-operative mortality compared to those having elective (non-emergency) surgery. In England and Wales, emergency CRC patients have a six-fold increased risk of 90-day post-operative mortality.

Several reports have highlighted the importance of recognising high-risk patients who are undergoing emergency abdominal surgery. This is defined as patients with ≥5% predicted risk of mortality from their surgery. It has been recommended that these patients should be transferred directly from theatre to critical care facilities, rather than going from theatre to the ward and potentially having a critical care admission following this ("indirect transfer").

Critical care facilities have historically encompassed Level 3 (Intensive Care Unit) and Level 2 (High Dependency Unit) care. Critical care enables more intensive monitoring of patients, with higher nurse to patient ratios, and the availability of organ support. Despite evidence that high-risk patients who are directly transferred to critical care have improved outcomes, the most recent National Emergency Laparotomy Audit (NELA) report showed that a fifth of patients with predicted risk of mortality ≥5% were not being directly transferred to critical care following their emergency surgery.

The aim of this report is to assess the validity of information on post-operative destination for CRC patients undergoing emergency surgery in three routinely collected datasets (the National Bowel Cancer Audit (NBOCA), NELA, and the Intensive Care National Audit & Research Centre (ICNARC) Case Mix Programme) and give recommendations on capturing direct transfer from theatre to critical care across these datasets.

The results demonstrate that patients are more likely to be identified as going direct from theatre to critical care using data collected by NELA or ICNARC, rather than NBOCA. This is particularly the case for patients who have been identified as high-risk and would require a direct transfer to critical care as per national guidelines. Within NBOCA, the data item for post-operative destination is poorly completed and unreliable for identifying the direct transfer of patients to critical care following emergency surgery. However, extensive validation work has been conducted on the NBOCA dataset and poor completion of this singular data item is not reflective of the data quality of the dataset as a whole.

Our recommendation is that a patient should be defined as going direct to critical care following emergency CRC surgery if *either* their NELA post-operative destination is critical care *or* data linkage to ICNARC indicates direct transfer to critical care. These findings will facilitate further work to explore between-provider variation in critical care access and use. They will also allow a better understanding of any identified variation, as well as enabling the reporting and ongoing monitoring of this information. Finally, the findings will enable more detailed evaluations of the impact of direct transfer from theatre to critical care on outcomes for patients undergoing emergency CRC surgery, as well as CRC patients undergoing elective procedures.

Key Messages

- Current national guidelines recommend the direct transfer of high-risk patients (predicted mortality ≥5%) undergoing emergency abdominal surgery, including colorectal cancer surgery, to critical care but non-compliance with this standard is documented. It is therefore important to be able to measure this outcome from routinely collected data.

- The National Bowel Cancer Audit (NBOCA) collects data regarding the post-operative destination of colorectal cancer patients who have had surgery. This NBOCA data item is poorly completed and unreliable for identifying the direct transfer of patients to critical care following emergency surgery. Importantly, extensive validation work has been conducted on the NBOCA dataset and poor completion of this singular data item is not reflective of the data quality of the dataset as a whole.

- Linked National Emergency Laparotomy Audit (NELA) and Intensive Care National Audit & Research Centre (ICNARC) Case Mix Programme data can be used to ascertain a patient's post-operative destination. The agreement between data recorded in NELA and ICNARC for a patient's post-operative destination is much better than the agreement between NBOCA and ICNARC.

- For patients who are identified as high-risk (predicted mortality ≥5%) following emergency abdominal surgery, the correlation between the patient's post-operative destination in NELA and ICNARC is stronger than it is for NBOCA.

- Ideally, the recommended definition of direct transfer to critical care is where patients are recorded as going directly from theatre to critical care within 1 day of surgery according either to NELA or through data linkage to ICNARC. If only NELA or ICNARC data is available, a caveat should be included that there will be some under-capture.

Recommendations

No.	Recommendation	Intended audience for recommendation	Evidence in the report which underpins the recommendation	Guidance available (for example, NICE guideline)
Rec 1	The following are recommended to record those emergency CRC patients who undergo direct transfer from theatre to critical care: • Ideally, NELA and ICNARC datasets should be used together. • If both NELA and ICNARC data are available, a patient would be defined as having a direct transfer from theatre to critical care if *either* data source indicates this was the post-operative destination. • Where only one of NELA or ICNARC data sources is available, a caveat should be included that there will be some under-capture of direct transfer from theatre to critical care.	Researchers Methodologists	Pages 8-10. NELA and ICNARC are demonstrated to be the most reliable sources of post-operative destination.	Not applicable
Rec 2	The NBOCA data item "post-operative destination" should not be relied upon for any future analyses investigating critical care use, and should be stepped down for future data collection. Importantly, extensive validation work has been conducted on the NBOCA dataset and poor completion of this singular data item is not reflective of the data quality of the dataset as a whole.	Researchers Methodologists	Pages 8-10. NBOCA has high levels of missing data for this data item. It has been shown to be unreliable in identifying patients who have direct transfer to critical care compared to NELA and ICNARC.	Not applicable
Rec 3	Further work should be undertaken to explore the direct transfer of emergency CRC patients from theatre to critical care, for example, assessing variation between-providers and the impact this has on outcomes. This work should primarily focus on those patients who are deemed high-risk and therefore should be undergoing direct transfer to critical care according to national guidelines.	Researchers Methodologists	Pages 8-10.	Royal College of Surgeons of England. The High-Risk General Surgical Patient: Raising the Standard. (2018)

Introduction

Around 32,000 patients are reported as being newly diagnosed with colorectal cancer (CRC) in England and Wales each year. Approximately 20% of these patients will present as an emergency.[1] This includes patients who present to secondary care and are acutely unwell because their CRC has caused bleeding, obstruction, or perforation leading to peritonitis and, subsequently, sepsis.

CRC patients who present as an emergency fall under the remit of General Surgery. Unlike specialities such as Cardiothoracic Surgery which are centralised to tertiary centres, emergency general surgical procedures take place in every acute National Health Service (NHS) hospital in England and Wales. CRC patients undergoing emergency surgery have a much higher rate of mortality with, on average, 11.3% of those undergoing emergency surgery dying within 90 days of their procedure, compared to just 1.8% of those undergoing elective (non-emergency) surgery.[1]

In 2011, the publication of a report by the Royal College of Surgeons of England (RCS) and Department of Health first highlighted significantly higher rates of mortality and complications for high-risk patients undergoing emergency general surgical procedures. The report defined high-risk patients as those with a predicted hospital mortality ≥5%.[2] The rationale for this was to provide a means of identifying the general surgical patients most vulnerable to adverse events, although it was recognised that patients with a predicted mortality <5% were also likely to benefit from optimisation of their care. The report recommended that, as a minimum, patients with a predicted mortality ≥10% should have direct transfer to critical care after emergency surgery.[2]

In 2018, a revised version of the RCS report, *"The High-Risk General Surgical Patient: Raising the Standard",* was published.[3] The aim of this report was to update previous recommendations in line with new evidence. It showed that there were persistent deficits in peri-operative care and outcomes, particularly for emergency patients. This included ongoing between-provider variation in the availability and use of critical care facilities. This report recommended that patients with a predicted mortality ≥5% should have direct transfer to critical care after emergency surgery.[3]

Following on from the publication of the 2011 RCS report, the National Emergency Laparotomy Audit (NELA) was established to monitor and stimulate care quality improvement for emergency abdominal surgery.[4] In the most recent NELA report, a fifth of patients having emergency abdominal surgery with a predicted mortality ≥5% were not transferred directly to critical care.[5] For patients with a predicted mortality ≥10%, over a tenth of patients were not directly transferred to critical care.[5] These figures are concerning when some providers will routinely transfer patients to critical care following lower-risk elective CRC surgery.

In the UK, providers with increased critical care capacity have been shown to have improved mortality outcomes.[3] Critical care transfers can be categorised as "direct" (meaning that patients are transferred directly to critical care services from theatre) or "indirect" (meaning that patients are discharged from theatre to the ward or other areas, but have a transfer to critical care after this). Patients with direct transfer to critical care have been shown to have shorter critical care length of stay, as well as improved early and late mortality rates

compared to patients who have indirect transfer to critical care.[6-8] It has been suggested that this may be due to the availability of invasive monitoring and better staffing ratios which, in turn, allow more timely recognition and management of post-operative adverse events.

In light of this, it is important to be able to ascertain whether patients undergoing emergency surgery for CRC are having a direct transfer to critical care. This will facilitate the identification and exploration of between-provider variation in emergency CRC patient care, as well as enabling an evaluation of the impact of direct critical care transfer on outcomes for patients undergoing emergency CRC surgery.

Objectives

The aim of this report is to assess the validity of information on post-operative destination for CRC patients undergoing emergency surgery in three routinely collected datasets and give recommendations on capturing direct transfer from theatre to critical care across these datasets.

The objectives of this report are to:

- Compare the agreement between the post-operative destinations given in each of the three data sources: NBOCA, NELA, and ICNARC.
- Assess the data completeness of post-operative destination in each data source.
- Assess the correlation between recorded post-operative destination and the percentage of patients that are high-risk.
- Provide recommendations, based on these results, on the optimal definition of direct transfer to critical care using information across the datasets.

Methods

(i) Datasets

NBOCA is a mandatory national audit and part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP) commissioned by HQIP. NBOCA aims to measure the quality and outcomes of care for patients diagnosed for the first time with CRC. This includes reporting on patients being diagnosed and treated within all English and Welsh National Health Service (NHS) providers of CRC care. NBOCA has existed in its current form since 2010. Data is routinely collected via patient cancer management systems at multidisciplinary team (MDT) meetings and transferred to central databases.

NELA is a national clinical audit and also part of NCAPOP. Its purpose is to facilitate the improvement of quality of care for patients undergoing emergency laparotomy in hospitals in England and Wales.[4] Data is collected by clinical teams, often in real-time using an online web-tool.

ICNARC is a charity that runs four national clinical audits, including the Case Mix Programme which aims to measure the outcomes of patients admitted to adult general critical care units in England, Wales and Northern Ireland.[9] Data is routinely collected by critical care units and submitted to ICNARC.

(ii) Linkage methods

Linkage was carried out between NBOCA records and NELA records for patients having surgery in NHS hospitals in England or Wales. Patients were excluded from the analysis if they died prior to discharge from theatre according to NELA. Pairs of records were considered linked if there was exact agreement on the patients' unique NHS number. Where there were multiple NELA records linking to one NBOCA record, the NELA record with the closest date of surgery to that recorded in NBOCA was chosen. If date of surgery in NELA was missing, date of admission in NELA was used instead.

NBOCA and NELA were each separately linked to ICNARC Case Mix Programme data with exact agreement on NHS number.

Eligibility criteria were applied after data linkage to identify a cohort of CRC patients undergoing emergency surgery between 1st December 2016 and 30th November 2019. Not all patients' data were expected to link across all three datasets as not all CRC patients have emergency surgery, not all emergency laparotomies are for CRC, and not all patients having emergency surgery for CRC will go to critical care. Linked records were considered eligible if all of the following criteria were met:

- Patients were linked between NBOCA and NELA.
- The date of surgery in NBOCA or NELA was between 1st December 2016 and 30th November 2019.
- Surgical urgency in NBOCA was recorded as emergency or urgent.
- The surgery was recorded in NELA as being the first surgical procedure of that hospital admission rather than a complication of a previous operation in that admission.

(iii) Definitions of transfer to critical care

There are four levels of care.[10 11] Level 0 care is standard care on the ward with basic observations. Level 1 care is enhanced care on the ward, with increased monitoring but the patient does not require organ support. Level 2 care is a higher level of care including more detailed observation and single organ support (excluding mechanical ventilation) such as invasive blood pressure monitoring or renal support. This might be offered in a separate high dependency unit (HDU), although some hospitals have dedicated Level 2 beds within normal wards. Level 2 care should be staffed by a ratio of one nurse to two patients. Level 3 care is offered in an intensive care unit (ICU). This is when the patient needs two or more organs supported, or mechanical ventilation alone. Level 3 care is staffed by a ratio of one nurse to one patient and there should be a doctor present 24 hours a day.

Level 2 or 3 care are collectively defined as critical care. Hospitals vary in critical care structure – some hospitals have combined HDUs and ICUs, others have separate units. Information on transfer to critical care is available from all three datasets, as follows.

NBOCA has a data item recording the destination of patients after discharge from theatre recovery, as: ward, high care area, Level 2 HDU, or Level 3 ICU. For ease of comparison with information in the other datasets, the level 2 HDU and level 3 ICU categories were combined into one critical care category.

NELA has a data item recording the destination for continued post-operative care following surgery. The categories of this data item have changed over time. In earlier years, Level 2 and Level 3 care were separate categories but have since been combined into one critical care category. The other categories are ward, other enhanced care, and died prior to discharge from theatre. Patients who died in theatre, as mentioned in section (ii), were excluded from the analysis. Therefore, the categories considered were: ward, other enhanced care, or critical care.

ICNARC has information on the date and time of critical care admissions, including the location from which the patient was admitted to critical care. For the purposes of this report, patients were considered to have had a direct transfer to critical care if they met all three of the following criteria:

- Either, or both, of their NBOCA or NELA records linked to ICNARC.
- The date of admission in ICNARC was within 1 day of the date of surgery in either NBOCA or NELA.
- They were recorded in ICNARC as coming to critical care from theatre or theatre recovery (data item refers to “theatre and recovery”).

(iv) Definition of high-risk patients

We considered patients high-risk if they had ≥5% predicted mortality risk according to NELA’s pre-operative assessment entered into the medical record. This is because this mortality prediction reflects the clinician’s assessment of the patient and we expect this to be correlated with the decision to send patients direct to critical care after surgery.

Results

9,581 CRC patients could be linked between NBOCA and NELA, and had date of surgery between 1st December 2016 and 30th November 2019 in either NBOCA or NELA, or both. After applying the data linkage eligibility criteria (i.e. surgical urgency in NBOCA was categorised as either emergency or urgent, and surgery in NELA was the first surgical procedure of that NELA admission), the final cohort was 5,779 patients.

Data on post-operative destination was 100% complete in NELA but was missing in 34% of patients in NBOCA. Direct transfer to critical care in ICNARC was defined according to linkage to ICNARC and therefore, by definition, there is no missing information on post-operative destination according to ICNARC.

Overall, 51% of the patients in this cohort went direct to critical care according to NBOCA (1,947 out of 3,798 with complete data on post-operative destination), 64% according to NELA (3,724 out of 5,779), and 58% according to ICNARC (3,344 out of 5,779).

Table 1 shows the agreement between NBOCA and NELA on post-operative destination. There is considerable disagreement between NBOCA and NELA on post-operative destination although when the post-operative destination is recorded in NBOCA as critical care, there is 92% agreement between NBOCA and NELA. The largest discrepancy between NBOCA and NELA is for patients who have their post-operative destination recorded in NBOCA as ward and in NELA as critical care (444 patients).

NBOCA has a large proportion of missing values on post-operative destination, and 64% of these patients went direct to critical care according to NELA.

Table 1: Agreement between NBOCA and NELA on patients' post-operative destination for patients who met the inclusion criteria, and had records that linked between NBOCA and NELA. Concordant categories shown in bold.

	NBOCA post-operative destination				
	Ward	High care area	Critical care	Missing	Total
NELA post-operative destination					
Ward	**833**	83	95	638	1,649
Other enhanced care area	152	**122**	56	76	406
Critical care	444	217	**1,796**	1,267	3,724
Total	1,429	422	1,947	1,981	5,779

Table 2 shows the percentage of patients that had a direct transfer to critical care according to ICNARC, separately for each combination of post-operative destination in NBOCA and NELA (i.e., for each of the cells in Table 1). This demonstrates a higher agreement between NELA and ICNARC than between NBOCA and ICNARC on post-operative destination. It also shows that a high proportion of patients with missing information on post-operative destination in NBOCA went to critical care according to ICNARC.

Table 2: Percentages of patients that had a direct transfer to critical care according to ICNARC, in each combination of post-operative destination in NBOCA versus NELA.

	NBOCA post-operative destination			
	Ward	High care area	Critical care	Missing
NELA post-operative destination				
Ward	**1.9%**	9.6%	30.5%	6.4%
Other enhanced care area	3.3%	**5.7%**	32.1%	39.5%
Critical care	73.9%	80.2%	**89.4%**	85.5%

There is better agreement in post-operative destination between NELA and ICNARC compared to NBOCA and ICNARC (Table 2). For example, for patients who have post-operative destination recorded as critical care in NELA but ward, high care area, or missing response within NBOCA, 74%, 80% and 86% of patients respectively went to critical care according to ICNARC. In contrast, for patients who have post-operative destination recorded as critical care in NBOCA but not in NELA, 31% and 32% of patients went to critical care according to ICNARC.

Table 2 makes it clear that NBOCA misclassifies a large proportion of patients who went to critical care as going direct to the ward. For the 444 patients recorded as going direct to the ward in NBOCA but critical care in NELA, 74% went direct to critical care according to ICNARC.

Guidelines state that all high-risk patients should be transferred direct from theatre to critical care [3] and there should be very high correlation, therefore, between post-operative destination and the proportion of patients that are high-risk.

Table 3 shows strong correlation between going direct to critical care according to NELA and ICNARC, and the percentage of patients that are high-risk. There is little correlation between going direct to critical care according to NBOCA and the percentage of patients that are high-risk. Note that NELA is the source of data on whether or not the patient is high-risk and this is likely to increase the correlation between NELA post-operative destination and percentage of patients that are high-risk.

Table 3: Percentages of patients who were high-risk (≥5% predicted risk, in each combination of post-operative destination in NBOCA versus NELA), stratified by whether they had a direct transfer to critical care according to ICNARC.[1]

		NELA post-operative destination	**NBOCA post-operative destination**			
			Ward	High care area	Critical care	Missing
Direct transfer to critical care according to ICNARC	No	Ward	27.2%	31.6%	39.6%	29.9%
		Other enhanced care area	27.9%	29.9%	41.9%	25.0%
		Critical care	65.5%	69.7%	67.9%	62.2%
	Yes	Ward	60.0%	16.7%	43.5%	38.2%
		Other enhanced care area	60.0%	42.9%	35.7%	88.9%
		Critical care	71.2%	71.6%	70.3%	70.6%

Limitations and further work

In this work we were unable to validate Level 3 critical care (ICU) separately from Level 2 critical care (HDU), as NELA currently does not distinguish between the two. Analyses using direct transfer to critical care should include sensitivity analyses to compare using Level 3 critical care alone to using Level 2 and Level 3 combined.

For most of the duration of the study period, the existing guidelines stated that patients with a predicted mortality ≥10% should be transferred direct to critical care after surgery.[2] The revised guidelines, published in 2018, recommended that patients with a predicted mortality ≥5% should go direct to critical care.[3] However, both reports used a threshold of 5% to define high-risk patients. In addition, NELA changed the predicted mortality risk data item in December 2018 from “5-10% risk” and “>10% risk” categories, to one “≥5%” category. We therefore defined high-risk in this study as a predicted mortality ≥5%.

Some critical care units do not submit data to the ICNARC Case Mix Programme every month. By including these trusts in our analysis, it may mean that we have underestimated the proportion of patients going direct to critical care according to ICNARC. Further work is

[1] Percentage denominators exclude a fifth of patients in the analysis cohort who did not have their predicted risk documented in NELA (1,115 out of 5,779). According to NELA post-operative destination, 27% of patients going to the ward did not have risk documented (443 out of 1,649), 19% of patients going to other enhanced care area (77 out of 406), and 16% going to critical care (595 out of 3,724).

needed to explore how much bias this is likely to cause and to develop methods to reduce this.

Finally, there is a further potential source of critical care information available from Hospital Episode Statistics Adult Critical Care.[12] This will also require validation in the same manner as that carried out within this report for the other datasets.

Implications of the findings

This methodology report finds that within NBOCA, the data item for post-operative destination is poorly completed and unreliable for identifying the direct transfer of patients to critical care following emergency surgery. Recommendations are made on how this information should be obtained through linkage to other datasets. From 2024 NBOCA will move to reporting using existing data only, with no bespoke data collection, and there will no longer be collection of a post-operative destination data item. Information on post-operative destination will need to come from linked datasets, as recommended in this report.

Whilst this report highlights data quality issues with the data item for post-operative destination, it should not raise concerns about the data quality of other NBOCA data items. Extensive validation work is carried out routinely on the NBOCA dataset every year. Validation processes carried out each year include: validation rules within the data collection platform; checking of data items and initial results by healthcare providers; and further checking of data items for potentially outlying providers. NBOCA analysts carry out a series of annual validation checks, including range checking of individual data items; within-patient plausibility of dates along the patient pathway; identification of inconsistent information such as rectal cancer procedures for colon cancer; and cross-validation of data items to check that correlations are as expected. In addition to these annual data validation processes, NBOCA carries out in-depth data validation of performance indicators which it publishes as short reports and peer-reviewed publications.[13-16]

Summary and conclusions

A summary of the findings is:

- NBOCA has a high level of missing information on postoperative destination, and a high proportion of patients with this information missing went direct to critical care according to NELA and according to ICNARC.
- The agreement between NELA and ICNARC on postoperative destination is higher than the agreement between NBOCA and ICNARC.
- The correlation between the percentage of patients that are high-risk and postoperative destination is stronger for NELA and ICNARC than it is for NBOCA.

Based on these findings, ICNARC and NELA are more reliable sources of post-operative destination than NBOCA for patients undergoing emergency CRC surgery. If a patient is recorded as going direct to critical care according to *either* NELA *or* ICNARC then we can be very confident that they went direct to critical care. This is the recommended definition of direct transfer to critical care. Overall, 67% of patients went direct to critical care according to *either* NELA or ICNARC (3,878 out of 5,779). 82% of these patients went direct to critical

care according to both sources (3,190 out of 3,878). Of the patients we define as going direct to critical care, 69% are high-risk (2,251 out of 3,255 with predicted risk documented in NELA). Of the patients we define as not going direct to critical care, 29% are high-risk (410 out of 1,409 with predicted risk documented in NELA).

It is likely that there is under-reporting of critical care use within all three routinely collected datasets, most notably in NBOCA. Although the post-operative destination data item is poorly completed in NBOCA and unreliable for identifying the direct transfer of patients to critical care following emergency surgery, this singular data item is not reflective of the data quality of the NBOCA dataset as a whole.

Given that ICNARC is a dataset dedicated to collecting information regarding critical care use and NELA is a dataset dedicated to collecting information about emergency abdominal surgery, it is perhaps not surprising that this data item is comparatively less complete in NBOCA. The data item for post-operative destination in NBOCA has not been a focus of any prior work. However, as detailed throughout this report, direct transfer from theatre to critical care is an important aspect of patient care and it is reassuring that robust information can be collected from alternative datasets.

To conclude, the recommended definition of direct transfer to critical care is where patients are recorded as going directly from theatre to critical care within 1 day of surgery according *either* to NELA *or* through data linkage to ICNARC. This recommendation is based on comparing the agreement between the three data sources, assessing data completeness, and looking at the correlation between recorded post-operative destination and the percentage of patients that are high-risk. Incorporating additional information from NBOCA on post-operative destination would result in only a very small increase in the number of patients identified as going direct to critical care and we have shown that NBOCA is an unreliable source of this information.

Glossary

Colorectal cancer (CRC) – the medical term for “bowel cancer”.

Critical care – an overarching term to describe the care provided in either an ICU or HDU setting.

Direct transfer – after having their emergency operation, a patient will be moved directly from theatre or theatre recovery, to critical care.

Emergency laparotomy – this is the broad term for any emergency operation required on the abdomen, including emergency bowel cancer operations.

High dependency unit (HDU) – this is the second highest level of care provided in a hospital. Nurses tend to look after a couple of patients each. Patients are monitored more intensively than on a normal ward and single organ failure can be supported. For example, patients with low blood pressure might have special lines inserted for continuous monitoring and administration of special drugs to increase their blood pressure. Ventilation is not provided on HDU.

Indirect transfer – after having their emergency operation, a patient will be moved from theatre to the ward or other areas excluding critical care. They will then go on to have a transfer to critical care at a later point in their admission.

Intensive care unit (ICU) – this is the highest level of care provided in a hospital. Each patient has their own nurse looking after them. Patients are monitored continuously and organs which are failing can be supported, for example, if a patient is struggling to breathe on their own they can be ventilated.

Obstruction – this is when poo can’t move through your bowel due to a blockage. This blockage can be caused by a bowel cancer.

Perforation – a hole in the bowel which might be caused directly by a bowel cancer or as a result of a blockage.

Peritonitis – commonly caused by a hole in the bowel which allows leakage of poo from the bowel into the inside of the abdomen creating an infection.

Post-operative destination – this is the place in a hospital where a patient is transferred following their emergency surgery. It can be either critical care, an enhanced care ward, or a normal ward.

Sepsis – a severe infection which can be potentially life-threatening.

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