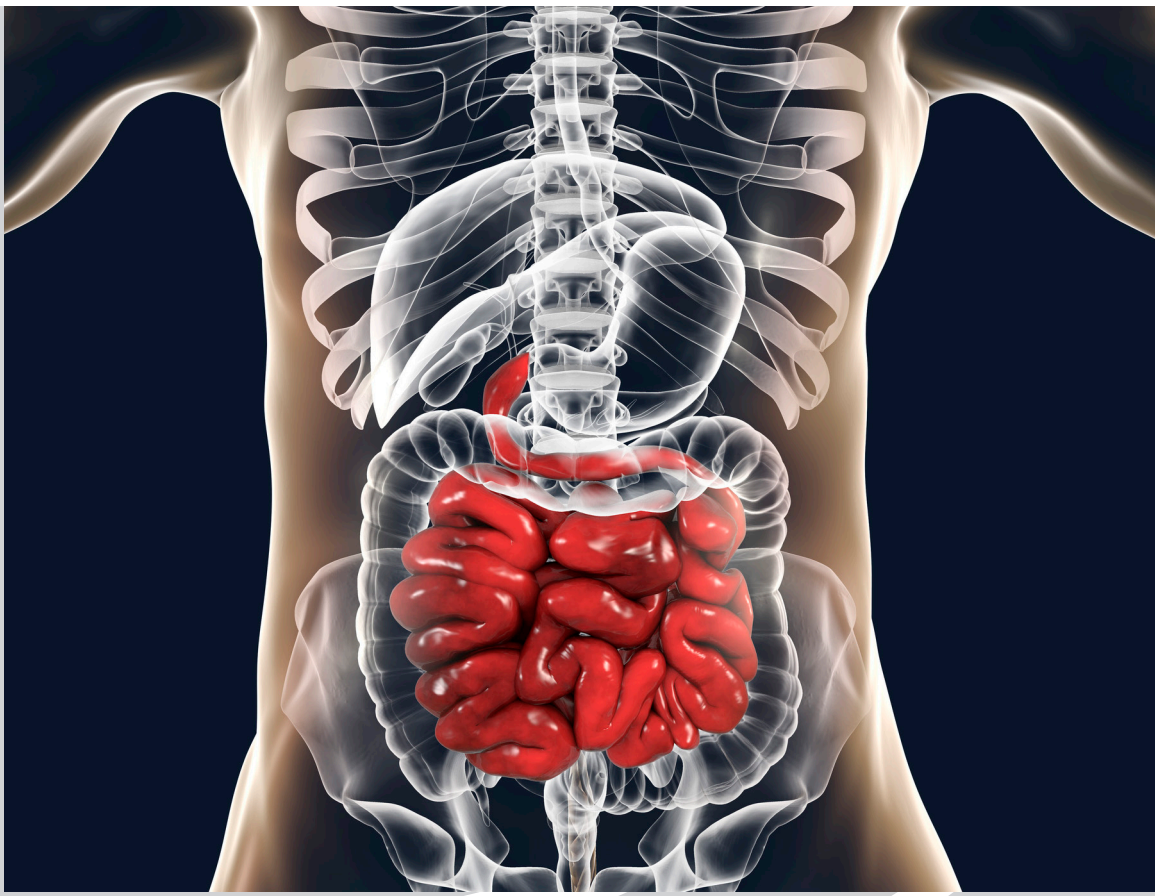
Delay in Transit

A review of the quality of care provided to patients aged over 16 years with a diagnosis of acute bowel obstruction



NCEPOD

Improving the quality of healthcare

Delay in Transit

A review of the quality of care provided to patients aged over 16 years with a diagnosis of acute bowel obstruction

A report published by the National Confidential Enquiry into Patient Outcome and Death (2020)

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Foreword

Acute bowel obstruction is a relatively common emergency condition which, nonetheless, still presents a significant challenge for clinicians. The challenge is identifying those patients who need the prompt diagnosis and therapy essential to avoid significant morbidity and mortality, particularly as the presenting symptoms of abdominal pain, nausea and vomiting are relatively non-specific.

Although this study did not set out to assess the presentation of patients with non-specific gastrointestinal symptoms, it did assess key elements of the acute bowel obstruction pathway, to 'stress-test' the system in patients who developed more severe disease or complications related to deficiencies in the pathway. Care should be taken not to extrapolate the data too widely, due to the sampling used but the recommendations to improve the care pathway will be relevant to the 780,000 patients presenting to emergency departments per year with gastrointestinal symptoms[i] and 600,000 patients admitted to surgical departments with abdominal pain.[ii]

The study showed that despite guidelines existing for the management of small and large bowel obstruction, and improvements in laparotomy care stimulated by previous NCEPOD reports and the National Emergency Laparotomy Audit (NELA), there is still more that can be done to improve the care provided.

Problems with timely access to CT scanning for diagnosis, and access to the operating theatre for treatment, were commonly identified themes. The recommendation to carry out a prompt CT scan with IV contrast to identify patients with or at risk of serious complications such as perforation should be taken seriously to ensure speedy diagnosis and urgent surgery. Furthermore, it was somewhat ironic that delays in access to the operating theatre occurred in this study as NCEPOD has championed the issue of emergency theatre access since its inception over 30 years ago. The recommendation that all hospitals should have a process in place to ensure timely access to theatre for these critically ill patients is crucial and where these standards are not being met there is a requirement to consider how to utilise resources more effectively.

We often hear that patients are getting older and frailer and this can be a challenge when deciding on the best course of action for each patient. This study has shown that frailty was a common risk factor for surgery in patients with acute bowel obstruction. The recommendation to assess frailty to facilitate multidisciplinary assessment and shared decision-making will assist clinicians, patients and their relatives in these complex scenarios.

Delays in recognition, senior assessment, appropriate imaging, decision-making, recognition of acute kidney injury and resuscitation and surgery, all feature heavily in the report. Even the most basic assessments of pain, hydration and nutrition were frequently inadequate. These delays, which are widely known to contribute to poorer outcomes, may be avoidable. I hope therefore that each and every consultant, clinical and medical director heeds the recommendations of this report, and takes steps to ensure that robust, auditable pathways are introduced and consistently followed, in order to maximise the likelihood of good outcomes for patients.

As ever I must thank all those involved in undertaking this study, which represent an enormous combined effort. It is particularly gratifying to see contributions to the review process from such a wide ranging multidisciplinary group of professionals. Our local reporters are pivotal in identifying the sample population and supporting the return of case notes and questionnaires and without them our studies would simply not happen. We are particularly grateful as this was the first study in which we had used electronic clinical questionnaires, which we know provided new challenges to the local reporters and to the treating clinicians who gave up their time to complete the

questionnaire. This process provided the treating clinician with the opportunity to state their retrospective view on the care they provided. This self-reflection is of vital importance in contributing to the dataset, to ascertain whether there were things which could have been done better. Given that the GMC[iii] expect clinicians to co-operate fully in the work of the confidential enquiries, we would encourage medical directors to ensure that clinicians are supported with the ongoing resources to participate in such studies. Furthermore our Steering Group and Trustees all play a valuable role in reviewing the study data and providing guidance to the NCEPOD Clinical Co-ordinators and staff who ultimately compile the report. To all of them I am enormously grateful.

Ian C Martin,
Chair

i. Accident and Emergency Statistics - Parliament UK - Number 6964, 21 February 2017 – Page 12 https://researchbriefings.files.parliament.uk/documents/SN06964/SN06964.pdf

ii. Association of Surgeons of Great Britain and Ireland and the Royal College of Surgeons of England. Commissioning Guide: Emergency General Surgery (acute abdominal pain) 2014 https://www.rcseng.ac.uk/library-and-publications/rcs-publications/docs/emergency-general-guide/

iii. GMC Good Medical Practice "23 To help keep patients safe you must: a) contribute to confidential inquiries" https://www.gmc-uk.org/ethical-guidance/ethical-guidance-for-doctors/good-medical-practice/domain-2----safety-and-quality

Introduction

Acute bowel obstruction occurs when there is an interruption to the forward flow of intestinal contents, and accounts for 10% of emergency surgical admissions.[1] Intestinal obstruction is associated with life threatening complications such as aspiration pneumonia as well as bowel ischaemia and perforation. Planning optimal therapy can be challenging; surgeons have to make critical decisions with regard to non-operative management versus surgery. Prompt radiological investigations and diagnosis is essential to prevent a delay in surgical intervention, which can significantly affect patient outcome.

Early recognition of impending perforation is essential using clinical and radiological investigations to ensure expedient surgery or other therapeutic intervention. Early abdominal CT with intravenous contrast is recommended to identify closed-loop obstruction, bowel ischaemia and bowel perforation.[2-4] Adhesions from previous surgery are currently the leading cause of small bowel obstruction in industrialised countries (70%), followed by malignancy, inflammatory bowel disease, and hernias. Malignancy and volvulus are the commonest causes of large bowel obstruction.[5]

When surgery is required, mortality can exceed 10%, far higher than seen in elective gastrointestinal surgery. The majority of patients requiring surgery can be categorised as 'high-risk' and require consultant delivered care as well as admission to critical care after surgery. Prompt recognition of patient deterioration, sepsis, and perforation is needed. Surgery may be required within a matter of hours for the surgical source control of sepsis, or to prevent impending perforation.[6,9]

Currently there is no national guideline nor framework for the management of acute bowel obstruction and there is considerable variation in care, with variation in outcomes.[2,5,7-9]

This NCEPOD study was developed with wide multidisciplinary input and a number of areas for review were identified as those affecting the care and outcome of patients with bowel obstruction. Particular focus was on the early clinical recognition of bowel obstruction and early definitive diagnosis by abdominal CT with intravenous contrast. Data were collected on potential delays in the pathway including the availability of CT imaging, decision-making regarding the timing of surgery and subsequent access to theatres.

This review includes an assessment of service structure at an organisational level and patient care at a clinical level. Recommendations are formed from data provided by clinicians and from the external peer review of a sample of patients.

Executive summary

Aim

The aim of this study was to highlight areas where care could be improved in patients who were admitted to hospital and had a diagnosis of acute bowel obstruction.

Method

A retrospective questionnaire review was undertaken in 690 patients and a case note review in 294 patients aged 16 and over who had an acute bowel obstruction either presenting to hospital or during their hospital admission.

Key messages

This study has highlighted significant opportunities to improve the care of patients with acute bowel obstruction. The overarching finding was that there were significant delays in the pathway of care for this group of patients, from requesting imaging, diagnosis, decision-making and availability of an operating theatre.

There were delays in imaging in 57/276 (20.7%) of the cases reviewed and the delays increased if an abdominal X-ray was performed as well as an abdominal CT. Furthermore a delay in imaging led to a delay in diagnosis in 35/57 (61.4%) patients whereas only 14/219 (6.4%) patients had a delay in diagnosis if there was no delay in imaging.

Delays in consultant assessment led to a delay in diagnosis in 13/32 (40.6%) patients. Only 23/147 (15.6%) patients who were seen in a timely manner by a consultant experienced a delay in diagnosis. Following diagnosis 72/368 (19.6%) patients experienced a delay in access to surgery and in 38/72 (52.8%) patients the delay was due to non-availability of theatre and in 34/72 (47.2%) it was due non-availability of an anaesthetist.

In addition to the delays, there was found to be room for improvement in the clinical care of this group of patients. Risk and frailty assessments were variable. Risk assessment is important as patients who had a risk assessment had better escalation of care, however this was inadequate in 98/219 (44.7%) patients. Similarly, only 34/124 (27.4%) patients over 65 years of age had their frailty score assessed on admission to the ward and if patients did have a Rockwood frailty score of 5 or higher this was more likely to result in discussions around mortality, resuscitation status and treatment options.

To prevent malnutrition and acute kidney injury, nutrition and hydration status are fundamental to care in patients with an acute bowel obstruction, these were often not well assessed. Only 163/686 (23.8%) patients had their hydration status recorded, 105/254 (41.3%) patients either had no nutritional status assessment or the assessment was inadequate and only 88/233 (37.8%) patients had a nutrition assessment on discharge.

The areas for improvements in care highlighted in the report, and the recommendations made, have the potential to improve the care of a large proportion of surgical patients. This should lead to measurable improvements in outcomes and enhanced patient care.

Recommendations

These recommendations have been formed by a consensus exercise including all those listed in the acknowledgements. They highlight a number of areas that are suitable for local audit and quality improvement initiatives to address any areas of care that are below the expected standard. The result of the audits or quality improvement initiatives should be presented at a quality or governance meeting and action plans shared with the Executive Board.

RECOMMENDATIONS			
Suggested groups to undertake the recommendation are shown in brackets after each one, as a guide only. NB. The term clinicians includes nurses		# is the number of the supporting key data in the report	Associated guidelines and other related evidence
1	Undertake a CT scan with intravenous contrast promptly, as the definitive method of imaging* for patients presenting with suspected acute bowel obstruction. Prompt radiological diagnosis will help ensure admission to the correct specialty, so the time to CT reporting should be audited locally. **unless the use of IV contrast is deemed inappropriate by a senior clinician, in which case CT without contrast should be performed – in line with NICE CG169* *(Emergency Medicine, Admitting Clinicians, Radiologists, Quality Improvement Leads)*	**CHAPTER 5 – PAGE 33** #23 There were delays in imaging in 57/276 (20.7%) of the cases reviewed **CHAPTER 5 – PAGE 28** #24 Radiological imaging was most often reported by a consultant: X-ray for 216/293 (73.7%) patients; CT with IV contrast for 403/436 (92.4%) patients and CT without contrast for 33/38 (86.8%) patients **CHAPTER 5 – PAGE 29** #25 CT with IV contrast was sufficient to diagnose acute bowel obstruction in 427/479 (89.1%) patients whereas abdominal X-ray was sufficient to diagnose acute bowel obstruction in 132/411 (32.1%) #26 CT with IV contrast affected subsequent decision-making in the management of acute bowel obstruction in 456/484 (94.2%) patients and abdominal X-ray in 266/411 (64.7%) patients **CHAPTER 5 – PAGE 31** #27 35/57 (61.4%) patients with delayed imaging also experienced a delay in diagnosis whereas only 14/219 (6.4%) patients had a delay in diagnosis if there was no delay in imaging **CHAPTER 5 – PAGE 33** #21 34/434 (7.8%) patients who had an abdominal X-ray and 9/491 (1.8%) patients who had a CT with IV contrast had a delay in the reporting on the image #22 43/491 (8.8%) patients who underwent a CT with IV contrast and 6/421 (1.4%) patients who underwent an abdominal X-ray experienced a delay due to access to radiology #28 In 23/29 (79.3%) cases reviewed where the patient was considered to have had unnecessary imaging and 28/57 (49.1%) where there was an unnecessary delay, the patient had undergone both an abdominal X-ray and a CT scan **CHAPTER 11 – PAGE 58** #69 In 31/168 (18.5%) hospitals there was a CT scanner in the emergency department **CHAPTER 11 – PAGE 60** #71 There was a maximum time reporting of CT of less than 1 hour in 43/74 (58.1%) hospitals (in hours) and 48/94 (51.1%) hospitals out-of-hours	NELA https://www.nela.org.uk/reports ACPGBI - NASBO https://www.acpgbi.org.uk/content/uploads/2017/12/NASBO-REPORT-2017.pdf ACPGBI – LBO pathway https://www.acpgbi.org.uk/content/uploads/2016/12/Large-Bowel-Obstruction-pathway-2017.pdf RCSEng & AAGBI https://www.rcseng.ac.uk/library-and-publications/rcs-publications/docs/emergency-general-guide/ NICE CG169 https://www.nice.org.uk/guidance/cg169/chapter/1-Recommendations#assessing-risk-of-acute-kidney-injury NICE CG131 https://www.nice.org.uk/guidance/cg131/ipf/chapter/acute-large-bowel-obstruction

2	Undertake a consultant review in all patients diagnosed with acute bowel obstruction as soon as clinically indicated and at the latest within 14 hours of admission to hospital. Discussion with a consultant should occur within an hour for high-risk patients* **As recommended by the RCP London and NHS England ('High risk' is defined as where the risk of mortality is greater than 10%, or where a patient is unstable and not responding to treatment as expected)* *(Consultant Surgeons)*	**CHAPTER 4 – PAGE 22** #12 41/258 (15.9%) patients experienced a delay in consultant review **CHAPTER 5 – PAGE 33** #29 13/32 (40.6%) patients who had a delay in consultant assessment had a delay in diagnosis. In patients who were seen in a timely manner by a consultant only 23/147 (15.6%) experienced a delay in diagnosis	RCP Acute care toolkit 12 https://www.rcplondon.ac.uk/guidelines-policy/acute-care-toolkit-12-acute-kidney-injury-and-intravenous-fluid-therapy RCP Acute care toolkit 4 https://www.rcplondon.ac.uk/guidelines-policy/acute-care-toolkit-4-delivering-12-hour-7-day-consultant-presence-acute-medical-unit NHS England NHS Services, Seven Days a Week Forum. Standard 2 https://www.england.nhs.uk/wp-content/uploads/2013/12/forum-summary-report.pdf
3	Admit patients with symptoms of acute bowel obstruction as necessary, but patients who have a definitive diagnosis of acute bowel obstruction should be admitted under the care of a surgical team. *(Clinicians, Clinical Directors)*	**CHAPTER 4 – PAGE 22** #11 Admission to an inappropriate ward was most commonly due to admission to a medical rather than surgical ward (22/24; 91.7%), which was also the reason for a delay to the patient being assessed by the surgical team in 31/52 (59.6%) patients **CHAPTER 4 – PAGE 24** #31 14/26 (53.8%) patients who experienced a delay in surgical assessment also had a delay in diagnosis compared with 24/170 (14.1%) when surgical assessment was not delayed **CHAPTER 4 – PAGE 35** #30 Delays in obtaining a CT scan with IV contrast were more likely if patients were admitted under the medical team (18/74; 24.3%) compared with admission under surgery (33/351; 9.4%) #33 Clinicians reported a delay in diagnosis that was outside of their control in 22/118 (18.6%) patients where the patient was admitted under medical teams compared with 20/454 (4.4%) of those under surgical teams #34 A delay in making the decision about the best treatment for the patient occurred in 11/125 (8.8%) admissions under medical teams and 14/483 (2.9%) under surgical teams	

4	Assess pain in all patients with symptoms of acute bowel obstruction and give analgesia in line with local and national guidelines. Ensure that: a. Pain is assessed at presentation to the emergency department b. Pain is assessed throughout the admission c. Referral to the acute pain team is undertaken when pain is difficult to manage, while ensuring the referral does not cause a delay in any definitive treatment. *(Clinicians, Acute Pain Teams)*	**CHAPTER 3 – PAGE 19** #4 438/690 (63.5%) patients had a presenting symptom of pain. However, a pain score was performed in 252/438 (57.5%) **CHAPTER 4 – PAGE 23** #15 163/544 (30.0%) patients did not have their pain score assessed on admission to a ward of which 102/163 (62.6%) patients had presented with abdominal pain #16 When analgesia was given, it was considered by case reviewers to be timely in 164/187 (87.7%) patients and adequate in 166/184 (90.2%) **CHAPTER 4 – PAGE 27** #17 37/639 (5.8%) patients were seen by the acute pain team prior to surgery **CHAPTER 8 – PAGE 49** #54 343/354 (96.9%) surgical patients received adequate postoperative pain management **CHAPTER 11 – PAGE 57** #65 In 15/148 (10.1%) hospitals there was no guideline for pain scoring in the emergency department	
5	Measure and document hydration status in all patients presenting with symptoms of acute bowel obstruction in order to minimise the risk of acute kidney injury (AKI). Ensure that hydration status is: a. Assessed at presentation to the emergency department b. Assessed throughout the admission *(Clinicians)*	**CHAPTER 3 – PAGE 20** #5 163/690 (23.6%) patients had their hydration status recorded and 157/690 (22.8%) patients had their weight recorded resulting in Body Mass Index (BMI) only recorded in 80/690 (11.6%) patients **CHAPTER 3 – PAGE 21** #8 69/264 (26.1%) patients had acute kidney injury (AKI) on admission and 16 patients developed it following admission. In the view of the case reviewers this was avoidable in four patients and clinicians completing questionnaires thought that AKI resuscitation was inadequate in 10/178 (5.6%) patients	
6	Undertake, record and act on nutritional screening in all patients who present with symptoms of acute bowel obstruction. This should include: a. A MUST score on admission to hospital b. A MUST score at least weekly throughout the admission c. Review by a dietitian/nutrition team once a diagnosis has been made d. A MUST score, and if required a dietitian/nutrition team assessment at discharge *As recommended by BAPEN* *Clinicians, Dietitians, Nutrition Teams)*	**CHAPTER 3 – PAGE 20** #5 163/690 (23.6%) patients had their hydration status recorded and 157/690 (22.8%) patients had their weight recorded resulting in Body Mass Index (BMI) only recorded in 80/690 (11.6%) patients **CHAPTER 4 – PAGE 24** #18 105/254 (41.3%) patients either had no nutritional status assessment or the assessment was inadequate #19 271/516 (52.5%) patients had a MUST score recorded on the ward **CHAPTER 8 – PAGE 48** #56 35/181 (19.3%) patients did not have an appropriate ongoing nutritional assessment #57 Some patients in the study were starved for at least one day: 41/163 (25.2%) prior to admission, 34/96 (35.4%) of conservatively/medically cared for patients and 85/133 (63.9%) patients undergoing surgery #55 105/191 (55.0%) patients in the study were reported to have had a MUST score performed on a weekly basis if they were in hospital for more than a week **CHAPTER 10 – PAGE 54** #62 88/233 (37.8%) patients had a nutrition assessment on discharge #63 147/409 (35.9%) patients received no nutritional advice on discharge and no advice was given to 80/304 (26.3%) patients who had commenced on new medication	BAPEN. THE 'MUST' REPORT Nutritional screening of adults: a multidisciplinary responsibility. 2003 https://www.bapen.org.uk/pdfs/must/must-report.pdf ACPGBI - NASBO https://www.acpgbi.org.uk/content/uploads/2017/12/NASBO-REPORT-2017.pdf

7	Ensure patients with a high frailty score (eg. Rockwood 5 or more) receive: a. A multidisciplinary team discussion for shared decision-making, including care of the elderly b. A risk assessment, with input from critical care relevant to the patient's needs c. A treatment escalation plan d. Their resuscitation status recorded *(Clinicians including Care of the Elderly)*	**CHAPTER 2 – PAGE 17** #3 195/549 (35.5%) patients had a frailty score of 5 or more, of whom 187/195 (95.9%) patients were aged 60 years or older **CHAPTER 4 – PAGE 26** #14 Only 34/124 (27.4%) patients over 65 years of age had their frailty score assessed on admission to the ward **CHAPTER 6 – PAGE 38** #38 Care of the elderly input was sought in 61/498 (12.2%) patients in the view of the clinicians completing questionnaires. Of the patients who had no care of the elderly input, 343/437 (78.5%) were over the age of 65 #40 21/204 (10.3%) patients who did not have a critical care opinion should have; 4/21 (19.0%) of these patients died and 18/21 (85.7%) patients had an operation. **CHAPTER 6 – PAGE 39** #42 Critical care input influenced care in 36/61 (59.0%) patients. Of those patients who had surgery 99/390 (25.4%) required critical care post operatively #43 579/603 (96.0%) patients had their treatment plan discussed with them and in 394/497 (79.3%) it was discussed with the their family #44 If the patient had a Rockwood frailty score of 5 or more, their treatment plan was discussed with them 169/186 (90.9%) cases reviewed and with their family in 168/190 (88.4%) #45 101/279 (36.2%) patients had their resuscitation status documented **CHAPTER 7 – PAGE 42** #48 30/109 (27.5%) patients did not have all possible alternative treatment options discussed with them **CHAPTER 10 – PAGE 54** #61 84/223 (37.7%) patients noted to be frail (Rockwood score 5-9) on admission, died during the admission compared to 10/333 (3.0%) who had a Rockwood score of 1-4 when they were admitted to hospital	The Rockwood Frailty Score: Rockwood K Song X, MacKnight C et al. 2005. A global clinical measure of fitness and frailty in elderly people. CMAJ. 173:489-495 https://www.dal.ca/sites/gmr/our-tools/clinical-frailty-scale.html
8	Ensure local policies are in place for the escalation of patients requiring surgery for acute bowel obstruction to enable rapid access to the operating theatre.* This should be regularly audited to ensure adequate emergency capacity planning. **e.g. The NCEPOD Classification of Intervention can be used to ensure that patients are treated within a clinically acceptable timeframe* *(Medical Directors, Clinical Directors, Quality Improvement Leads)*	**CHAPTER 7 – PAGE 45** #49 183/273 (67.0%) patients had their operation within 6 hours of the decision to operate. Of the 29 patients where case reviewers found that the timing of surgery was inappropriate, they were of the opinion that the inappropriate delay affected the outcome of eight patients **CHAPTER 7 – PAGE 44** #50 72/368 (19.6%) patients experienced a delay in access to surgery and in 38/72 (52.8%) patients the delay was due to non-availability of theatre, in 34/72 (47.2%) it was due non-availability of an anaesthetist and in 15/72 (20.8%) the patient required further treatment **CHAPTER 11 – PAGE 63** #73 136/170 (80.0%) hospitals had at least one dedicated emergency (CEPOD) theatre #74 120/166 (72.3%) hospitals reported that there was priority grading for emergency surgery and in 79/164 (48.2%) hospitals there was a theatre co-ordinator to facilitate this	NCEPOD Classification of Intervention www.ncepod.org.uk/classification

9	Agree joint clinical network pathways of care that enable improved access to stenting services for those patients with acute large bowel obstruction who require the service. *(Medical Directors, Division Leads, Commissioners, Clinical Networks)*	**CHAPTER 11 – PAGE 64** #75 38/171 (22.2%) hospitals had no on-site access to stenting and only five reported to be part of a clinical network to improve access to this service	
10	Calculate morbidity and mortality risk for all patients admitted with, and before any surgery for, acute bowel obstruction, to aid: a. Shared decision-making between the patient, carers and clinicians, with regard to the treatment options available and to ensure the appropriate informed consent is taken b. Assessment of the risk and predicted outcome associated with undertaking a laparotomy *(Surgeons)*	**CHAPTER 6 – PAGE 37** #37 In 98/219 (44.7%) of patients case reviewers felt that mortality and morbidity risk assessment was not adequate **CHAPTER 7 – PAGE 42** #47 199/353 (56.4%) patients undergoing emergency surgery for bowel obstruction had their risk of death documented on the consent form #48 30/109 (27.5%) patients did not have all possible alternative treatment options discussed with them	https://www.nela.org.uk/reports NELA 4th report - recommendation 2.3 (2019)
11	Minimise delays to diagnosis and treatment for acute bowel obstruction. Development of an evidence-based pathway for acute bowel obstruction, including recommendations 1-10 could facilitate this. The pathway should be audited at specific time points such as: a. Time from arrival to CT scan b. Time from arrival to diagnosis c. Time from decision to operate to start of anaesthesia *(Clinicians, Medical Directors, Clinical Directors, Quality Improvement Leads)*	**CHAPTER 9 – PAGE 50** #Figure 9.1 Delays in the pathway of care of patients with acute bowel obstruction showing where the same patients were affected by delays at different stages and where different patients were affected **CHAPTER 11 – PAGE 56** #67 28/169 (16.6%) hospitals reported a specific pathway for acute bowel obstruction; in 63/169 (37.3%) there was not a specific acute bowel obstruction pathway but a more general acute abdomen pathway **CHAPTER 11 – PAGE 58** #68 Of those hospitals where there was a pathway, they only included guidelines on time limit to treatment decision in 22/91 (24.2%) hospitals and timing of surgery in 33/91 (36.3%) hospitals **CHAPTER 11 – PAGE 62** #76 149/165 (90.3%) hospitals reported that there was a discharge planning team but in 68/149 (45.6%) hospitals this did not include nutrition or dietetic staff	

1

Method and data returns

Study Advisory Group (SAG)

A multidisciplinary group of clinicians was convened to define the objectives of the study and advise on the key questions. The study advisory group comprised anaesthetists, dieticians, gastroenterologists, general physicians, intensivists, lay representatives, nurses, radiologists and surgeons (both general and those specialising in upper and lower gastrointestinal surgery).

Study aim

The aims of the study were to look at remediable factors in the process of care of patients over the age of 16 years who were admitted to hospital and had a diagnosis of acute bowel obstruction.

Objectives

- Emergency admission factors including recognition of bowel obstruction
- Initial assessment and diagnosis (including risk assessment and any delays in diagnosis)
- Admission to the ward (including the route of admission, admitting speciality and delays in admission)
- Imaging (including the modality of imaging, the time to imaging, the reporting of imaging and the communication of results)
- Treatment plan (including continuity of care and communication)
- Decision-making (including multidisciplinary input and clinician seniority)
- Non-surgical therapy
- Surgery (including delays, decision-making and continuity of care)
- Postoperative care (including location, nutrition and complications)
- Discharge/follow-up arrangements
- End of Life Care if appropriate
- Organisational factors that impacted on patients' outcomes.

Study population and case ascertainment

Inclusion criteria

The study population comprised patients aged 16 and over who had bowel obstruction and were admitted to hospital between 16th April and 13th May 2018. Patients were identified by ICD10 codes for conditions associated with large and small bowel obstruction (see Appendix 1 for details) and sampled for inclusion in the study as follows:

- A maximum of ten patients per hospital were selected for the completion of a clinical questionnaire: two patients treated medically, four treated surgically, two patients who had died and, two patients who had acute kidney injury. All the patients (apart from those who died) needed to have had a minimum hospital stay of three days
- A maximum of two of the ten patients were sampled from each hospital for peer review of anonymised case notes.

Hospital participation

National Health Service hospitals in England, Scotland, Wales and Northern Ireland were expected to participate as well as public hospitals in the Isle of Man, Guernsey and Jersey.

Within each hospital, a named contact, referred to as the NCEPOD Local Reporter, acted as a link between NCEPOD and the hospital staff, facilitating case identification, dissemination of questionnaires and data collation.

Data collection

Spreadsheet

A pre-set spreadsheet was provided to every Local Reporter to identify all patients meeting the study criteria during the defined time period. From this initial cohort the sampling for inclusion into the study took place.

Questionnaires

Two questionnaires were used to collect data for this study: a clinician questionnaire for each patient and an organisational questionnaire for each participating hospital.

Clinician questionnaire

This questionnaire was sent online to the consultant responsible for the patient at the time of their admission to hospital. If the consultant was not the most suitable person to complete the questionnaire they were asked to identify a more appropriate consultant. Information was requested on the patient's presenting symptoms, initial management, imaging and other investigations, surgery (if applicable), escalation in care, discharge/ death (if applicable).

Organisational questionnaire

This questionnaire was disseminated to each hospital with cases in the study and included information on bowel cancer screening, pathways/protocols for the management of acute bowel obstruction and imaging and other provision of services.

Case notes

Copies of case note extracts were requested for each case that was to be peer reviewed. These included:

- General practitioner referral letter
- Ambulance service Patient Report Form/notes
- All inpatient annotations/medical notes
- Emergency department clerking proforma/ records
- Nursing notes
- Critical care notes/ charts
- Operation/procedure notes
- CT with/without IV contrast, abdominal X-ray and other radiology investigation reports
- Observation charts
- Haematology/biochemistry results
- Fluid balance charts
- Drug charts including anticoagulation charts
- Consent forms
- Do Not Attempt Cardio Pulmonary Resuscitation (DNACPR) and treatment escalation forms
- Discharge letter/summary
- Autopsy report if applicable.

Peer review of the case notes and questionnaires

A multidisciplinary group of case reviewers was recruited to peer review the case notes. The group of case reviewers comprised consultants, trainees and clinical nurse specialists, from the following specialties: colorectal surgery, general surgery, hepatobiliary/ pancreatic surgery, upper gastrointestinal surgery, anaesthesia, intensive care medicine, acute medicine, emergency medicine, gastroenterology, radiology, specialist nursing and dietetics.

Case notes were anonymised by the non-clinical staff at NCEPOD. All patient identifiers were removed. Neither the Clinical Co-ordinators at NCEPOD, nor the case reviewers, had access to patient identifiable information.

After being anonymised, each case was reviewed by at least one reviewer within a multidisciplinary group. At regular intervals throughout the meeting the Chair allowed a period of discussion for each reviewer to summarise their cases and ask for opinions from other specialties or raise aspects of the case for discussion.

Case reviewers answered a number of specific questions using a semi structured electronic questionnaire and were encouraged to enter free text commentary at various points.

The grading system below was used by the case reviewers to grade the overall care each patient received:

Good practice: A standard that you would accept from yourself, your trainees and your institution

Room for improvement: Aspects of **clinical** care that could have been better

Room for improvement: Aspects of **organisational** care that could have been better

Room for improvement: Aspects of both **clinical and organisational** care that could have been better

Less than satisfactory: Several aspects of clinical and/or organisational care that were well below that you would accept from yourself, your trainees and your institution

Insufficient data: Insufficient information submitted to NCEPOD to assess the quality of care

Information governance

All data received and handled by NCEPOD comply with all relevant national requirements, including the General Data Protection Regulation 2016 (Z5442652), Section 251 of the NHS Act 2006 (PIAG 4-08(b)/2003, App No 007), PBPP (1718-0328) and the Code of Practice on Confidential Information.

Each patient was given a unique NCEPOD number.
The data from all paper questionnaires received were electronically scanned into a pre-set database. All electronic questionnaires were submitted through a dedicated online application. Prior to any analysis taking place, the data were cleaned to ensure that there were no duplicate records and that erroneous data had not been entered during scanning. Any fields that contained data that could not be validated were removed.

Data analysis

Following cleaning of the quantitative data, descriptive data summaries were produced.
Qualitative data collected from the case reviewers' opinions and free text answers in the clinician questionnaires were coded, where applicable, according to content to allow quantitative analysis. The data were reviewed by NCEPOD Clinical Co-ordinators, a Clinical Researcher and Researcher to identify the nature and frequency of recurring themes.

Case studies have been used throughout this report to illustrate particular themes.

The findings of the report were reviewed by the Study Advisory Group, Case Reviewers, NCEPOD Steering Group including Clinical Co-ordinators, Trustees and Lay Representatives prior to publication.

Data returns

A total of 177/242 (73.1%) organisational questionnaires were received. There were 3,695 patients identified who fulfilled the study criteria of which 1,161 were sampled for clinical questionnaire completion (maximum of ten per hospital) and 349 were sampled for case note review (two per hospital). A return of 690 clinical questionnaires (59.4%) was made and 294 sets of case notes (84.2%) (Figure 1.1).

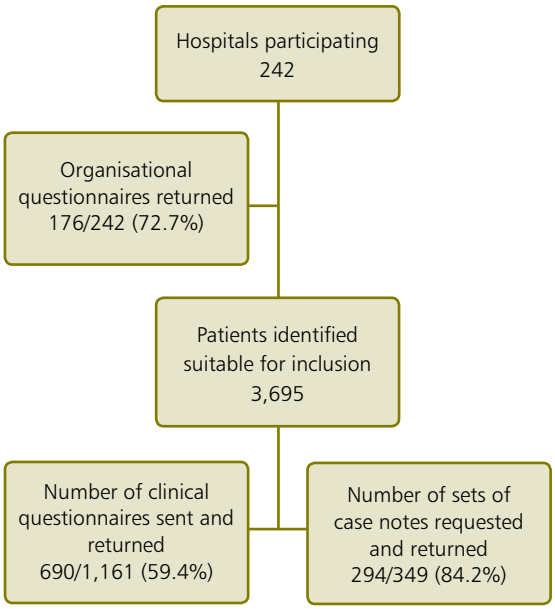

Figure 1.1 Data returns

2

Demographics

Of the included study population with an acute bowel obstruction, 476/668 (71.3%) presented with small bowel obstruction and 158/668 (23.7%) with large bowel obstruction. A further 34/668 (5.1%) patients presented with both small and large bowel obstruction. The site of the obstruction was not identified for 22 patients.

The sampled study population was skewed towards the older age group with a median of 59.4 years (range 19-99 years) and Figure 2.1 shows the age and the site of the obstruction in the study population.

As 519/690 (75.2%) of the study population were over 60 years of age, their frailty before the onset of the bowel obstruction was estimated from the data available. Figure 2.2, overleaf, shows that in the Rockwood scores[10] of the study population as a whole there were 195/549 (35.5%) patients who had a frailty score of 5 or more, of whom 187/195 (95.9%) patients were aged 60 years or older.

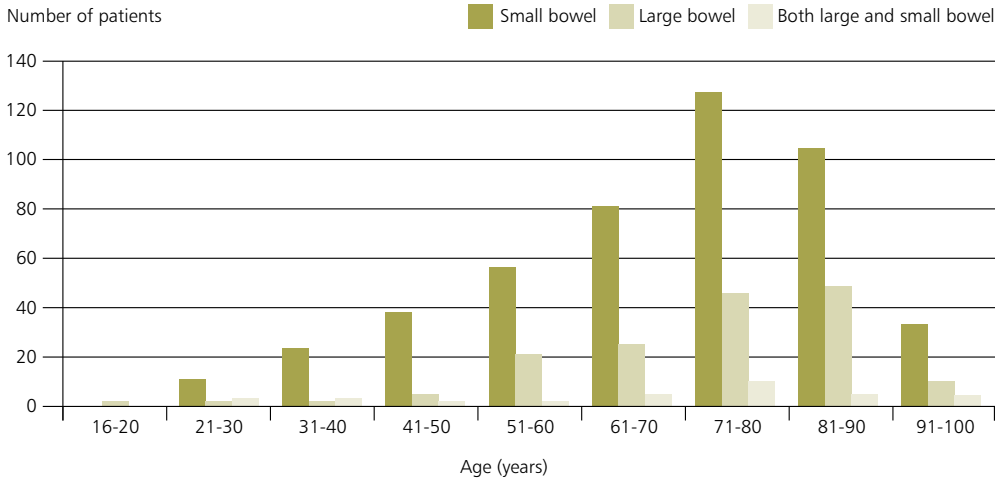

Figure 2.1 Patient age and site of bowel obstruction (n=668)

Clinical questionnaire data

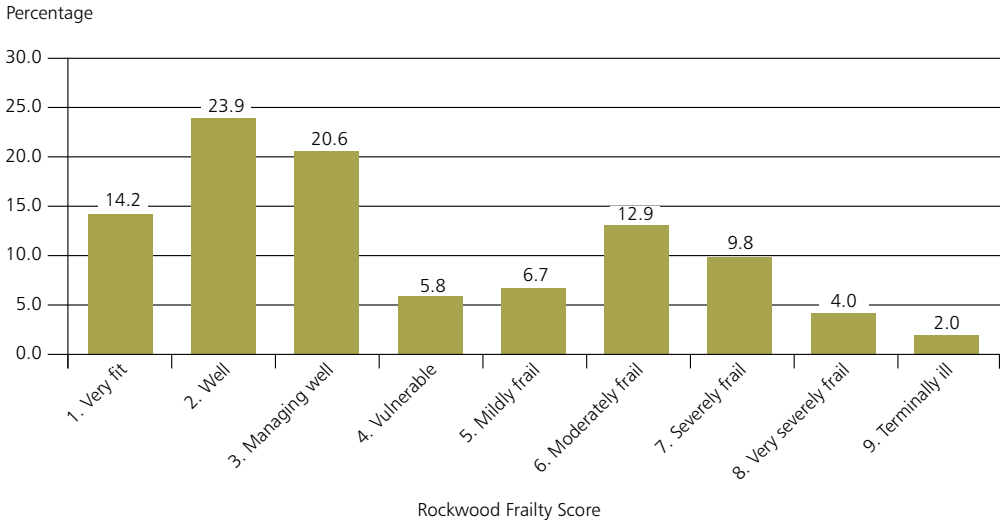

Figure 2.2 Functional status on admission (n=549)

Clinical questionnaire data

It was not possible from the available datasets to ascertain how many of the patients with large bowel obstruction had been screened for colonic cancer. However, it was reported in a third of the cases reviewed (70/210; 33.3%) that the patient had seen their GP for symptoms of large bowel obstruction prior to admission.

Key Findings

1. 476/668 (71.3%) patients in the study presented with small bowel obstruction and 158/668 (23.7%) with large bowel obstruction. A further 34/668 (5.1%) patients presented with both small and large bowel obstruction
2. 519/690 (75.2%) of the study population were over 60 years of age
3. 195/549 (35.5%) patients had a frailty score of 5 or more, of whom 187/195 (95.9%) patients were aged 60 years or older

3

Presentation to hospital and initial assessment

Presentation

The majority of patients presented via the emergency department (556/677; 82.1%). Of these patients 329/556 (59.2%) presented outside normal working hours. The most common presenting symptom was abdominal pain (438/690; 63.5%), but in 61/690 (8.8%) the presentation was with non-gastrointestinal related symptoms (Table 3.1).

Table 3.1 Presenting symptoms

	Number of patients	%
Abdominal pain	438	63.5
Nausea/vomiting	302	43.8
Abdominal distension	94	13.6
Constipation	47	6.8
Diarrhoea	25	3.6
Hernia	13	1.9
Other non-gastrointestinal related symptoms	61	8.8

Answers may be multiple; n=690 Clinical questionnaire data

Initial assessment

The majority of patients had their initial assessment performed in emergency department (514/657; 78.2%). The grade of the staff member performing the initial assessment is shown in Table 3.2, where it can be seen that 245/572 (42.8%) patients were initially assessed by more senior doctors (ST3 or above), 276/572 (48.3%) were seen by junior doctors and 51/572 (8.9%) by nursing staff. Overall 292/572 (51.0%) of the initial assessments were performed by junior team members.

Table 3.2 Grade of clinician carrying out the initial assessment

	Number of patients	%
Foundation grade (HO/FY1 or SHO/FY2 or equivalent)	143	25.0
Junior specialist trainee (ST1 and ST2 or CT equivalent)	133	23.3
Senior specialist trainee (ST3+ or equivalent)	110	19.2
Staff grade/Associate specialist	66	11.5
Consultant	59	10.3
Specialist nurse (nurse consultant/ nurse practitioner etc.)	19	3.3
Senior staff nurse	16	2.8
Staff nurse	16	2.8
Trainee with core clinical training (CCT)	10	1.7
Subtotal	**572**	
Unknown	118	
Total	**690**	

Clinical questionnaire data

Clinical questionnaire data

Table 3.3 shows that a pain score was performed in 290/690 (42.0%) patients despite pain being the commonest presenting symptom. In those patients where pain was noted as a presenting symptom, a pain score was performed in 252/438 (57.5%). In the context of bowel dysfunction, hydration and nutrition are important considerations but hydration status was only assessed in 163/690 (23.6%) patients and weight recorded in 157/690 (22.8%) patients resulting in Body Mass Index (BMI) only recorded in 80/690 (11.6%) patients.

Table 3.3 Observations recorded at initial assessment

	Number of patients	%
Pulse	644	93.3
Blood pressure	652	94.5
Respiratory rate	636	92.2
Temperature	639	92.6
Oxygen saturation	629	91.2
Glasgow Coma Score	362	52.5
Pain score	290	42.0
Hydration status	163	23.6
Weight	157	22.8
Body Mass Index	80	11.6
Other	51	7.4

Answers maybe multiple; n=690 Clinical questionnaire data

The non-imaging investigations performed at initial assessment are shown in Table 3.4.

Table 3.4 Non-imaging investigations undertaken at the initial assessment

	Number of patients	%
Arterial blood gas	156	24.6
Lactate	321	50.7
C-reactive protein	411	64.9
Full blood count	475	75.0
Urea and electrolytes	466	73.6
Other	92	14.5

Answers maybe multiple; n=633 Clinical questionnaire data

In the opinion of the case reviewers, 253/282 (89.7%) patients had a satisfactory initial assessment undertaken in terms of the investigations performed, but in 44/283 (15.5%) cases reviewed there was a delay in concluding that bowel obstruction was present.

Following the initial assessment, 116/618 (18.8%) patients had an escalation of care. In 76/116 (65.5%) patients this was determined by using an early warning score, in 40/116 (34.5%) no early warning score was noted. The location to which the patients' care was escalated is shown in Table 3.5.

Table 3.5 Location to which patients' care was escalated during initial assessment

	Number of patients	%
Surgical ward	39	35.8
Surgical assessment unit	37	33.9
Medical assessment unit	16	14.7
Level 3 care	7	6.4
Medical ward	7	6.4
Level 2 care	3	2.8
Subtotal	**109**	
Unknown	7	
Total	**116**	

Clinical questionnaire data

Care was escalated to a surgical ward in 76/109 (69.7%) patients, underscoring the need for surgical ward staff to be fully trained in identifying a deteriorating patient.

The fluid shifts associated with bowel obstruction coupled with impaired intake mean that hypovolaemia is a significant risk. In the view of the case reviewers, 69/264 (26.1%) patients were found to have acute kidney injury (AKI) after initial assessment (Table 3.6). Although the selection criteria for patients in this study enriched this group. A further 16 patients developed AKI following admission; in four of these patients the AKI was thought to have been avoidable if adequate resuscitation had taken place. In the view of the clinicians completing questionnaires, 180/666 (27.0%) patients had AKI on admission and were of the opinion that resuscitation was inadequate in 10/178 (5.6%) patients.

Table 3.6 Acute Kidney Injury (AKI) present at the initial assessment

	Number of patients	%
Yes	69	26.1
No	195	73.9
Subtotal	**264**	
Unknown	30	
Total	**294**	

Case reviewer data

As a result of the initial assessment only 83/645 (12.9%) patients were started on a pathway of care specifically for acute bowel obstruction. For 263/645 (40.8%) patients they were admitted to a hospital in which there was a pathway but it was not used, and in 299/645 (46.4%) patients they were admitted to a hospital in which there was no pathway.

Key Findings

4. 438/690 (63.5%) patients had a presenting symptom of pain. However, a pain score was performed in 252/438 (57.5%)
5. 163/690 (23.6%) patients had their hydration status recorded and 157/690 (22.8%) patients had their weight recorded resulting in Body Mass Index (BMI) only recorded in 80/690 (11.6%) patients
6. 253/282 (89.7%) patients and a satisfactory initial assessment undertaken in terms of the investigations performed in the view of the case reviewers
7. 44/283 (15.5%) cases reviewed highlighted a delay in identifying acute bowel obstruction at the initial assessment
8. 69/264 (26.1%) patients had acute kidney injury (AKI) on admission and 16 patients developed it following admission. In the view of the case reviewers this was avoidable in four patients and clinicians completing questionnaires thought that AKI resuscitation was inadequate in 10/178 (5.6%) patients
9. 83/645 (12.9%) patients were cared for on a specific pathway for acute bowel obstruction
10. 299/645 (46.4%) patients were admitted to a hospital in which there was no pathway for acute bowel obstruction

4

Initial ward care

Location of admission

Table 4.1 shows the locations to which patients were admitted following their initial assessment and resuscitation. In 131/647 (20.2%) cases reviewed, the patient was admitted to a medical rather than surgical ward.

Table 4.1 Location to which patients were admitted

	Number of patients	%
Surgical assessment unit	255	39.4
Surgical ward	241	37.2
Medical assessment unit	96	14.8
Medical ward	35	5.4
Level 3 care	12	1.9
Level 2 care	8	1.2
Subtotal	**647**	
Unknown	43	
Total	**690**	

Clinical questionnaire data

In 248/272 (91.2%) cases reviewed, the case reviewers stated that the ward that the patient was admitted to was appropriate. Where it was reported not to be appropriate, it was most commonly due to admission to a medical rather than surgical ward (22/24; 91.7%) and the admission to a medical ward was the reason for a delay to the patient being assessed by the surgical team in 31/52 (59.6%) patients (Table 4.2).

Overall there were 106/622 (17.0%) patients who were not seen by a senior clinician within 4 hours of admission (Table 4.3) and there was a delay in consultant review in 41/258 (15.9%) patients, which did not comply with guidelines that consultant review should occur within 14 hours of admission.[11,12]

Table 4.2 Patient was reviewed by a surgical team/ surgeon following admission

	Number of patients	%
Yes	611	92.2
No	52	7.8
Subtotal	**663**	
Unknown	27	
Total	**690**	

Clinical questionnaire data

Table 4.3 Patient was seen by a senior clinician (ST3 or above) within 4 hours

	Number of patients	%
Yes	516	83.0
No	106	17.0
Subtotal	**622**	
Unknown	68	
Total	**690**	

Clinical questionnaire data

CASE STUDY 1 - delayed senior review

A frail elderly patient with symptoms of large bowel obstruction was admitted to a surgical ward via the emergency department at 2.30pm. Whilst the ward care provided was good, there was no evidence in the case notes that the patient had seen a senior clinician or consultant until the ward round the next day. At this point a CT was requested and subsequently a decision to undergo surgery was made. The patient was operated on the same day but experienced an extended stay in critical care postoperatively, with eventual discharge home 14 days later.

The case reviewers were of the opinion that this patient should have been seen sooner by a consultant as the delay to diagnosis and subsequent surgery had an impact on the outcome of the patient.

CASE STUDY 2 - good senior review

An elderly patient presented to an emergency department during the early hours with small bowel infarction. The patient was reviewed by a specialist surgical registrar, admitted to a ward and reviewed by a consultant surgeon within 6 hours of arrival to the ward. The patient underwent bowel resection and a hernia repair on the same day, within 4 hours of the decision being made. The surgeon and the anaesthetist undertaking the procedure were of suitable seniority. The patient experienced an uneventful postoperative recovery and successful discharge home five days later.

The case reviewers stated that this was an example of good care, with efficient reviews and decision-making.

Assessments at the ward admission

On arrival on the ward, patients should have their pain assessed and treated, their nutritional state recorded and an assessment made of their frailty. Some patients will require the insertion of a nasogastric tube in order to reduce the risks of bowel distention with the potential risks of bowel ischaemia and perforation as well as reducing the risk of aspiration.

In terms of pain, 163/544 (30.0%) patients did not have their pain score assessed and 102/163 (62.6%) patients had presented with abdominal pain (Table 4.4). Only 16 patients in this group had already had a pain score performed at the initial assessment in the emergency department.

Table 4.4 Pain Score recorded on admission

	Number of patients	%
Yes	381	70.0
No	163	30.0
Subtotal	**544**	
Unknown	146	
Total	**690**	

Clinical questionnaire data

Once pain was recognised, in the view of the case reviewers, analgesia was both timely (164/187; 87.7%) and adequate (166/184; 90.2%) in the majority of cases reviewed (Table 4.5).

Table 4.5 Assessment of the analgesia administered

	Timely analgesia		Adequate analgesia	
	Number of patients	%	Number of patients	%
Yes	164	87.7	166	90.2
No	23	12.3	18	9.8
Subtotal	**187**		**184**	
NA - analgesia not given	42		38	
Unknown	65		72	
Total	**294**		**294**	

Case reviewer data

Only 37/639 (5.8%) patients were seen by an acute pain team before their surgery (although it is important that assessment by the acute pain team does not result in delay to urgent surgery) (Table 4.6). Even if it were presumed that patients with sigmoid volvulus were sent directly for colonoscopy as therapy for the underlying condition and the quickest way of relieving pain due to obstruction, these were the minority (30/438; 6.8%).

Table 4.6 Patient was seen by the acute pain

	Number of patients	%
Yes	37	5.8
No	602	94.2
Subtotal	**639**	
Unknown	51	
Total	**690**	

Clinical questionnaire data

Table 4.7 Adequacy of the nutritional assessment

	Nutritional assessment carried out		Adequate nutritional assessment	
	Number of patients	%	Number of patients	%
Yes	167	65.7	146	89.0
No	87	34.3	18	11.0
Subtotal	**254**		**164**	
Unknown	40		3	
Total	**294**		**167**	

Case reviewer data

Bowel obstruction is a major risk factor for malnutrition yet in 105 patients (87+18 =105/254; 41.3%) nutritional status was either not assessed at all or the assessment was inadequate (Table 4.7) despite poor nutrition being a risk factor for delayed recovery.

The Malnutrition Universal Screening Tool (MUST) score is the expected assessment of nutritional status.[13] Table 4.8 shows that only 271/516 (52.5%) patients had evidence of this being done in the view of the clinicians completing questionnaires.

The indications for a nasogastric (NG) tube insertion in patients with bowel obstruction are to relieve vomiting or to allow some enteral feeding in patients who are recovering.

Table 4.8 A MUST score was recorded

	Number of patients	%
Yes	271	52.5
No	245	47.5
Subtotal	**516**	
Unknown	174	
Total	**690**	

Clinical questionnaire data

Patients who had a nutritional review were more likely to have an NG tube inserted (137/238 (57.6%) vs 148/302 (49.0%), Figure 4.1).

NG tubes were also inserted more frequently in patients with small bowel obstruction (299/471; 63.5% vs 38/161; 23.6%; Figure 4.2).

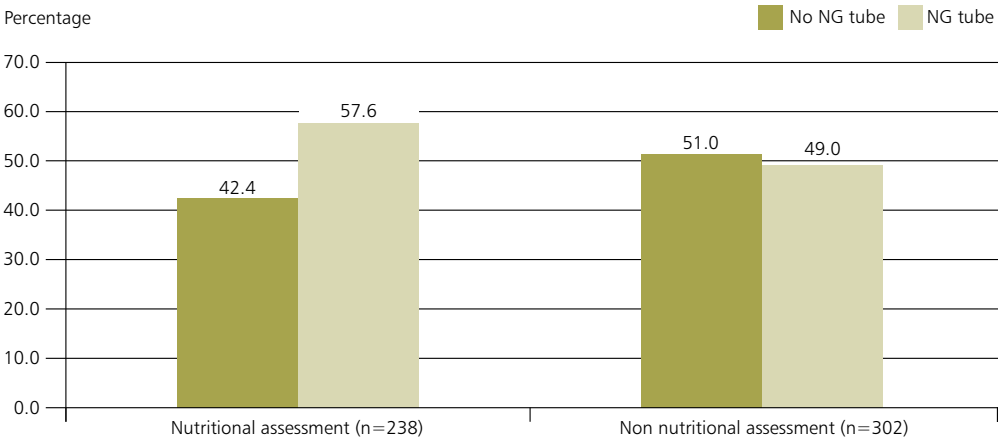

Figure 4.1 Frequency of nasogastric (NG) tube insertion and nutritional assessment

Clinical questionnaire data

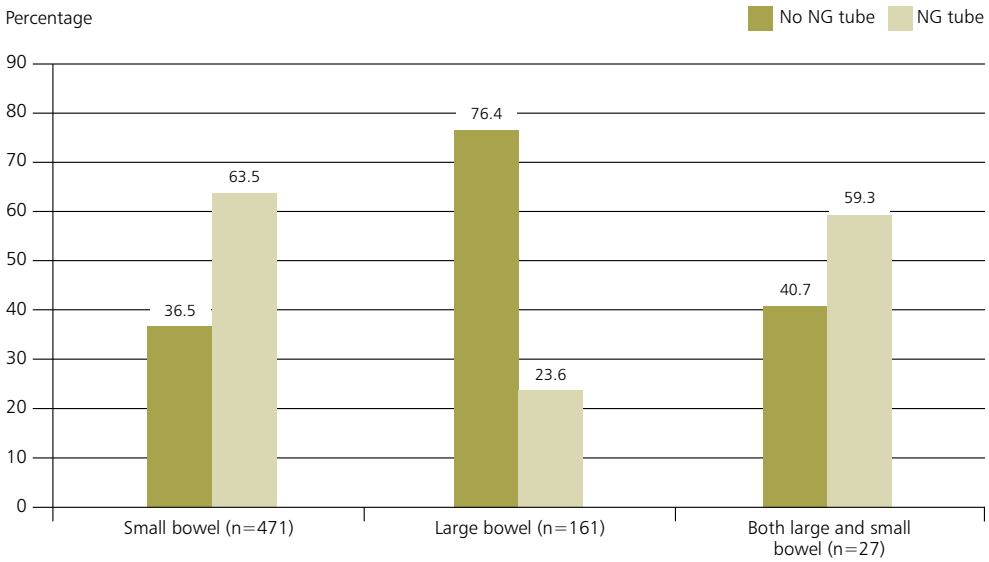

Figure 4.2 Frequency of nasogastric (NG) tube insertion and location of the bowel obstruction

Clinical questionnaire data

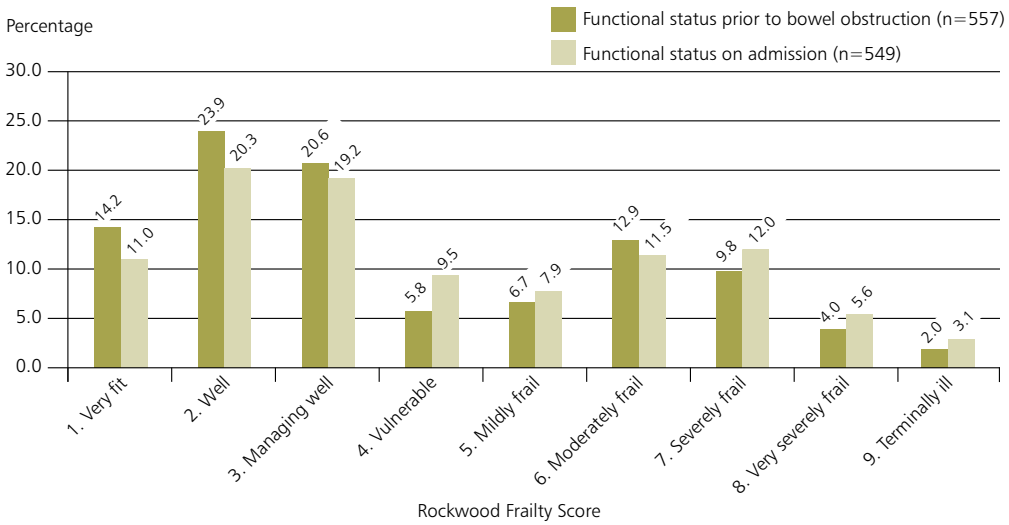

Figure 4.3 Functional status prior to bowel obstruction and on admission to hospital

Clinical questionnaire data

As shown in Chapter 2, the study population was skewed to those patients who were over 60 years of age and comparison between the patient's condition on admission and their pre-morbid state showed an increase in frailty, testament to the debilitating effect of the illness (Figure 4.3). However, only 34/124 (27.4%) patients over 65 years of age had their frailty score assessed on admission to the ward. Assessing frailty allows therapy decisions to be tailored to the holistic needs of the patient as suggested in the ReSPECT guidelines.[14,15]

Key Findings

11. Admission to an inappropriate ward was most commonly due to admission to a medical rather than surgical ward (22/24; 91.7%), which was also the reason for a delay to the patient being assessed by the surgical team in 31/52 (59.6%) patients
12. 41/258 (15.9%) patients experienced a delay in consultant review
13. 106/622 (17.0%) patients were not seen within 4 hours of admission
14. 34/124 (27.4%) patients over 65 years of age had their frailty score assessed on admission to the ward
15. 163/544 (30.0%) patients did not have their pain score assessed on admission to a ward of which 102/163 (62.6%) patients had presented with abdominal pain
16. When analgesia was given, it was considered by case reviewers to be timely in 164/187 (87.7%) patients and adequate in 166/184 (90.2%)
17. 37/639 (5.8%) patients were seen by the acute pain team prior to surgery
18. 105/254 (41.3%) patients either had no nutritional status assessment or the assessment was inadequate
19. 271/516 (52.5%) patients had a MUST score recorded on the ward

5

Diagnosis of acute bowel obstruction

The initial diagnosis of acute bowel obstruction is important because any delay can result in serious complications including bowel perforation, ischaemia and sepsis. It is therefore essential that an accurate diagnosis is made at presentation to determine which patients need urgent surgery and those whose early management can be conservative.[2,4]

Diagnostic imaging

Abdominal imaging including plain abdominal X-ray and CT scanning can contribute to accurate and timely diagnosis of acute bowel obstruction.[2,4,5] Abdominal X-rays are readily obtainable and have traditionally been used in the assessment of abdominal pathology but a CT scan with intravenous contrast is seen as the gold standard investigation in the assessment of acute abdominal pathology.[2,4,5,16]

Table 5.1 shows the radiological investigations patients had, as identified from the case note review and from the clinician questionnaire.

Table 5.1 Imaging undertaken

	Case reviews		Clinician questionnaire	
Imaging	**Number of patients (n =247)**	**%**	**Number of patients (n = 657)**	**%**
Abdominal X-ray	150	60.7	434	66.1
CT scan with IV contrast	180	72.9	491	74.7
CT scan without contrast	11	4.5	40	6.1
Gastrografin follow-through	16	6.5	34	5.2
MRI	3	1.2	32	4.9
None	5	2.0	3	0.5
Other	150	60.7	13	1.2

Answers maybe multiple

Table 5.2 Gastrografin was performed in this patient

	Number of patients	%
Yes	79	17.8
No	364	82.2
Subtotal	**443**	
Not applicable	23	
Unknown	44	
Total	**510**	

Clinical questionnaire data

Patients with adhesional small bowel obstruction sometimes undergo a gastrografin follow-through, if they do not need immediate surgery, to help predict the likelihood of spontaneous resolution of the bowel obstruction and successful conservative management. In this study 79/443 (17.8%) patients with small bowel obstruction underwent a gastrografin X-ray (Table 5.2).

In both data sources there were a substantial number of patients who underwent both abdominal X-rays and CT scans (case reviews: 116/247 (47.0%); clinician questionnaire: 321/657 (48.9%).

Location and reporting

The investigations were most often performed in the emergency department and included abdominal X-ray (282/420; 67.1%), CT with IV contrast (154/474; 32.5%) and CT non-contrast (20/40; 50.0%) (Figure 5.1). The radiology was most commonly reported by a consultant for abdominal X-ray (216/293; 73.7%), CT with IV contrast (403/436 92.4%) and CT non-contrast (33/38; 86.8%) (Figure 5.2).

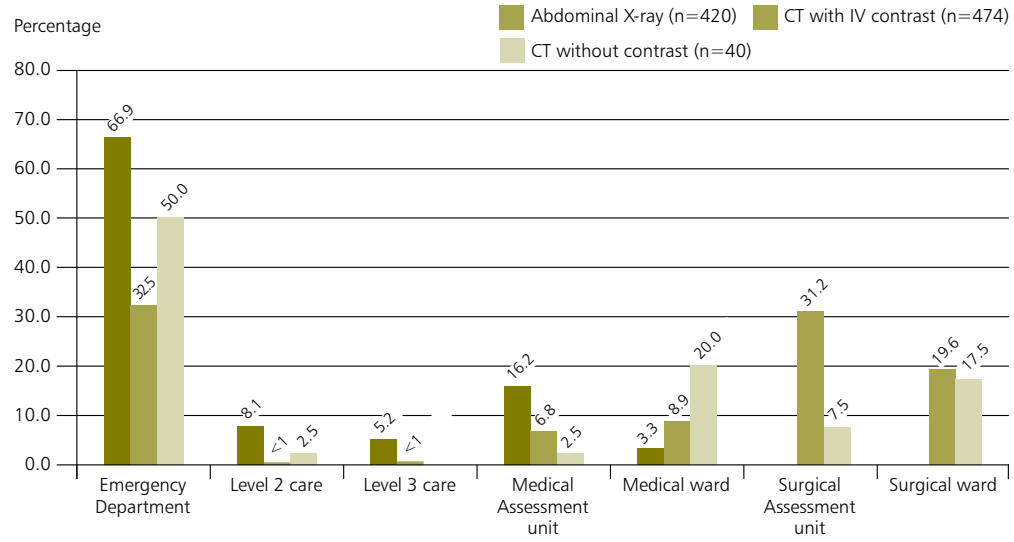

Figure 5.1 Location at which different radiological imaging modalities were performed
Clinical questionnaire data

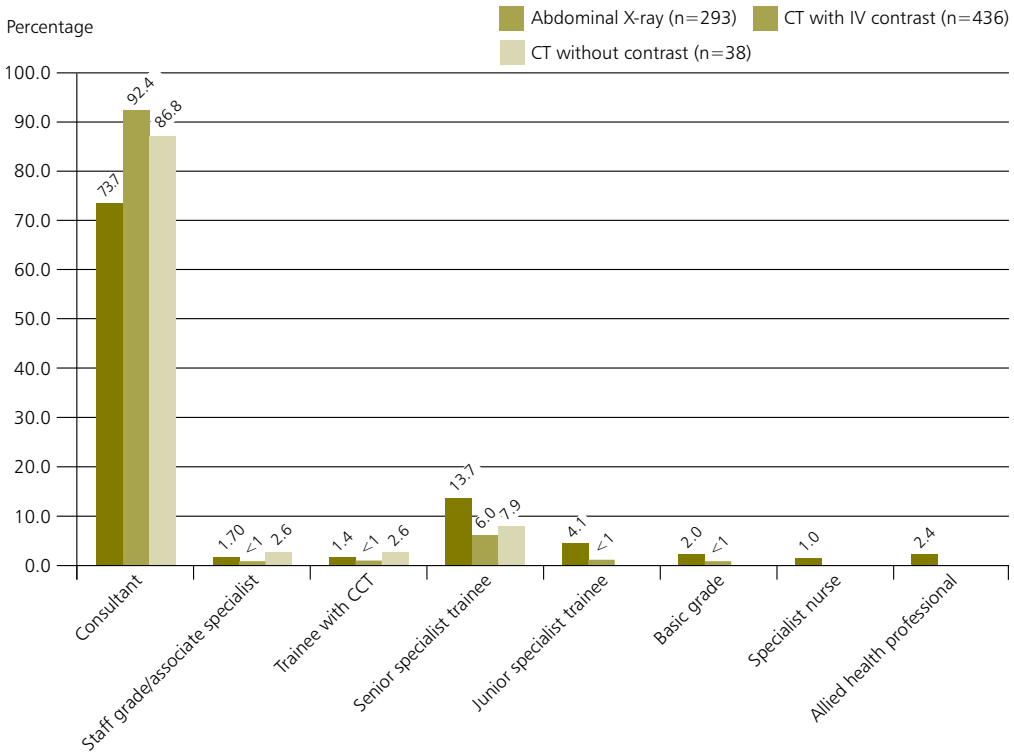

Figure 5.2 Grade of clinician who reported the different imaging modalities
Clinical questionnaire data

Usefulness of the different imaging modalities

In the view of the clinicians completing the questionnaires, abdominal X-rays were much less good at aiding diagnosis of the intra-abdominal pathology than CT scans with intravenous contrast (abdominal X-ray 132/411 (32.1%); CT with IV contrast 427/479 (89.1%) Figure 5.3)

CT scans also had a much greater effect on aiding decision-making as can be seen in Figure 5.4 (CT with IV contrast 456/484 (94.2%); CT without contrast 31/39 (79.5%); abdominal X-ray 266/411 (64.7%).

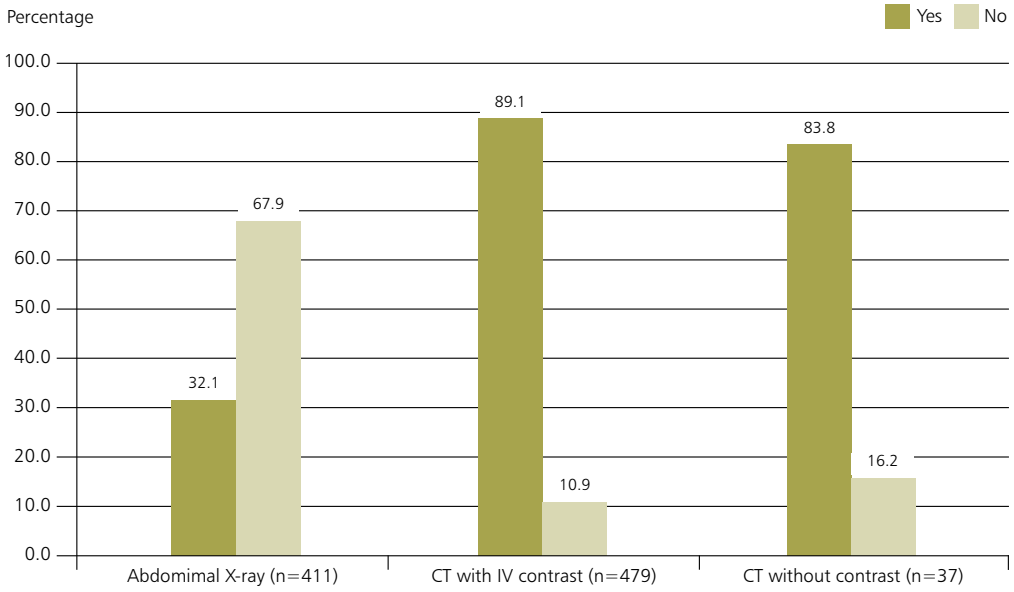

Figure 5.3 Adequacy of the imaging to aid diagnosis of acute bowel obstruction
Clinical questionnaire data

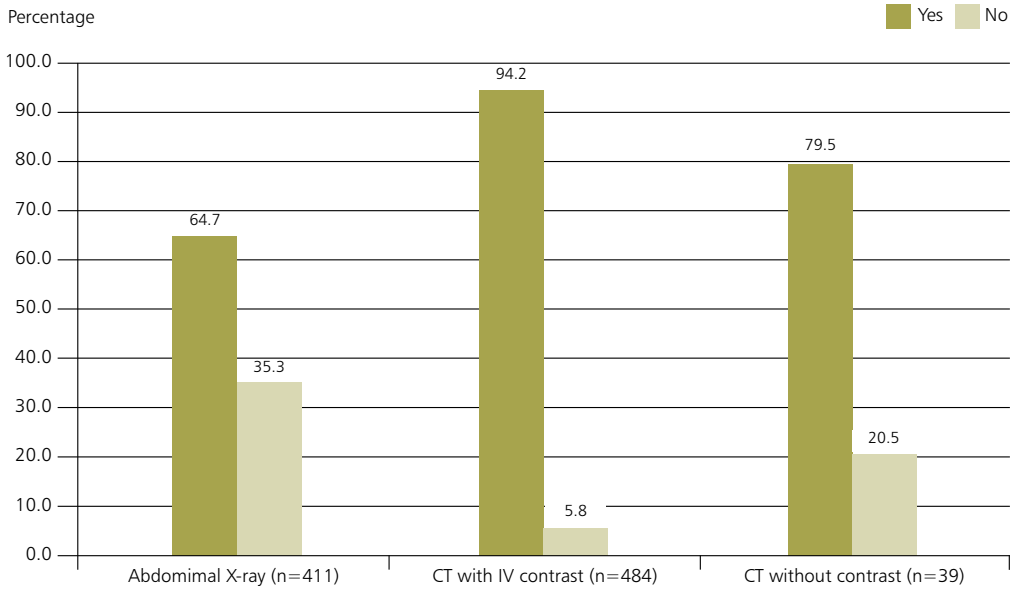

Figure 5.4 Influence of the radiological imaging on decision-making
Clinical questionnaire data

As abdominal X-rays do not provide an accurate aid to the diagnosis of acute bowel obstruction, or influence decision-making, serious consideration should be given instead to using CT scans with IV contrast as the primary imaging modality for all patients who are suspected of having acute bowel obstruction. There has long been debate about the use of IV contrast for imaging in patients with acute renal impairment because of the perceived potential nephrotoxic effect of the contrast. Conversely, the risk of missed or under-diagnosis of a surgical pathology such as acute bowel obstruction is likely to be of more risk to the patient as this can result in delay in the diagnosis and treatment of ischaemic or perforated bowel. Nearly all reviewers and Study Advisory Group members on this study were of the opinion that in patients with suspected acute bowel obstruction, CT with IV contrast should not be delayed/ omitted because of poor renal function.

CASE STUDY 3 - delay to imaging

An elderly patient was admitted to hospital following a fall resulting in a fractured neck of femur. Three days after surgery the patient deteriorated and became constipated. The constipation was initially treated with laxatives but they did not resolve the issue. One day later a CT was requested for a suspected volvulus. The CT was not undertaken until the following afternoon. The patient was diagnosed with a tumour in the large bowel, although this was initially reported as 'pseudo-obstruction'.

The case reviewers were of the opinion that the delay in CT of more than 24 hours led to delay in diagnosis and surgery. They also noted that there was no formalised frailty scoring undertaken or pain assessment.

CASE STUDY 4 - prompt CT

A middle-aged patient arrived in the emergency department with symptoms of large bowel obstruction. CT was undertaken whilst in the emergency department allowing early identification of an obstruction. The patient underwent surgery that day and an appropriate postoperative admission to critical care. Although the patient developed a postoperative infection, this was treated appropriately and the patient was discharged home.

In the view of the case reviewers the rapid access to CT, and timely and accurate report ensured prompt surgery at which resolution of the obstruction resulted in successful re-perfusion of the bowel.

Clinical diagnosis

In 291/649 (44.8%) patients a consultant made the diagnosis of bowel obstruction and in 56/649 (8.6%), it was a staff grade/ associate specialist (Table 5.3). Trainees made the diagnosis in 299/649 (46.1%) of cases with 198/649 (30.5%) senior trainees (including those with CCT) and 64/649 (9.9%) junior specialist trainees. Specialist nurses or basic grades doctors made the diagnosis in 40/649 (6.2%).

Table 5.3 Grade of clinician who made the diagnosis of acute bowel obstruction

	Number of patients	%
Consultant	291	44.8
Senior specialist trainee (ST3+ or equivalent)	182	28.0
Junior specialist trainee (ST1 and ST2 or CT equivalent)	64	9.9
Staff grade/associate specialist	56	8.6
Basic grade (HO/FY1 or SHO/FY2 or equivalent)	37	5.7
Trainee with CCT	16	2.5
Specialist nurse (nurse consultant, nurse practitioner etc.)	3	<1
Subtotal	**649**	
Unknown	41	
Total	**690**	

Clinical questionnaire data

Delays in diagnosis

Case reviewers were of the opinion that there was a delay in diagnosis in 51/285 (17.9%) patients (Table 5.4). They stated that this was avoidable in 15 patients and that the outcome was affected in 12/51 (23.5%) patients in whom there was a delay.

Table 5.4 Delay in diagnosis

	Number of patients	%
Yes	51	17.9
No	234	82.1
Subtotal	**285**	
Unknown	9	
Total	**294**	

Case reviewer data

Delays in imaging

Delays were identifiable at all stages of the pathway and delays in imaging were common. Figure 5.5 shows that when patients experienced a delay in imaging, 35/57 (61.4%) patients also experienced a delay in diagnosis. Conversely, only 14/219 (6.4%) patients had a delay in diagnosis if there was no delay in imaging. This suggests that early imaging with CT scanning is an important factor in establishing an accurate diagnosis and should be included in pathways for the management of bowel obstruction.

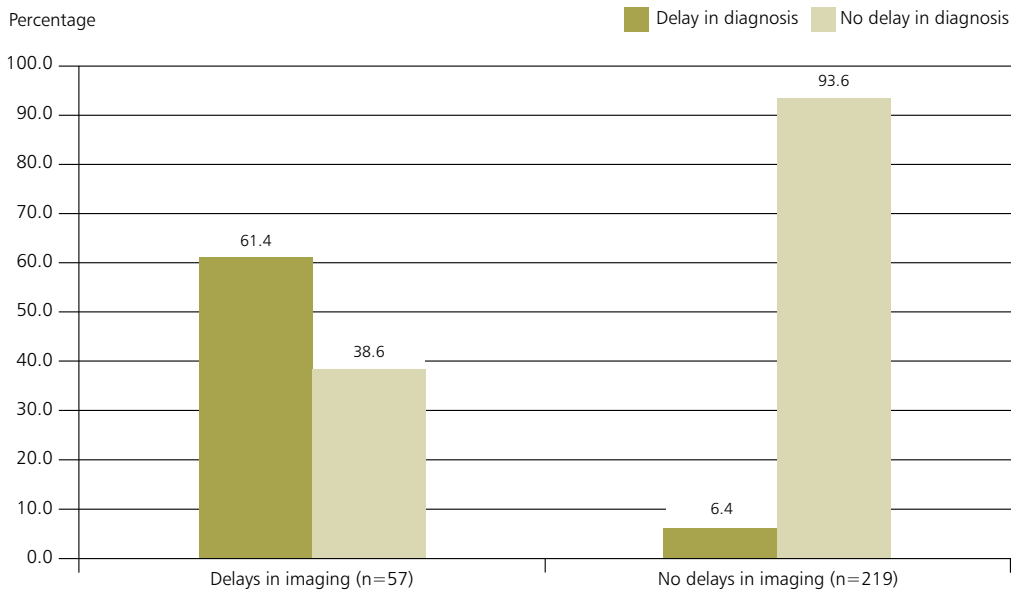

Figure 5.5 Delay in imaging and diagnosis

Case reviewer data

Delays in the pathway for different modalities of radiological imaging with regard to the timeliness of the imaging and the reports are shown in Figure 5.6.

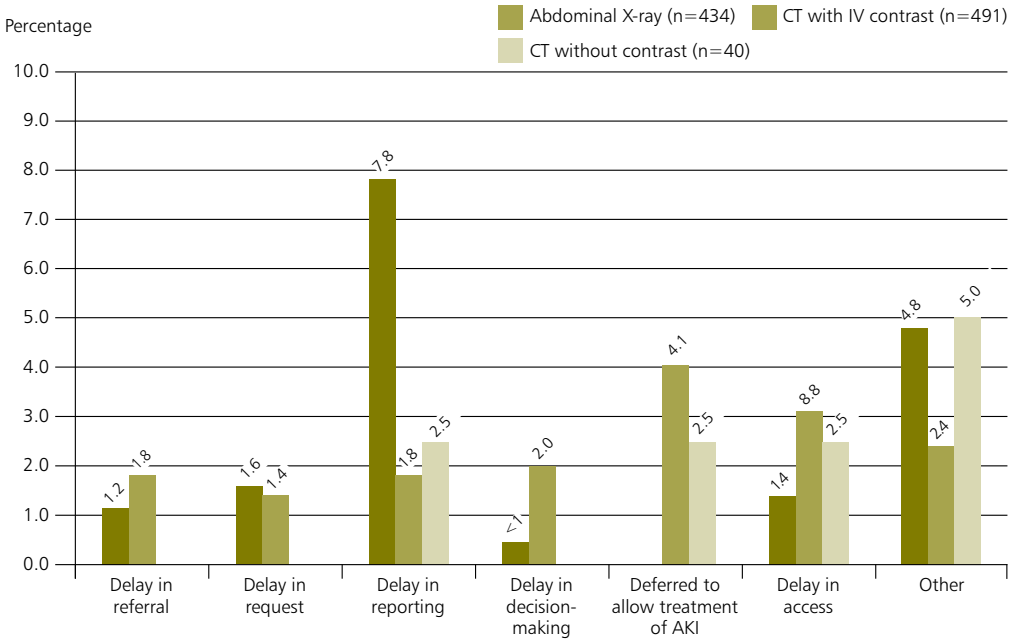

Figure 5.6 Delays in the pathway for different modalities of radiological imaging

Answers may be multiple
Clinical questionnaire data

It appeared that although it was easy to request an abdominal X-ray the reports were more likely to be delayed (34/434; 7.8%) than those of a CT scan with IV contrast (9/491; 1.8%). However, there was a much higher incidence of delay in CT scans due to problems with access (CT with IV contrast: 43/491; 8.8% vs abdominal X-ray: 6/421; 1.4%) (See Chapter 8).

The time to performing radiological investigations was longer if patients were not on an acute bowel obstruction pathway (Table 5.5) which underscores the need for pathways to be developed and be easily accessible in the emergency department.

Table 5.5 Delays to imaging and presence of pathway for acute bowel obstruction

Acute Bowel Obstruction Pathway	Abdominal X-Ray					CT scan				
	Delay	%	**Subtotal**	Unknown	**Total**	Delay	%	**Subtotal**	Unknown	**Total**
Yes	3	6.3	**48**	3	**51**	3	4.6	**65**	2	**67**
No	49	14.8	**331**	26	**357**	64	16.7	**383**	11	**394**
Subtotal	**52**		**379**	**29**	**408**	**67**		**448**	**13**	**461**
Unknown	3		**22**	4	**26**	3		**24**	6	**30**
Total	**55**		**401**	**33**	**434**	**70**		**472**	**19**	**491**

Clinical questionnaire data

Table 5.6 Unnecessary imaging and unnecessary delays in imaging

	Unnecessary imaging		Unnecessary delays in imaging	
	Number of patients	**%**	**Number of patients**	**%**
Yes	29	10.3	57	20.7
No	252	89.7	219	79.3
Subtotal	**281**		**276**	
Unknown	13		18	
Total	**294**		**294**	

Case reviewer data

Case reviewers considered that there was unnecessary imaging carried out in 29/281 (10.3%) patients and unnecessary delays in imaging in 57/276 (20.7%) patients (Table 5.6). In 23/29 (79.3%) cases reviewed where the patient was considered to have had unnecessary imaging and 28/57 (49.1%) where there was an unnecessary delay, the patient had undergone both an abdominal X-ray and a CT scan.

Delays in clinical assessment

Senior assessment was another factor that case reviewers identified as contributing to a timely diagnosis. Figure 5.7 shows that 13/32 (40.6%) patients who had a delay in consultant assessment had a delay in diagnosis. In patients who were seen in a timely manner by a consultant only 23/147 (15.6%) experienced a delay in diagnosis.

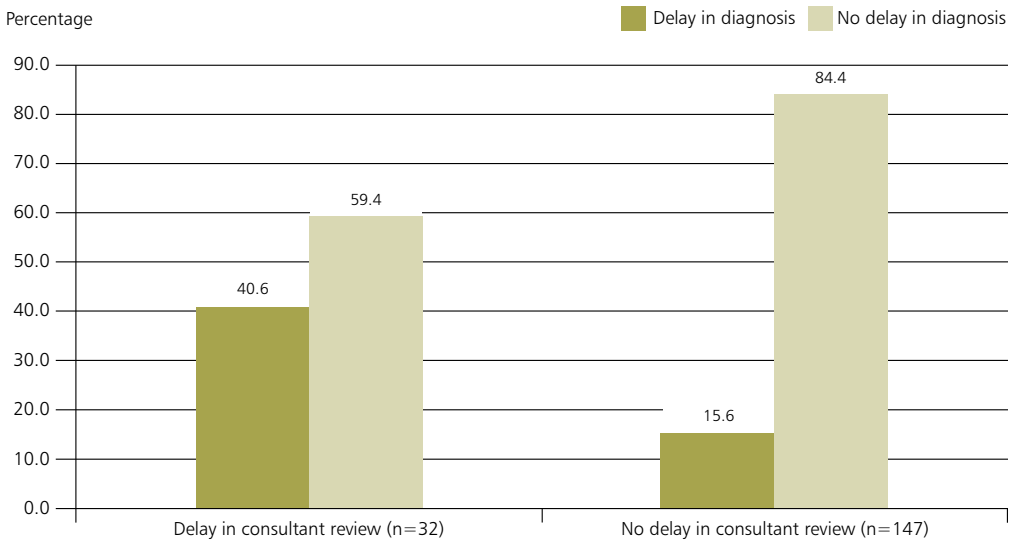

Figure 5.7 Delayed access to senior review and delay in diagnosis

Case reviewer data

It was also found by the case reviewers that there was a delay in diagnosis in 14/26 (53.8%) patients who experienced a delay in surgical assessment compared with only 24/170 (14.1%) when surgical assessment was not delayed (Figure 5.8).

A diagnosis was made within 24 hours of admission for 344/427 (80.6%) patients, of which 284/344 (82.6%) patients had a diagnosis within 12 hours. The remaining 83/427 (19.4%) patients were diagnosed more than 24 hours after admission with a range of 24-144 hours. (Figure 5.9).

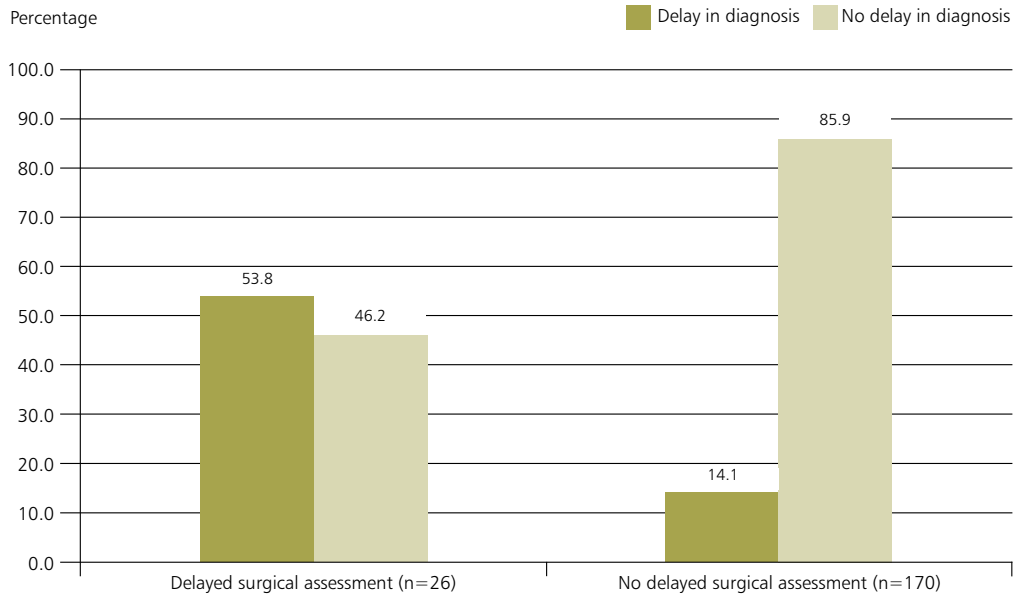

Figure 5.8 Delay in surgical assessment and delay in diagnosis
Case reviewer data

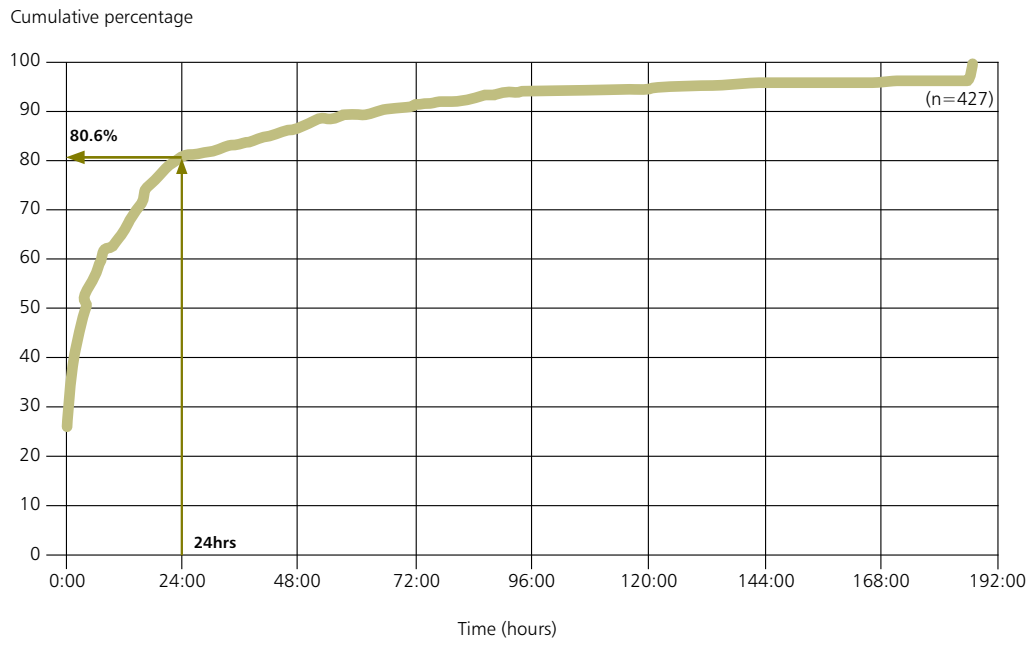

Figure 5.9 Time from admission to diagnosis of acute bowel obstruction
Clinical questionnaire data

Admission under a non-surgical team can lead to delayed recognition of bowel obstruction and assessment for a variety of reasons. Patients admitted under the medical team may have vague symptoms at presentation resulting in delayed recognition, referral and CT. Other reasons include severe comorbidities and frailty in patients not suitable for surgery.

Delays in obtaining a CT scan with IV contrast were more likely if patients were admitted under a medical (18/74; 24.3%) rather than a surgical team (33/351; 9.4%). Clinicians reported a delay in diagnosis that was outside of their control in 22/118 (18.6%) patients under medical teams compared with 20/454 (4.4%) patients under surgical teams. A delay in making the decision about the best treatment for the patient occurred in 11/125 (8.8%) patient admissions under medical teams and 14/483 (2.9%) under surgical teams.

Where delays affected outcome, serious complications including bowel perforation (2 patients), avoidable bowel resection (5 patients), clinical deterioration (5 patients) and increased length of stay (4 patients) were adverse consequences identified by case reviewers.

Key Findings

20. 321/657 (48.9%) patients underwent both a CT scan and an abdominal X-ray
21. 34/434 (7.8%) patients who had an abdominal X-ray and 9/491 (1.8%) patients who had a CT with IV contrast had a delay in the reporting on the image
22. 43/491 (8.8%) patients who underwent a CT with IV contrast and 6/421 (1.4%) patients who underwent an abdominal X-ray experienced a delay due to access to radiology
23. There were delays in imaging in 57/276 (20.7%) of the cases reviewed
24. Radiological imaging was most often reported by a consultant: X-ray for 216/293 (73.7%) patients; CT with IV contrast for 403/436 (92.4%) patients and CT without contrast for 33/38 (86.8%) patients
25. CT with IV contrast was sufficient to diagnose acute bowel obstruction in 427/479 (89.1%) patients whereas abdominal X-ray was sufficient to diagnose acute bowel obstruction in 132/411 (32.1%)
26. CT with IV contrast affected subsequent decision-making in the management of acute bowel obstruction in 456/484 (94.2%) patients and abdominal X-ray in 266/411 (64.7%) patients
27. 35/57 (61.4%) patients with delayed imaging also experienced a delay in diagnosis whereas only 14/219 (6.4%) patients had a delay in diagnosis if there was no delay in imaging
28. In 23/29 (79.3%) cases reviewed where the patient was considered to have had unnecessary imaging and 28/57 (49.1%) where there was an unnecessary delay, the patient had undergone both an abdominal X-ray and a CT scan
29. 13/32 (40.6%) patients who had a delay in consultant assessment had a delay in diagnosis. In patients who were seen in a timely manner by a consultant only 23/147 (15.6%) experienced a delay in diagnosis
30. Delays in obtaining a CT scan with IV contrast were more likely if patients were admitted under the medical team (18/74; 24.3%) compared with admission under surgery (33/351; 9.4%)
31. 14/26 (53.8%) patients who experienced a delay in surgical assessment also had a delay in diagnosis compared with 24/170 (14.1%) when surgical assessment was not delayed
32. 344/427 (80.6%) patients were diagnosed within 24 hours of admission, of which 284/344 (82.6%) patients had a diagnosis within 12 hours. The remaining 83/427 (19.4%) patients were diagnosed more than 24 hours after admission with a range of 24-144 hours
33. Clinicians reported a delay in diagnosis that was outside of their control in 22/118 (18.6%) patients where the patient was admitted under medical teams compared with 20/454 (4.4%) of those under surgical teams
34. A delay in making the decision about the best treatment for the patient occurred in 11/125 (8.8%) admissions under medical teams and 14/483 (2.9%) under surgical teams

6

Decision-making and treatment planning

The study proposers and Study Advisory Group suggested that due to the complexity of care of patients with acute bowel obstruction, multiple handovers of care may lead to delays in treatment. Table 6.1 shows the number of consultants who reviewed each patient prior to treatment. There were 123/617 (19.9%) patients who were not reviewed by a consultant surgeon before treatment. Furthermore, case reviewers found that delays in treatment due to multiple handovers occurred in only 6/199 (3.0%) patients.

Case reviewers were of the opinion that there was a further delay relating to decision-making in 42/281 (14.9%) patients once a diagnosis had been made (Table 6.2) and this adversely affected the outcome in 15 of these patients.

In 14/41 (34.1%) patients for whom a delayed decision occurred, they were admitted under the incorrect specialty compared to 10/237 (4.2%) for whom a delayed decision did not occur (Figure 6.1). Most patients considered to be admitted under the incorrect specialty were under a medical team (23/25; 92.0%).

There was also an inappropriate delay in treatment in 39/281 (13.9%) patients in the view of the case reviewers (Table 6.3). This was seen more frequently in patients who had a delayed diagnosis (23/50; 46.0% v 16/229; 7.0%) and delay in decision-making (22/41; 53.7% v 15/236; 6.4%) than those who did not.

Table 6.1 Number of consultant surgeons who reviewed each patient prior to treatment

	Number of patients	%
0	123	19.9
1	357	57.9
2	118	19.1
3	16	2.6
4	1	0.2
5	2	0.3
Subtotal	**617**	
Unknown	73	
Total	**690**	

Table 6.2 Delays in decision-making

	Number of patients	%
Yes	42	14.9
No	239	85.1
Subtotal	**281**	
Unknown	13	
Total	**294**	

Case reviewer data

Table 6.3 Inappropriate delay in treatment

	Number of patients	%
Yes	39	13.9
No	242	86.1
Subtotal	**281**	
Unknown	13	
Total	**294**	

Case reviewer data

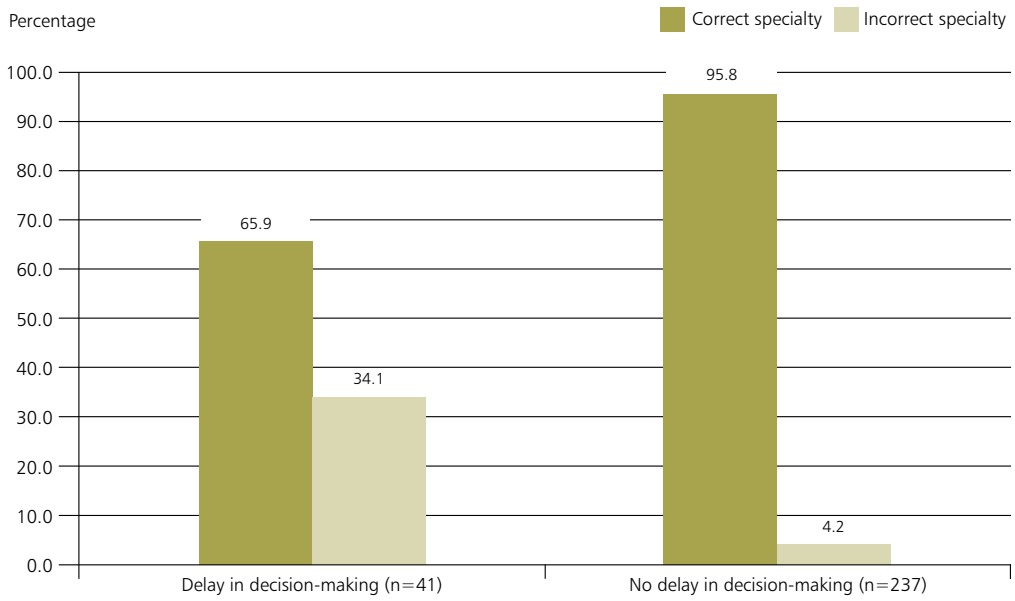

Figure 6.1 Delay in decision-making by admission to correct specialty

Case reviewer data

Risk assessment and multidisciplinary team input

All patients requiring emergency surgery should have an assessment of their risk documented in their case notes and/or on the consent form. Mortality risk scoring is an important aspect of patient assessment prior to any surgical procedure. Risk scoring can be used to inform decision-making regarding treatment options as well as escalation of care to critical care or the wider multidisciplinary team, during the perioperative period.[9,17,18] This is especially important in patients potentially undergoing emergency laparotomy for bowel obstruction as the mortality risk is, on average, 10% nationally for these operations.[9,19-21]

In 98/219 (44.7%) patients, case reviewers stated that mortality and morbidity risk assessment was not adequate (Table 6.4) and 11/98 (11.2%) patients with an inadequate risk assessment died prior to discharge. Furthermore 68/98 (69.4%) patients were reported to have had an inadequate risk assessment before undergoing surgery.

A risk assessment tool was used in 315/582 (54.1%) patients and these are shown in Table 6.5 and case reviewers reported that this influenced the clinical management plan in 146/315 (46.3%) patients.

Table 6.4 Adequate mortality and morbidity risk assessment

	Number of patients	%
Yes	121	55.3
No	98	44.7
Subtotal	**219**	
Unknown	75	
Total	**294**	

Case reviewer data

Table 6.5 The mortality and morbidity risk assessment tool used

	Number of patients	%
P-POSSUM	209	67.6
Clinical judgement	117	37.9
National emergency laparotomy audit (NELA)	90	29.1
American Society of Anesthesiologists (ASA)	88	28.5
Surgical outcome risk tool (SORT)	6	1.9
American College of Surgeons (ACS)	3	1.0

Answers may be multiple; n=309 Clinical questionnaire data

In more complex, frail or higher-risk patients a multidisciplinary approach to care, including input from care of the elderly, anaesthetic and critical care clinicians would be expected.[9,19] Care of the elderly input was sought in 61/498 (12.2%) patients in the view of the clinicians completing questionnaires (Table 6.6). Of the patients who had no care of the elderly input, 343/437 (78.5%) were over the age of 65 and 58/61 (95.1%) patients with care of the elderly input were over 65.

Table 6.6 Input from care of the elderly was sought in the care planning for this patient

	Number of patients	%
Yes	61	12.2
No	437	87.8
Subtotal	**498**	
Not applicable	156	
Unknown	36	
Total	**690**	

Clinical questionnaire data

Clinical questionnaire data

An anaesthetic opinion was obtained for 238/638 (37.3%) patients. Of those patients who had an anaesthetic opinion 204/361 (56.5%) had surgery. Furthermore, a critical care opinion was sought for 48/261 (18.4%) patients and not for 213/261 (81.6%) patients.

Case reviewers were of the opinion that in 21/204 (10.3%) patients a critical care opinion should have been obtained but was not; 4/21 (19.0%) of these patients died. A further 18/21 (85.7%) patients who should have had a critical care review but did not, had an operation.

CASE STUDY 5 - poor risk assessment

An elderly patient was admitted via the emergency department with vomiting and acute kidney injury, suspected to have gastroenteritis. The patient was treated with fluid resuscitation but gradually developed abdominal distension and persistent faeculent vomiting. The junior medical team arranged a CT scan, after discussion with the surgical registrar, which was delayed to correct the patient's renal function. The CT showed large bowel obstruction due to a sigmoid cancer with liver metastases. Further discussion between junior medical and surgical teams occurred and four days after admission the patient was reviewed by a consultant surgeon who stated that the patient was too frail to undergo surgery and end-of-life care was commenced.

Case reviewers were of the opinion that the patient would have been better cared for if earlier surgical assessment had occurred and frailty / risk assessment had been performed to guide the management plan. In this case, the CT should not have been delayed to correct renal function in the opinion of case reviewers, and they also noted that a combined multidisciplinary approach may have been more appropriate than the traditional anatomical diagnosis model.

CASE STUDY 6 - good risk assessment

A middle-aged patient was admitted with small bowel obstruction. The patient was risk scored almost at admission while initially being treated conservatively. The patient was scored as high-risk and surgery was discussed between the patient, their family, and the surgeon prior to making a decision. The discussion was clearly documented in the case notes. The patient underwent a laparotomy with a pre-arranged stay in critical care postoperatively.

The case reviewers remarked that the care had been exemplary and the early risk assessment along with the use of laparotomy care bundles had led to prompt and efficient care for this patient

Where a critical care opinion was obtained, the most common reasons for doing this were pre-operative management/optimisation and decision not to escalate/palliate (Table 6.7). It was stated that critical care input influenced management in 36/61 (59.0%) patients. Of those patients who had surgery 99/390 (25.4%) required critical care post operatively. Of those who did not have an operation 7/293 (2.4%) required higher level care.

Table 6.7 How critical care influenced the treatment plan

	Number of patients	%
Ceilings of Treatment	36	52.9
Optimisation	17	25.0
Palliation	12	17.6
Not fit for surgery	12	17.6
Not appropriate critical care	8	11.8
Critical care pre-operatively	6	8.8
Changed priority	3	4.4

Answers may be multiple; n=68 Case reviewer data

Treatment planning

There was a treatment plan for nearly all patients (650/665; 97.7%) (Table 6.8) which included the correction of organ failure in 220/640 (34.4%), initial management strategy in 537/640 (83.9%), intervention timing in 172/640 (26.9%) and a nutrition plan in 121/640 (18.9%).

Table 6.8 Patient had a treatment plan

	Number of patients	%
Yes	650	97.7
No	15	2.3
Subtotal	**665**	
Unknown	25	
Total	**690**	

Clinical questionnaire data

Clinicians who completed questionnaires within the hospitals were of the opinion that there was room for improvement in decision-making in only 36/558 (6.5%) patients at this stage in the pathway. However, the reviewers found that there was inadequate decision-making in 27/217 (12.4%) cases reviewed.

Clinicians reported that in 579/603 (96.0%) patients the treatment plan was discussed with the patient and in 394/497 (79.3%) it was discussed with the patient's family. However, if the patient had a Rockwood frailty score of 5 or greater, the treatment plan was discussed with 169/186 (90.9%) patients and with their family in 168/190 (88.4%). In seven instances it was discussed with neither (three patients had a Rockwood score of 5 or more). If patients had a Rockwood frailty score of 4 or less the treatment plan was discussed with 310/320 (96.9%) patients and their family in 165/232 (71.1%). Frailty appeared to influence discussions with both the patient and family.

The demographic chapter has shown that patients with bowel obstruction in the study were an older population many of whom were frail. In addition, the overall mortality rate of patients in the study was 129/690 (18.7%), which is higher because of study selection design. It would therefore have been expected that resuscitation status had been discussed and documented for many, if not all, of these patients rather than the 101/279 (36.2%) in which it was (Table 6.9). Where resuscitation status was documented 50/101 (49.5%) patients were recorded as 'not for cardiopulmonary resuscitation' and 51/101 (50.5%) were.

Table 6.9 Patient's resuscitation status was documented

	Number of patients	%
Yes	101	36.2
No	178	63.8
Subtotal	**279**	
Unknown	15	
Total	**294**	

Case reviewer data

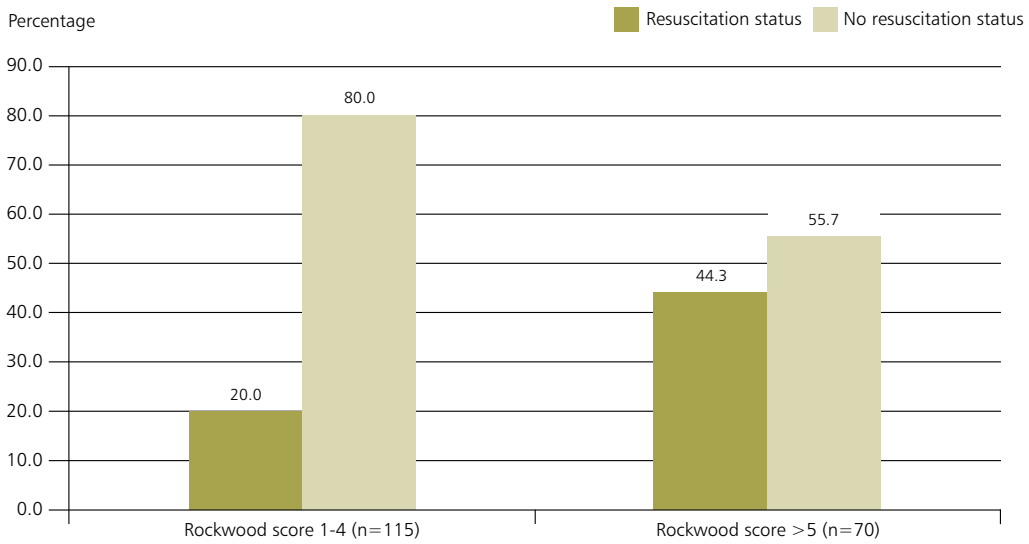

Figure 6.2 Documentation of resuscitation status and Rockwood score on admissions

Case reviewer data

Figure 6.2 shows that resuscitation status was more likely to be discussed in patients with a frailty score of 5 or more 31/70 (44.3%) than those with a Rockwood score of 1-4 (23/115; 20.0%). However 39/70 (55.7%) patients with a Rockwood score of 5 or more were not discussed.

Key Findings

35. 42/281 (14.9%) patients experienced a further delay relating to decision-making once a diagnosis had been made and this adversely affected the outcome in 15 of these patient
36. 14/41 (34.1%) patients for whom a delayed decision occurred, were admitted under the incorrect specialty compared to 10/237 (4.2%) for whom a delayed decision did not occur
37. 98/219 (44.7%) patients did not have an adequate mortality and morbidity risk assessment in the view of the case reviewers
38. Care of the elderly input was sought in 61/498 (12.2%) patients in the view of the clinicians completing questionnaires. Of the patients who had no care of the elderly input, 343/437 (78.5%) were over the age of 65
39. An anaesthetic opinion was obtained for 238/638 (37.3%) patients
40. 21/204 (10.3%) patients who did not have a critical care opinion should have; 4/21 (19.0%) of these patients died and 18/21 (85.7%) patients had an operation
41. Where a critical care opinion was obtained, the most common reasons for doing this were pre-operative management/optimisation and decision not to escalate/palliate
42. Critical care input influenced care in 36/61 (59.0%) patients. Of those patients who had surgery 99/390 (25.4%) required critical care post operatively
43. 579/603 (96.0%) patients had their treatment plan discussed with them and in 394/497 (79.3%) it was discussed with the their family
44. If the patient had a Rockwood frailty score of 5 or more, their treatment plan was discussed with them 169/186 (90.9%) cases reviewed and with their family in 168/190 (88.4%)
45. 101/279 (36.2%) patients had their resuscitation status documented

7

Ongoing inpatient treatment

The care of small and large bowel obstruction differs due to the underlying pathology. Large bowel obstruction is more commonly due to malignancy whilst small bowel obstruction is often due to adhesions from previous surgery. In this study 225/293 (76.8%) of the case notes peer reviewed were for patients with small bowel obstruction and 74/293 (25.3%) for large bowel obstruction. Similarly, of the clinician questionnaires returned 510/668 (76.3%) were for patients with small bowel obstruction and 192/668 (28.7%) for large bowel obstruction. The most common causes of large bowel obstruction were cancer (69 patients) and volvulus (63 patients). Benign strictures and other causes made up the remainder.

Stenting

In the view of the case reviewers, stenting of large bowel obstruction due to cancer was considered in 18 patients and was not considered but should have been in a further four. In eight patients a colonic stent was inserted with one perforation recorded. Stenting was not considered in 47 patients, which was appropriate in the opinion of the case reviewers.

Surgery

Pre-operative assessment and multidisciplinary team review

Pre-operative assessment for surgery is an increasingly important aspect of preparation for emergency laparotomy and was covered in Chapter 6, some aspects are covered here with a specific emphasis on surgical intervention. For many complex, elderly, frail patients undergoing surgery for bowel obstruction the issue of mental capacity to consent can arise. In this study 10/176 (5.7%) patients did not have adequate mental capacity to consent in the view of the case reviewers (Table 7.1).

Table 7.1 The patient had adequate mental capacity to consent to treatment

	Number of patients	%
Yes	166	94.3
No	10	5.7
Subtotal	**176**	
Unknown	5	
Total	**181**	

Case reviewer data

Multidisciplinary input including review by the critical care outreach team may improve the outcome of patients and ensure a combined assessment for surgery. In this study a critical care outreach nurse reviewed 11/159 (6.9%) patients prior to surgery. Case reviewers noted that all patients who had inadequate resuscitation pre-operatively had not been seen by the critical care outreach team (Table 7.2)

Table 7.2 Patients were reviewed by a critical care outreach nurse pre-operatively

	Number of patients	%
Yes	11	6.9
No	148	93.1
Subtotal	**159**	
Unknown	22	
Total	**181**	

Case reviewer data

Table 7.3 Presence of acute kidney injury at the initial assessment and review by critical care outreach nurse pre-operatively

	Acute kidney injury recorded at initial assessment				
Critical care outreach nurse reviewed the patient pre-operatively	**Yes**	**No**	**Subtotal**	Unknown	**Total**
Yes	4	7	**11**	0	**11**
No	35	106	**141**	7	**148**
Subtotal	**39**	**113**	**152**	**7**	**159**
Unknown	5	14	**19**	3	**22**
Total	**44**	**127**	**171**	10	**181**

Case reviewer data

There were 39 patients who had acute kidney injury on admission and who underwent surgery. Only four of these patients were seen by a critical care outreach nurse prior to surgery (Table 7.3).

Treatment options discussions

As part of a valid consent process, it would be expected that all alternatives to surgery are discussed with the patient. Case reviewers were of the opinion that 30/109 (27.5%) patients did not have all possible alternative treatment options discussed with them (Table 7.4).

Table 7.4 Alternative treatment options were discussed prior to surgery

	Number of patients	%
Yes	79	72.5
No	30	27.5
Subtotal	**109**	
Unknown	72	
Total	**181**	

Case reviewer data

All but one patient had a consent form completed prior to surgery with 182/376 (48.4%) completed by consultant/ staff grade, 174/376 (46.3%) by a senior trainee and 20/376 (5.3%) by a junior trainee. However, clinicians reported that the risk of death was only documented on the consent form for 199/353 (56.4%) patients undergoing emergency surgery for bowel obstruction. These discussions should be clearly documented in the case notes in addition to the consent form.

CASE STUDY 7 - poor discussion of treatment

An elderly patient with multiple comorbidities was admitted from a nursing home with faeculent vomiting and abdominal distension. An abdominal X-ray showed large bowel obstruction. The patient was resuscitated with intravenous fluids and underwent a CT scan within 24 hours which showed a sigmoid colon cancer with liver metastases. The patient underwent a laparotomy with bowel resection and end colostomy, at which peritoneal disease was noted. The patient was treated in critical care postoperatively but deteriorated with pneumonia once on the ward and died three weeks after admission when a decision was made not to escalate treatment further.

Case reviewers were of the opinion that other options for treatment were not considered or discussed with the patient. They stated that the patient underwent a major surgical intervention without considering less invasive procedures such as stenting or stoma formation which may have been more appropriate in this situation. Palliative care aimed at symptom control was also not considered or discussed with the patient. Case reviewers were also of the opinion that consent for treatment was invalid.

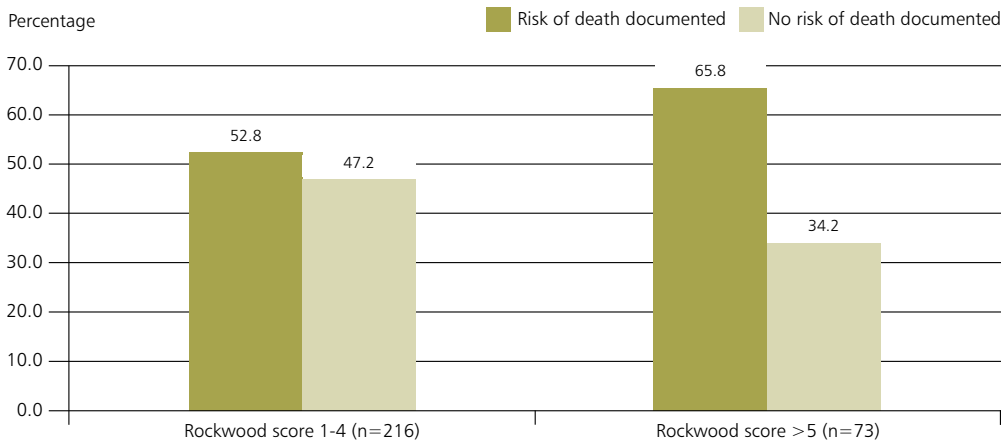

Figure 7.1 Documentation of risk of death on the consent form and Rockwood score

Clinical questionnaire data

Risk of death was more likely to be documented on the consent form in patients who had a Rockwood frailty score of 5 or more (48/73; 65.8%) (Figure 7.1). For patients with a Rockwood score of 4 or less 114/216 (52.8%) patients had risk of death documented.

CASE STUDY 8 - good discussion of treatment

A very elderly patient was admitted from a nursing home with an incomplete small bowel obstruction. The patient was noted to have an acute kidney injury on admission and a decision was made with the patient, their family, the surgeon, a nephrologist and healthcare for the elderly input to undertake a mini rather than full laparotomy for a hernia repair. The patient made an uneventful recovery and was discharged back to the nursing home.

Case reviewers were of the opinion that the multidisciplinary input along with consideration of the best treatment options for this patient provided a level of good holistic care.

Operation

Most surgeons making the decision to operate were either general or colorectal surgeons (355/381; 93.2%). All decisions to operate were made by surgeons of ST3 or above experience with 335/381 (87.9%) being consultants, 16/381 (4.2%) SAS doctors and 30/381 (7.9%) senior specialist trainees.

The grade of the surgeon performing the operation was a consultant for 264/384 (68.8%) patients and senior trainee or SAS doctor in a further 106/384 (27.6%) (Table 7.5).

Table 7.5 Grade of operating clinician

	Number of patients	%
Consultant	264	68.8
Senior specialist trainee (ST3+ or equivalent)	71	18.5
Staff grade/associate specialist	35	9.1
Trainee with CCT	12	3.1
Junior specialist trainee (ST1 and ST2 or CT equivalent)	2	<1
Subtotal	**384**	
Unknown	6	
Total	**390**	

Clinical questionnaire data

Surgeons declared a general surgery interest in 224/387 (57.9%) instances, colorectal interest in 130/387 (33.6%) and other interests in 33/387 (8.5%) (Table 7.6).

Table 7.6 Specialty of operating clinician

	Number of patients	%
General surgery	224	57.9
Colorectal surgery	130	33.6
Upper gastrointestinal surgery	22	5.7
Hepatobiliary and pancreatic surgery	10	2.6
Urology	1	<1
Subtotal	**387**	
Unknown	3	
Total	**390**	

Clinical questionnaire data

There was no consultant performing the operation for 120/384 (31.3%) patients but consultants said they were supervising a senior trainee or SAS doctor in 118/120 (98.3%) instances.

Case reviewers were of the opinion that in 159/162 (98.1%) cases reviewed, where it could be assessed, the grade and specialty of the surgeon was appropriate for the procedure. Case reviewers were also of the opinion that for 126/130 (96.9%) patients the grade of anaesthetist was appropriate.

Case reviewers also reported that there was appropriate timing of surgery in 143/172 (83.1%) patients (Table 7.7). Of the 29 patients where timing of surgery was inappropriate, case reviewers were of the opinion that the inappropriate delay affected the outcome of eight patients. When there was a delay in decision-making it was more likely to result in an inappropriate timing of surgery. Thus 15 patients who experienced delayed decision-making also had inappropriate timing of surgery, whilst only 13 of those who did not experience delayed decision-making had inappropriate timing of surgery (13/145; 9.0%).

Table 7.7 The timing of surgery was appropriate

	Number of patients	%
No	29	16.9
Yes	143	83.1
Subtotal	**172**	
Unknown	9	
Total	**181**	

Case reviewer data

Clinicians looking after patients reported that there was a specific delay between the decision to operate and surgery in 83/370 (22.4%) patients (Table 7.8).

Table 7.8 Delay between the decision to operate and the operation being undertaken

	Number of patients	%
Yes	83	22.4
No	287	77.6
Subtotal	**370**	
Unknown	20	
Total	**390**	

Clinical questionnaire data

Clinicians reported that there was a general delay in access to surgery in 72/368 (19.6%) patients (Table 7.9) and in 38/72 (52.8%) patients the delay was due to non-availability of theatre, in 34/72 (47.2%) it was due non-availability of an anaesthetist and in 15/72 (20.8%) the patient required further treatment. The impact of the delays on the patient included potentially life-threatening complications such as bowel ischaemia, sepsis, bowel perforation and peritonitis, as well as malnutrition and pain.

Table 7.9 Delay in undertaking surgery

	Number of patients	%
Yes	72	19.6
No	296	80.4
Subtotal	**368**	
Unknown	22	
Total	**390**	

Clinical questionnaire data

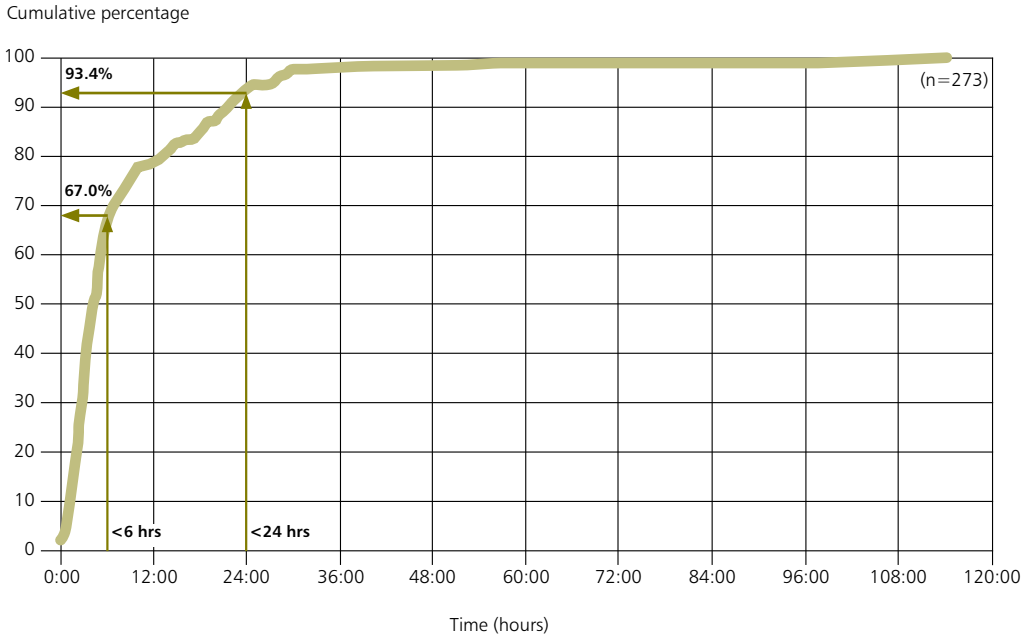

Figure 7.2 Number of hours between treatment decision and operation being performed
Clinical questionnaire data

Figure 7.2 shows that 183/273 (67.0%) patients had their operation within 6 hours of the decision to operate and a further 255/273 (93.4%) had surgery within 24 hours of the decision to operate.

Patients who require laparotomy for bowel obstruction should have timely access to emergency theatre. The NCEPOD classification of intervention is a good guide for this.[22] Whilst mortality data in a selected sample should be interpreted cautiously, in this study there were 6/31 (19.4%) patients for whom there was a delay to surgery and who died during the admission, compared with 8/116 (6.9%) patients in whom there was no delay to surgery who died.

Key Findings

46. 11/159 (6.9%) patients were reviewed by a critical care outreach nurse prior to surgery
47. 199/353 (56.4%) patients undergoing emergency surgery for bowel obstruction had their risk of death documented on the consent form
48. 30/109 (27.5%) patients did not have all possible alternative treatment options discussed with them
49. 183/273 (67.0%) patients had their operation within 6 hours of the decision to operate. Of the 29 patients where case reviewers found that the timing of surgery was inappropriate, they were of the opinion that the inappropriate delay affected the outcome of eight patients
50. 72/368 (19.6%) patients experienced a delay in access to surgery and in 38/72 (52.8%) patients the delay was due to non-availability of theatre, in 34/72 (47.2%) it was due non-availability of an anaesthetist and in 15/72 (20.8%) the patient required further treatment
51. 159/162 (98.1%) cases reviewed highlighted that the grade and specialty of the surgeon was appropriate for the procedure. Case reviewers were also of the opinion that for 126/130 (96.9%) patients the grade of anaesthetist was appropriate

8

Postoperative care and escalation

Emergency laparotomy is one of the most high-risk procedures performed and has a postoperative mortality on average of 10%, although prior to the National Emergency Laparotomy Audit (NELA) this was 15%.[6,9] It would therefore be expected that to ensure the best outcome, patients undergoing an emergency laparotomy would be treated postoperatively in critical care and certainly all patients with a mortality risk >5%.

For patients who underwent surgery, 201/383 (52.5%) went to critical care postoperatively as reported by clinicians completing questionnaires, 20/383 (5.2%) patients went to enhanced recovery and 160/383 (41.8%) returned to a surgical ward (Table 8.1).

Table 8.1 The location to which the patient was admitted postoperatively

	Number of patients	%
Surgical ward	160	41.8
Level 3 care	102	26.6
Level 2 care	99	25.8
Postoperative enhanced recovery area	20	5.2
Medical ward	2	<1
Subtotal	**383**	
Unknown	7	
Total	**390**	

Clinical questionnaire data

There were 99/383 (25.8%) patients who went to Level 2 care and 102/383 (26.6%) patients who went to Level 3 care in the postoperative period. Only seven non-surgical patients were admitted to critical care during their admission. Clinicians were of the opinion that there were nine patients (all surgical) who were not admitted to critical care who should have been. The outcome of the critical care admission is shown in Table 8.2.

Table 8.2 The patient outcome of the admission and whether the patient went to critical care

	Outcome of admission				
Patient went to critical care	**Died**	**Discharged alive**	**Subtotal**	**Unknown**	**Total**
Yes	10	83	**93**	1	**94**
No	17	171	**188**	4	**192**
Subtotal	**27**	**254**	**281**	**5**	**286**
Unknown	0	1	**1**	7	**8**
Total	**27**	**255**	**282**	**12**	**294**

Case reviewer data

Table 8.3 There was a delay in escalation

	Number of patients	%
Yes	13	5.6
No	220	94.4
Subtotal	**233**	
Unknown	10	
NA - no escalation necessary	51	
Total	**294**	

Case reviewer data

Case reviewers identified 13/233 (5.6%) patients had a delay in escalation to critical care and they also stated that the delay affected the outcome for five patients (Table 8.3).

C A S E S T U D Y 9 - under use of postoperative critical care

A middle-aged patient was admitted with vomiting, abdominal pain and distension. A history of multiple previous laparotomies for gynaecological problems with complications was noted. She had a past history of Type 1 diabetes, high blood pressure, obesity, angina and chronic obstructive pulmonary disease. A CT showed closed-loop small bowel obstruction with ischaemia and the patient was transferred to theatre in a timely manner for division of adhesions and small bowel resection. Postoperatively the patient was transferred to a surgical ward. On day three postoperatively she developed respiratory problems and was transferred to critical care where she developed sepsis, deteriorated and died.

Case reviewers were of the opinion that inadequate risk assessment led to the inappropriate placement of the patient on the ward postoperatively as there was a failure to recognise that the patient was high-risk. They stated that postoperative critical care may have avoided complications and a poor outcome.

C A S E S T U D Y 10 - good use of postoperative critical care

An elderly patient with a history of bowel cancer and multiple previous operations was admitted with abdominal pain. The patient was frail with a Rockwood score of 6. The patient was seen promptly by a consultant surgeon and a CT undertaken. A tumour was identified and the patient underwent a laparotomy. Due to the patient's frailty and previous medical history, a postoperative critical care admission was agreed pre-operatively.

Case reviewers were of the opinion that the planned critical care stay was an example of good, well thought through care that led to an uneventful hospital stay for the patient.

Nutrition

Patients admitted with bowel obstruction are often starved for a prolonged period of time, either because of pre-existing symptoms of gut dysfunction, as well as peri-operative assessment and investigation preventing the establishment of adequate nutritional support. Prolonged starvation therefore increases the risk of malnutrition and can impact on the outcome and associated length of stay following surgery, especially for high-risk patients. It is therefore essential that patients at risk of nutritional problems are identified and supplemental feeding such as parenteral nutrition (PN) is considered.

Figure 8.1 shows the cumulative starvation times for all patients prior to admission to hospital where data were available, and during the hospital admission for patients cared for conservatively/medically and for patients undergoing surgery (including both pre- and postoperative starvation).

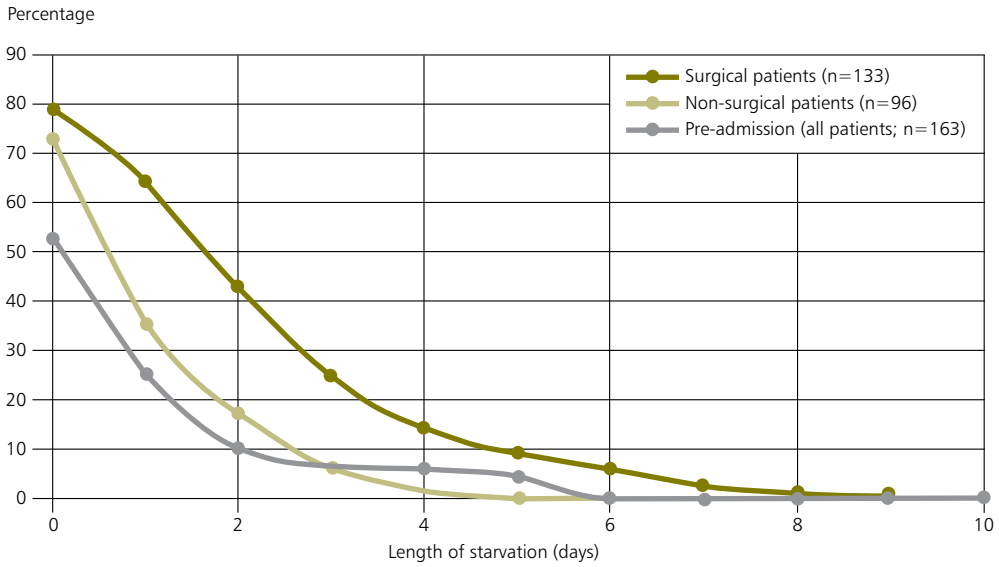

Figure 8.1 The number of days of starvation
Clinical questionnaire data

This shows that some patients were starved for at least one day: 41/163 (25.2%) patients prior to admission, 34/96 (35.4%) of conservatively/medically cared for patients and 85/133 (63.9%) patients undergoing surgery. Patients who underwent surgery had a prolonged length of starvation.

Clinicians reported that appropriate, ongoing nutritional assessment did not occur in 35/181 (19.3%) patients where it was applicable (Table 8.4). This is an improvement on the finding in the NCEPOD report, "A Mixed Bag", an enquiry into the care of patients in hospital receiving parenteral nutrition, which found that over half of the study population had inadequate nutritional assessment prior to the commencement of parenteral nutrition.[23]

Table 8.4 Appropriate ongoing nutritional assessment

	Number of patients	%
Yes	146	80.7
No	35	19.3
Subtotal	**181**	
NA - not required	54	
Unknown	59	
Total	**294**	

Case reviewer data

As a minimum it would be expected that patients in hospital would have a MUST score completed within 24 hours of admission, and the MUST score repeated on a weekly basis during their hospital stay.[13] Only 105/191 (55.0%) patients in the study were reported to have had a MUST score performed on a weekly basis if they were in hospital for more than a week (Table 8.5).

Clinicians completing questionnaires identified that in 108/356 (30.3%) patients who underwent surgery there were barriers to reinstating nutrition postoperatively (Table 8.6). Reasons for this included postoperative ileus in 54 patients, frailty in five and issues with nasogastric tube output in seven. There were eight patients who died whilst trying to re-establish nutrition postoperatively.

Table 8.5 A weekly MUST score was documented

	Number of patients	%
Yes	105	55.0
No	86	45.0
Subtotal	**191**	
NA – admission was less than1 week	70	
Unknown	33	
Total	**294**	

Case reviewer data

Table 8.6 Barriers to reinstating nutrition were present

	Number of patients	%
Yes	108	30.3
No	248	69.7
Subtotal	**356**	
Unknown	34	
Total	**390**	

Clinical questionnaire data

Table 8.7 shows the different forms of supplemental nutrition used in the postoperative period. There were 268 surgical patients who did not undergo supplementary feeding methods. Peripheral PN should be avoided where possible and the prompt input of a dietitian or nutrition support team is recommended to advise on the most suitable form of nutrition support.

Table 8.7 Supplementary feeding methods employed

	Number of patients	%
Total parenteral nutrition (TPN) via peripheral cannula	42	34.4
Nasogastric tube	41	33.6
Total parenteral nutrition via central line	33	27.1
Peripheral parenteral nutrition (PPN) via cannula	7	5.7

Answers may be multiple; n=122 Clinical questionnaire data

Multidisciplinary team input

Acute pain team

Patients undergoing surgery were seen postoperatively by the acute pain team in 227/350 (64.9%) cases reviewed, although it would not be expected that the acute pain team would see all postoperative patients. If adequate protocols are in place for the management of postoperative pain then it would be expected that there would be good pain management postoperatively. Postoperative pain management was deemed adequate in 343/354 (96.9%) surgical patients and pain management throughout the admission was adequate in 196/205 (95.6%) medical patients, in the view of the clinicians who completed the questionnaires.

Care of the elderly

Clinicians completing questionnaires were of the opinion that 61/307 (19.9%) patients who were not reviewed by care of the elderly should have been. Of those not reviewed by care of the elderly, there were 269/341 (78.9%) who were over 65 years old.

Complications

There were 62/276 (22.5%) patients who developed medical complications and 26/278 (9.4%) patients who developed surgical complications. Case reviewers reported that 13/189 (6.9%) patients had complications that were avoidable.

Key Findings

52. 13/233 (5.6%) patients had a delay in escalation to critical care
53. 201/383 (52.5%) patients who had surgery went to critical care post operatively. Nine patients who did not have critical care postoperatively should have
54. 343/354 (96.9%) surgical patients received adequate postoperative pain management
55. 105/191 (55.0%) patients in the study were reported to have had a MUST score performed on a weekly basis if they were in hospital for more than a week
56. 35/181 (19.3%) patients did not have an appropriate ongoing nutritional assessment
57. Some patients in the study were starved for at least one day: 41/163 (25.2%) patients prior to admission, 34/96 (35.4%) of conservatively/medically cared for patients and 85/133 (63.9%) patients undergoing surgery

9

Co-ordination of care

The impact of delays at various stages of the pathway has been described in preceding chapters. Delays in diagnosis and treatment can have potentially life-threatening consequences. The cumulative effect of the delays may be as a result of a single delay or multiple pathway delays. This chapter aims to review the issues of delay in more detail.

Clinicians completing the questionnaires reported delays in care that were outside their control in 71/647 (11.0%) patients that they cared for. The reasons for the delays are shown in Table 9.1.

Table 9.1 The reasons for delays in the pathway of care

	Number of patients
Delay in access to theatre	18
Admitted under medicine	11
Review by inexperienced medical staff	10
Multiple handovers of care	9
Delay in diagnosis	8
Delay in imaging	8
Infrequent consultant review	7
Delay in consultant/ specialist review	7
Lack of clinical review	4
Delay in discharge planning	3
Delay in decision-making	2
Too many clinical reviews	1
Arranging stenting	1
Other	2

Answers may be multiple; n =71 Clinical questionnaire data

As described in Chapter 7, access to an emergency theatre was the most commonly reported delay. Another important delay clinicians identified was review by inexperienced medical staff.

Throughout the pathway, the case reviewers identified that the delivery of care was delayed at many different stages. Figure 9.1, overleaf, shows that some of the same patients were affected by multiple delays in their pathway of care, as delay at one stage has a "knock-on" effect on subsequent care. Thus, of the 57 patients who had a delay in their radiological imaging, 36 also had a previous delay in their care, whereas for 21 patients it was the first time their care had been delayed.

Focusing on where delays affected multiple different patients, it can be seen that a delay in recognising bowel obstruction at initial assessment occurred in 44 patients whilst delay in surgical assessment occurred in an additional 19 patients. There were 21 patients (who had no previous delays) who were delayed in imaging and consultant review respectively. There were, therefore, a total of 126 individual patients who experienced a delay in the delivery of care at some part of the pathway. Of these patients, 34 patients had their outcome affected by delays across the pathway in the view of the case reviewers.

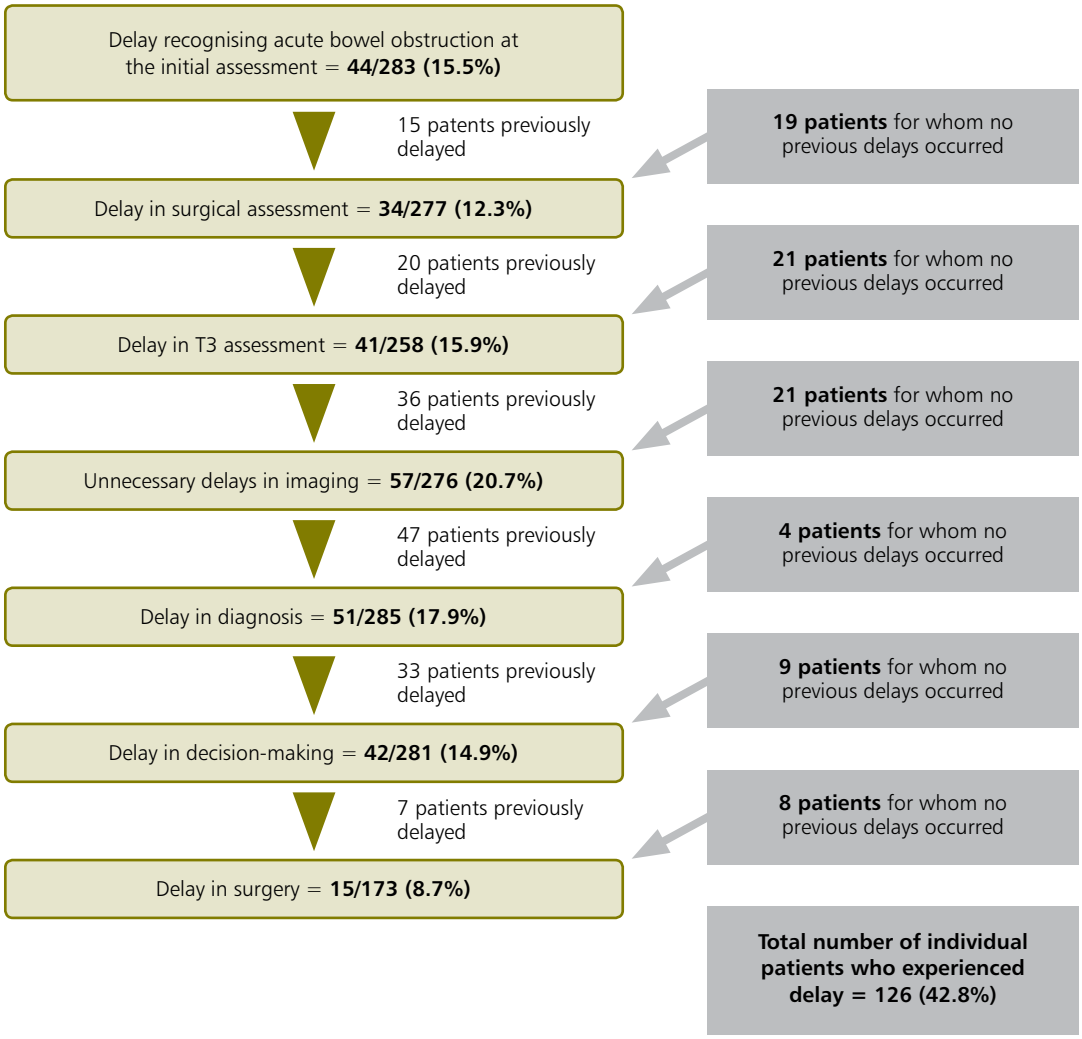

Figure 9.1 Delays in the pathway of care of patients with acute bowel obstruction showing where the same patients were affected by delays at different stages and where different patients were affected

(Case reviewer data)

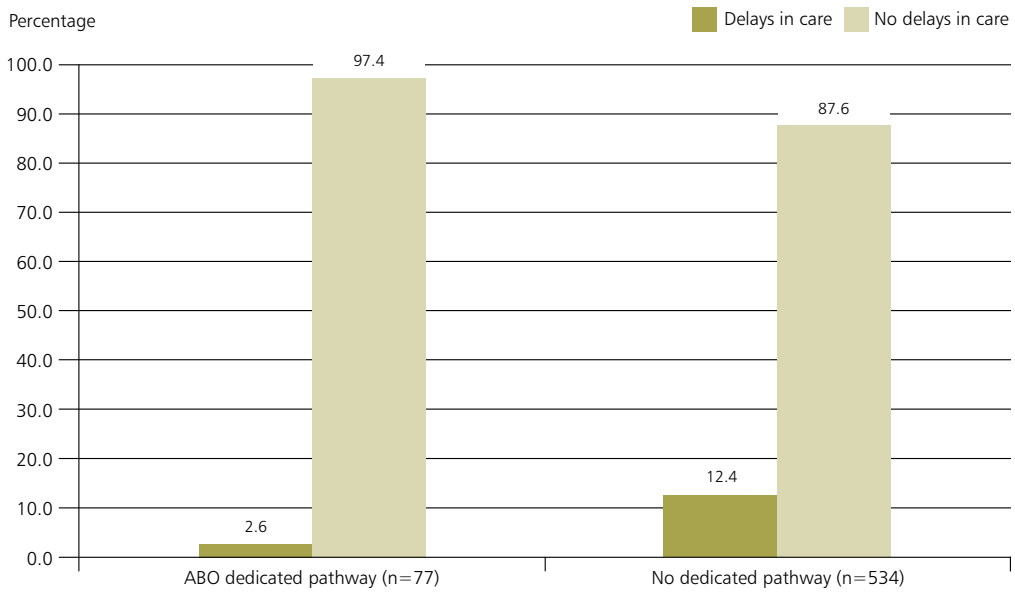

Figure 9.2 Effect of a dedicated acute bowel obstruction pathway on delays

Clinical questionnaire data

Patients who were cared for on a pre-defined acute bowel obstruction pathway were less likely to experience delays; 2/77 (2.6%) patients on a pathway experienced a delay compared with 66/534 (12.4%) patients who were not on a pathway (Figure 9.2).

There were 281/372 (75.5%) patients who were transferred between consultants during their admission (Table 9.2). The average length of stay and rota patterns for consultants make this a likely occurrence and data from Chapter 11 supports this.

Table 9.2 Consultant to consultant transfers carried out throughout the admission

	Number of patients	%
Yes	281	75.5
No	91	24.5
Subtotal	**372**	
Not applicable	264	
Unknown	54	
Total	**690**	

Clinical questionnaire data

Case reviewers were of the opinion that there were no gaps in continuity of care in 259/282 (91.8%) patients but there were in 23/282 (8.2%).

Key Findings

58. 126/294 (42.9%) patients experienced a delay in some part of their care in the view of the case reviewers
59. 2/77 (2.6 %) patients on a pathway experiencing a delay compared with 66/534 (12.4%) patients who were not on a pathway

Discharge, follow-up and end of life care

The majority of the patients in the study were discharged alive (562/681; 82.5%) to their own home (493/554; 89.0%). The destination of discharge is shown in Table 10.1. Following discharge 20/562 (3.6%) patients died within 30 days and a further 119/681 (17.5%) patients in the sample died during their hospital admission (36/390 (9.2%) patients died following surgery and 83/294 (28.2%) patients were treated conservatively). For nine patients the outcome was unknown. All but two patient deaths were expected. As the case selection process was designed to capture a greater proportion of patients who died, the disproportionally high mortality rate reflects the study design rather than the overall mortality from acute bowel obstruction, and the data must not be extrapolated.

Table 10.1 Destination to which the patient was discharged to

	Number of patients	%
Home	493	89.0
Nursing home	30	5.4
Other hospital	12	2.2
Other	11	2.0
Hospice	8	1.4
Subtotal	**554**	
Unknown	8	
Total	**562**	

Clinical questionnaire data

Figure 10.1 shows a summary of the study population's functional status on admission versus functional status at discharge/death.

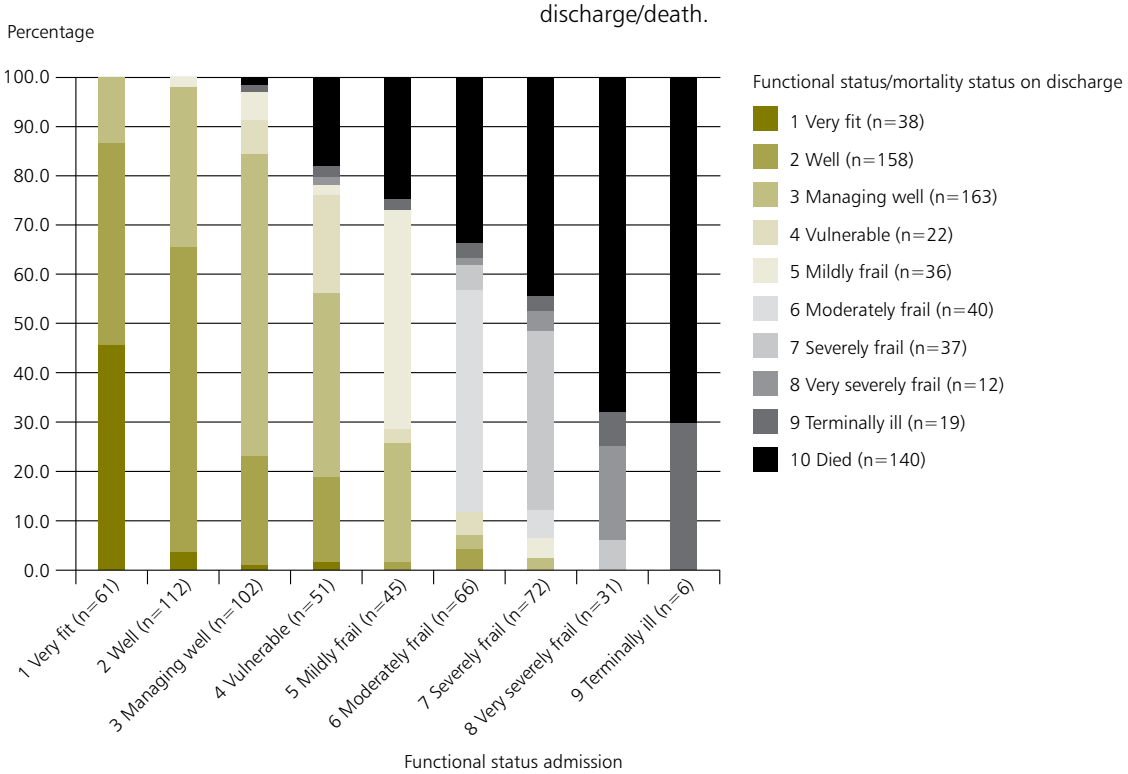

Figure 10.1 Functional status on admission and discharge/death

Clinical questionnaire data

Of the patients in the study who were noted to be frail on admission (Rockwood score 5-9), 84/223 (37.7%) died during the admission compared with 10/333 (3.0%) patients who had a Rockwood score of 1-4. Of the 137 patients who were frail on admission and who survived to discharge, 95/137 (69.3%) patients were discharged home, 22/137 (16.1%) were discharged to a nursing home and 15/137 (10.9%) patients were discharged to a hospice or other hospital.

There were 81/534 (15.2%) patients who were readmitted to hospital within 30 days of discharge, of whom 54 patients were readmitted with problems related to the original admission.

Discharge planning

In the view of the clinicians completing questionnaires, on discharge there was no nutritional advice given to 147/409 (35.9%) patients (unknown in 153), and 80/304 (26.3%) patients who had commenced on new medication did not receive advice regarding this (unknown in 98, not applicable in 60). Case reviewers were of the opinion that the discharge plan was inadequate for 28/230 (12.2%) patients (Table 10.2).

Table 10.2 Adequate discharge plan

	Number of patients	%
Yes	202	87.8
No	28	12.2
Subtotal	**230**	
Unknown	25	
Total	**255**	

Case reviewer data

Of the 255 patients discharged alive (the sample case reviewed), case reviewers reported that only 88/233 (37.8%) patients had a nutritional assessment on discharge. A nutritional assessment was more likely to be performed at discharge if a MUST score had been performed throughout the admission; 61/69 (88.4%) patients who had a MUST score performed had a nutritional assessment compared with 33/94 (35.1%) patients who did not have a MUST score performed (Table 10.3).

Table 10.3 Nutritional assessment on discharge and MUST scoring

	Nutritional assessment on discharge				
Weekly MUST score throughout the admission	**Yes**	**No**	**Subtotal**	**Unknown**	**Total**
Yes	61	33	**94**	3	**97**
No	8	61	**69**	5	**74**
Subtotal	**69**	**94**	**163**	**8**	**171**
NA – admission <1 week	12	43	**55**	5	**60**
Unknown	7	8	**15**	9	**24**
Total	**88**	**145**	**233**	**22**	**255**

Case reviewer data

End of life care

There were 100 patients on an end of life care pathway (Table 10.4) of whom 84/100 (84.0%) patients had their treatment decisions discussed with their family. Advance care planning was in place for 91/486 (18.7%) patients, not for 395/486 (81.3%) and unknown for a further 204 patients.

Table 10.4 An end of life care pathway was used

	Number of patients	%
Yes - appropriately	100	15.6
No - appropriately	521	81.5
No - inappropriately	18	2.8
Subtotal	**639**	
Unknown	51	
Total	**690**	

Clinical questionnaire data

Key Findings

60. 119/681 (17.5%) patients in the sample died during their hospital admission whilst 20/562 (3.6%) patients died following discharge
61. 84/223 (37.7%) patients noted to be frail (Rockwood score 5-9) on admission, died during the admission compared to 10/333 (3.0%) who had a Rockwood score of 1-4 when they were admitted to hospital
62. 88/233 (37.8%) patients had a nutritional assessment on discharge
63. 147/409 (35.9%) patients received no nutritional advice on discharge and no advice was given to 80/304 (26.3%) patients who had commenced on new medication

11

Organisation of services

Organisational questionnaires were received for 176/242 (72.7%) hospitals to which patients with an acute bowel obstruction may have attended (Table 11.1). There was an emergency department in 160/176 (90.9%) hospitals.

Table 11.1 Type of hospital from which organisational data were received

	Number of hospitals	%
District General Hospital >500	68	38.6
District General Hospital <500	45	25.6
University Teaching Hospital	54	30.7
Single Specialty Hospital	3	1.7
Independent Hospital	1	<1
Other	5	2.8
Total	**176**	

Pathway for acute bowel obstruction

Pathways for the care of patients with large and small bowel obstruction have been developed for use in many hospitals, or have been incorporated into acute abdominal pain pathways.[7-9,24] Where pathways exist they often guide the timing of CT scanning and surgery, and have been discussed and approved by the relevant departments involved in the pathway. All of which may make it easier to ensure that pathways are followed without organisational delays.

In this study there were only 28/169 (16.6%) hospitals in which a specific pathway for acute bowel obstruction was used. There were 63/169 (37.3%) hospitals where a more generic pathway was used, which could be used for guidance on the care of this group of patients, so overall there was some guidance for the care of patients with acute bowel obstruction in 91/169 (53.8%) hospitals.

The pathways varied in terms of whether advice on the timing of radiology investigations and assessments of frailty and nutrition were included (Table 11.2). In particular, CT scan timing was only part of a pathway in 33/91 (36.3%) hospitals that had a pathway. Pathways only included specific guidance for small bowel obstruction in 29/91 (31.9%) and large bowel obstruction in 26/91 (28.6%) hospitals with a pathway. This was important because there are specific treatment options which may be omitted or not considered in patients if these pathways have not been considered in advance at an organisational level.

Table 11.2 Guidance included in a pathway for acute bowel obstruction

	Dedicated acute bowel obstruction pathway (n=28)	Non-specific pathway (n=63)	Total (n=91)	%
Specific for small bowel obstruction	20	9	**29**	31.9
Specific for large bowel obstruction	16	10	**26**	28.6
Initial treatment and resuscitation	21	14	**35**	38.5
Timeframe for CT	12	21	**33**	36.3
Frailty assessment (patients admitted as an emergency)	7	28	**35**	38.5
Dementia assessment on all elderly patients	11	NA	**NA**	NA
Review of elderly patients by care of the elderly	3	9	**12**	13.2
Nutritional assessment	9	15	**24**	26.4

Pain assessment

A guideline for pain scoring should be available in all emergency departments,[25] but in this study no guideline was identified in 15/148 (10.1%) hospitals. It was reported from 151/162 (93.2%) hospitals that there was a guideline for pain scoring on admission, however no guideline was identified in 11/162 (6.8%) hospitals. More generic guidance on the assessment and treatment of pain was available in most hospitals both in the emergency department and on admission to the wards (Table 11.3)

Resuscitation

Resuscitation is an important preventive measure to stabilise the patient with an acute bowel obstruction whilst diagnosis is established and treatment is commenced. Fluid loss into the intestine can be significant, with the development of hypovolaemia and acute kidney injury. This can also lead to poor perfusion of the intestine, with an increased risk of ischaemia and perforation.

Guidance for the initial resuscitation of patients was reported to be available in 21 of the hospitals with a dedicated acute bowel obstruction pathway, and in 14 hospitals with non-specific pathways. Some pathways gave specific advice on the recommended initial resuscitation of patients and the subsequent observations, in particular urine output which is relevant considering the high risk of acute kidney injury in this patient group. Many basic measures were omitted from these pathways including oxygen administration and intravenous (IV) fluid administration (Table 11.4).

Table 11.3 A guideline for pain scoring

	Emergency department		On admission	
	Number of hospitals	**%**	**Number of hospitals**	**%**
Yes	133	89.9	151	93.2
No	15	10.1	11	6.8
Subtotal	**148**		**162**	
Unknown	28		14	
Total	**176**		**176**	

Table 11.4 Details of resuscitation guidance included in dedicated acute bowel obstruction pathway and non-specific pathway

	Dedicated acute bowel obstruction pathway (n=21)	Non-specific pathway (n=14)	Total (n=35)
Oxygen administration	5	13	**18**
Urine output measurement	9	13	**22**
IV fluid administration	10	14	**24**
Antibiotic administration	3	13	**16**
Nasogastric tube administration	9	11	**20**
Frequency of observation	5	11	**16**
Escalation criteria	5	13	**18**
Transfer criteria to higher level of care	4	11	**15**

Table 11.5 Details of guidance provided by dedicated acute bowel obstruction pathway and non-specific pathway

	Dedicated acute bowel obstruction pathway (n=28)	Non-specific pathway (n=63)	Total (n=91)	%
Timing of first senior review	12	44	**56**	61.5
Time limit for treatment decision	9	13	**22**	24.2
Guidance on which patients are suitable for surgery	15	16	**31**	34.1
Guidance on who (grade of clinician) can refer for surgical opinion	24	11	**35**	38.5
Timing of surgery	13	20	**33**	36.3

Some pathways included specific guidance on the timing of senior review, and interventions which should give the treating teams parameters to work within (Table 11.5). In particular, pathways only included guidelines on time limit to treatment decision in 22/91 (24.2%) hospitals and timing of surgery in 33/91 (36.3%) hospitals. Delays in timing of surgery were considered important by clinicians looking after these patients as patients who wait have an increased risk of ischaemia, perforation and increased complications (See Chapter 7).

Organisation of imaging

Access to scanners

As the optimal management of acute bowel obstruction needs CT scanning for diagnostic and prognostic purposes it would be expected that all hospitals in which patients with acute bowel obstruction are cared for would have access to a CT scanner.[7-9]

It was reported that in 168/176 (95.5%) hospitals there was access to CT scanning (Table 11.6), and 126/156 (80.8%) hospitals, had more than one scanner (Table 11.7).

As CT scanning is recommended as a first line investigation in acute bowel obstruction[7-9], and most patients in this study presented via emergency department, there is an expectation that more CT scanners will be needed in emergency departments and this was reported to be the case in 31/168 (18.5%) hospitals.

Table 11.6 Available on-site imaging

	Number of hospitals	%
Abdominal X-ray	171	97.2
CT scanner	168	95.5
Abdominal ultrasound	82	46.6
MRI scanner	52	29.5
Gastrografin follow-through (WSCS)	69	39.2
Other	10	5.7
Unknown	2	1.1

Answers maybe multiple; n=176

Table 11.7 Number of CT scanners on-site

	Number of hospitals	%
1	30	17.9
2	86	51.2
3	24	14.3
4	10	6.0
5	3	1.8
6	3	1.8
Subtotal	**156**	
Unknown	12	
Total	**168**	

Requesting imaging

Current guidelines recommend CT scanning as the diagnostic investigation of choice for acute bowel obstruction, so scanning needs to be accessible to all clinicians attempting to make this diagnosis. In 87/168 (51.8%) hospitals there was a restriction as to who could request a CT scan. The detail is shown in Table 11.8.

Where hospitals had a pathway for the management of acute bowel obstruction this often stipulated a timeframe for CT scanning (Table 11.9).

Table 11.8 The grade of clinician who could request a CT scan

Grade specified who can request a CT scan	Number of hosptials	%
Consultant or senior trainee only	37	42.5
Consultant, senior or junior trainee only	12	13.8
Specialist nurse, senior trainee or consultant only	6	6.9
Specialist Nurse, junior trainee or more senior doctor only	6	6.9
Specialist nurse, foundation year or more senior doctor	17	19.5
Specialist nurse, foundation year or more senior doctor or other healthcare professional	9	10.3
Total	**87**	

Table 11.9 Detail of timing of CT scan specified in dedicated acute bowel obstruction pathway and non-specific pathway

	Dedicated acute bowel obstruction pathway (n=12)	Non-specific pathway (n=21)	Total (n=33)
Immediately	1	3	**4**
<4 hours	4	11	**15**
<12 hours	1	3	**4**
<24 hours	5	2	**7**
Other	1	2	**3**

Method of performing radiology

There were 70/176 (39.8%) hospitals in which there were protocols for the method of performing a CT scan, and in most the use of intravenous contrast was dependant on estimated renal function (Table 11.10).

Table 11.10 CT contrast used as standard

	Number of hospitals	%
Use of EGFR cut-off to avoid use of IV contrast	61	87.1
Detail of IV administration	58	82.9
Detail of decision-maker - radiologist	44	62.9
Detail of oral administration	30	42.9
Detail of decision-maker - surgeon	10	14.3
Other	4	5.7

Answers may be multiple; n=70

Reporting of radiology

Traditionally all imaging was reported within hospital departments but there has been a gradual move to outsourcing reporting to virtual radiologists. In this study it was reported that the majority of scans performed in working hours were reported by consultants. However, CT reporting was outsourced, 'in hours' in 29/168 (17.3%) of hospitals and 'out of hours' in 93/168 (55.4%) hospitals (Figure 11.1).

Guidelines for the timeliness of reporting on radiology was available in 97/140 (69.3%) hospitals, but the parameters for the timeliness of a report varied considerably as shown in Figure 11.2. There was a maximum time reporting of CT of less than 1 hour in 43/74 (58.1%) hospitals ('in hours') and 48/94 (51.1%) hospitals 'out of hours'.

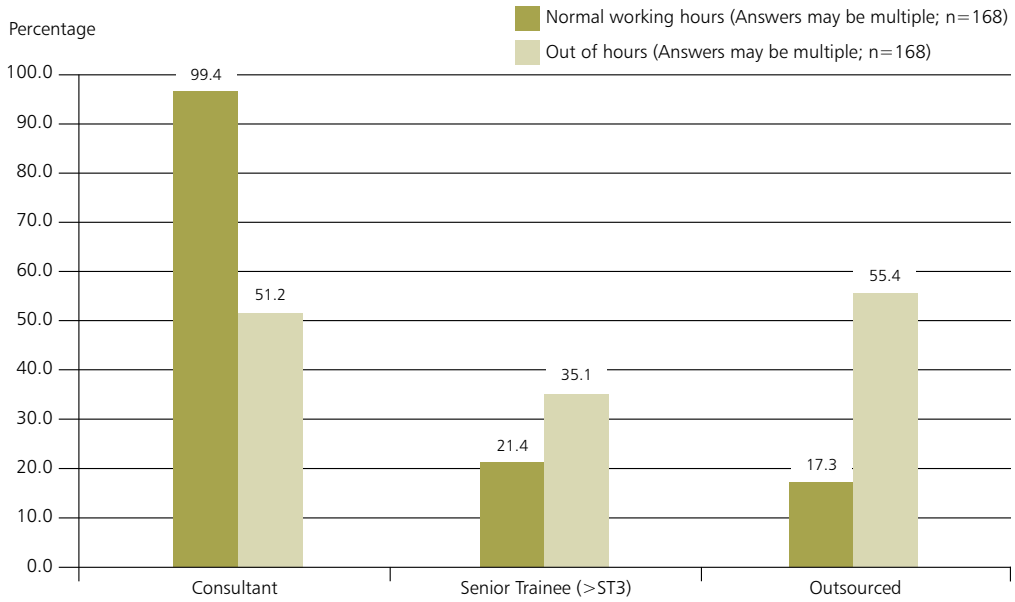

Figure 11.1 Grade of clinician who reported on the radiology 'in hours'/ 'out of hours'

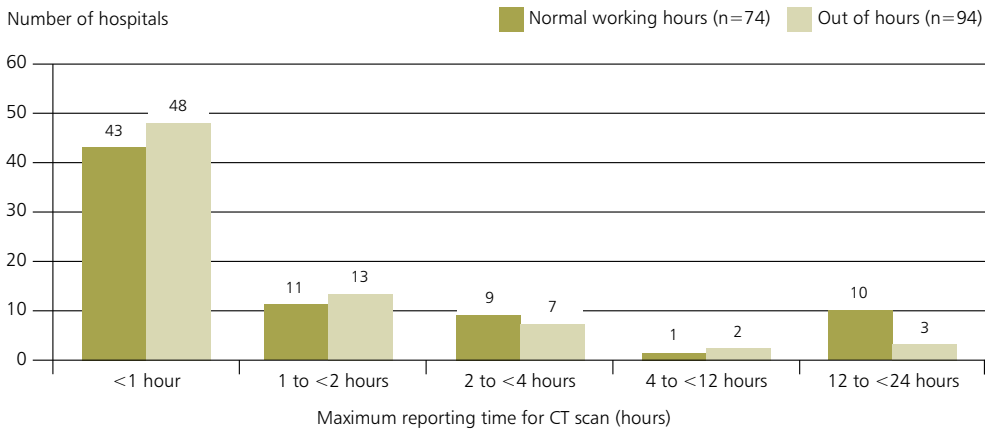

Figure 11.2 Maximum time for CT scan reporting 'in hours'/ 'out of hours'

It is questionable whether reporting times of over 4 hours are optimal in the management of acutely unwell surgical patients. In 97/137 (70.8%) hospitals there was no routine audit of reporting times for CT in patients with acute bowel obstruction.

Radiological investigations are only useful if the results are communicated to the treating team. There was a wide range of methods used by the radiology departments to achieve this as shown in Table 11.11.

Table 11.11 Mode by which CT reports were communicated

	Number of hospitals	%
Electronic reporting	142	84.5
Telephone to required clinician	101	60.1
Telephone to responsible consultant/on-call	66	39.3
Telephone to ward	24	14.3
Unknown	5	3.0
Other	14	8.3

Answers may be multiple; n=168

There were 26 hospitals with no electronic reporting. For hospitals without electronic reporting there needs to be a very clear pathway of how the results are communicated with the treating team if optimal patient care is to be given. This is particularly important in the out of hours scenario when outsourcing is more common and reporting radiologists are not on-site.

Screening for bowel cancer

Patients presenting with advanced bowel cancer causing acute large bowel obstruction have often experienced missed opportunities for diagnosis including bowel cancer screening. If bowel cancer screening uptake is poor, or if the service is poorly developed, this may result in missed diagnosis and a higher rate of patients presenting with large bowel obstruction.

There were 131/176 (74.4%) hospitals in the study from which it was reported that a bowel cancer screening programme was in place, with 109/131 (83.2%) of these screening programmes running for more than 5 years. Testing for faecal occult blood was the methodology used in 110/131 (84.0%) of screening programmes. The self-reported percentage of the population suitable for screening, and who participated in the programme, varied dramatically between hospitals (Table 11.12). This study was not set up to identify whether patients presenting with bowel cancer as an emergency had access to screening or whether they had been screened, but data from the national bowel screening programme show that on average 59% of people living in Northern Ireland and England who are sent the bowel cancer screening test for free in the post actually complete it, but this drops to 56% in Scotland and 53% in Wales."[26]

Table 11.12 Percentage of population invited for screening

	Number of hospitals	%
<10%	4	6.7
>11-40%	3	5.0
>51-60%	1	1.7
>61-70%	3	5.0
>71-80%	1	1.7
>81-90%	1	1.7
>91-100%	47	78.3
Subtotal	**60**	
Unknown	71	
Total	**131**	

Staffing

The surgical rotas were staffed mainly by specialist surgeons. However, it was reported from a minority of hospitals that non-gastrointestinal surgeons were on the rotas (Table 11.13).

Table 11.13 Specialty of surgeons on the on-call rota

	Number of hospitals	%
Lower gastrointestinal colorectal surgery	151	85.7
Upper gastrointestinal surgery	139	79.0
General surgery	124	70.5
Hepatobiliary and pancreatic surgery	36	20.5
Breast surgery	24	13.69
Other	16	9.1

Answers maybe multiple; n=176

The structure of the rotas in terms of number of hours on-call per day, and the duration of the on-call commitment varied considerably (Table 11.14).

Table 11.14 Structure of the on-call rota

	Number of hospitals	%
14/day-1 week on-call	10	5.7
24/day split 2-3 days on-call	55	31.3
24 hour single day on-call	31	17.6
Different consultants cover day/night	17	9.7
Rolling day on-call	4	2.3
Surgeon of the week (with colleagues covering overnight)	39	22.2

Answers maybe multiple; n=176

In terms of non-surgical staffing, nearly all the hospitals reported access to the full range of allied healthcare services at some stage in the working week (Table 11.15).

Table 11.15 Availability of allied healthcare services

	Number of hospitals	%
Palliative care	164/171	95.9
Acute pain team	161/171	94.2
Physiotherapy	165/176	93.8
Dietetics	163/176	92.6
Care of the elderly	154/169	91.1
Occupational therapy	158/176	89.8
Social care	156/176	88.6
Critical care outreach team	151/176	85.8
Pharmacy	117/176	66.5
Other	12/176	6.8

There was a discharge planning team in 149/165 (90.3%) hospitals but in 68/149 (45.6%) hospitals this did not include nutrition or dietetic staff (Table 11.16).

Table 11.16 Discharge team

	Number of hospitals	%
Social care	116	77.9
Physiotherapy	110	73.8
Occupational therapy	109	73.2
Dietetics	76	51.0
Nutrition team	67	45.0
Other	25	16.8

Answers may be multiple; n=149

Availability of operating theatres

In previous chapters the importance of availability of operating theatres and staff to ensure timely surgery has been highlighted. Clinicians looking after patients said the most common delay was unavailability of theatre staff. The level of organisation of theatres within hospitals was also reviewed.

There were 136/170 (80.0%) hospitals in which there was a dedicated emergency theatre (CEPOD theatre). In 107/127 (84.3%) hospitals, from which data were obtained, there was only a single theatre available for emergencies. There were 112/170 (65.9%) hospitals had scheduled emergency out of hours lists as shown in Table 11.17.

Table 11.17 Hospital has scheduled out of hours emergency surgery sessions (CEPOD lists)

	Number of hospitals	%
Yes	112	65.9
No	58	34.1
Subtotal	**170**	
Unknown	6	
Total	**176**	

With inevitable pressure on the use of emergency theatre facilities, choices have to be made as to the relative urgency of patient needs. There were 120/166 (72.3%) hospitals in which a priority grading system was in place and 79/164 (48.2%) hospitals in which a co-ordinator was employed to confirm the fitness of patients for surgery, thus ensuring optimal utilisation of this limited resource. However, the prioritisation system needs to take into account the high-risk profile of acute bowel obstruction patients and the deleterious consequences of delayed surgery in this group. Guidelines on the time to surgery have already been published by NCEPOD and these timescales should be adhered to and appear in pathways for the care of patients with acute bowel obstruction.[22]

Access to laparoscopy, endoscopy and colonic stenting

With increasing specialisation of care this has changed the function of the on-call surgeon who may need the help of other specialists to aid in the management of colonic obstruction. This includes endoscopic management of sigmoid volvulus and stenting of obstructing tumours which may need endoscopic and/or interventional radiological input. There was a perception amongst the Study Advisory Group that the provision of these services is not organised as well as it could be. The access to endoscopic therapy for sigmoid volvulus was available in 162/170 (95.3%) hospitals but was only available 24 hours/day in 99/162 (61.1%) (Figure 11.3).

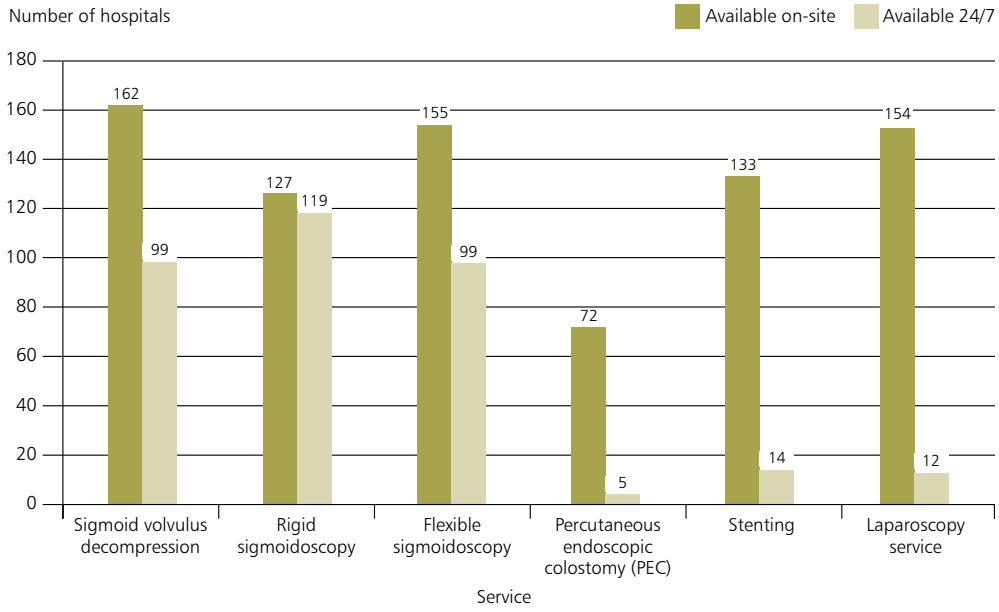

Figure 11.3 Access to volvulus decompression, rigid and flexible sigmoidoscopy, percutaneous endoscopic colostomy, stenting and laparoscopy on-site and availability (n=176)

Access to percutaneous endoscopic colostomies was much more limited, being available in only 72/163 (44.2%) hospitals and only five hospitals had a protocol for access to this procedure 24 hours/day.

For large bowel obstruction, especially in the context of malignant disease, stenting of the colon is a method of relieving the obstruction with low morbidity. Stenting was available in 133/171 (77.8%) hospitals, as shown in Figure 11.3. It was available 24/7 in 14 hospitals and most commonly available Monday-Friday during working hours (106/133; 79.7%).

Of 38/171 (22.2%) hospitals in which there was no on-site access to colonic stenting, only five were reported to be part of a clinical network to improve access to this service and only 40/136 (29.4%) hospitals that had protocols to refer patients for stenting to other units audited the outcome of those transfers.

Critical care

There were 168/174 (96.6%) hospitals from which it was reported there was a critical care unit on-site and 140/154 (90.9%) hospitals were part of a critical care network.

Audit

It was reported from 162/168 (96.4%) hospitals that an audit of deaths within 30 days of surgery, within the context of a Mortality and Morbidity (M&M) meeting, was undertaken. However, audits of delays to surgical therapy were less frequent (Table 11.18).

Table 11.18 An audit of delay to surgery for acute bowel obstruction undertaken

	Number of hospitals	%
Yes	83	56.8
No	63	43.2
Subtotal	**146**	
Unknown	30	
Total	**176**	

In terms of participation in national audits 152/163 (93.3%) hospitals reported participation in the National Emergency Laparotomy Audit (NELA), 154/163 (94.5%) in the National Bowel Cancer Audit (NBOCA), 96/139 (69.1%) in the National Audit of Small Bowel Obstruction (NASBO) and 4/7 Scottish hospitals took part in the Emergency Laparotomy and Laparoscopic Scottish Audit (ELLSA). There were 59/140 (42.1%) hospitals from which it was reported that they had gaps in their service provision but only 36/59 (61.0%) had plans in place to address them.

Key Findings

64. 131/176 (74.4%) hospitals in the study reported that a bowel cancer screening programme was present and 109/131 (83.2%) of these screening programmes had been running for more than 5 years
65. In 15/148 (10.1%) hospitals there was no guideline for pain scoring in the emergency department
66. 11/162 (6.8%) hospitals did not have a guideline for pain scoring on admission
67. 28/169 (16.6%) hospitals reported a specific pathway for acute bowel obstruction; in 63/169 (37.3%) there was not a specific acute bowel obstruction pathway but a more general acute abdomen pathway
68. Of those hospitals where there was a pathway, they only included guidelines on time limit to treatment decision in 22/91 (24.2%) hospitals and timing of surgery in 33/91 (36.3%) hospitals
69. In 31/168 (18.5%) hospitals there was a CT scanner in the emergency department
70. In 86/168 (51.2%) hospitals there were restrictions on who could request CT scans
71. There was a maximum time reporting of CT of less than 1 hour in 43/74 (58.1%) hospitals (in hours) and 48/94 (51.1%) hospitals out of hours
72. CT reporting was outsourced, in hours in 29/168 (17.3%) of hospitals and out of hours in 93/168 (55.4%)
73. 136/170 (80.0%) hospitals had at least one dedicated emergency (CEPOD) theatre
74. 120/166 (72.3%) hospitals reported that there was priority grading for emergency surgery and in 79/164 (48.2%) hospitals there was a theatre co-ordinator to facilitate this
75. 38/171 (22.2%) hospitals had no on-site access to stenting and only five reported to be part of a clinical network to improve access to this service
76. 149/165 (90.3%) hospitals reported that there was a discharge planning team but in 68/149 (45.6%) hospitals this did not include nutrition or dietetic staff.

12

Overall quality of care

Figure 12.1 shows the overall quality of care provided to patients in the study as rated by the case reviewers. There were 156/284 (54.9%) patients for whom the care was rated as good practice, 121/284 (42.6%) rated as requiring room for improvement either in clinical or organisational factors (or both) and seven cases reviewed were considered as less than satisfactory. For 10 cases reviewed, there was insufficient data to rate the overall quality of care.

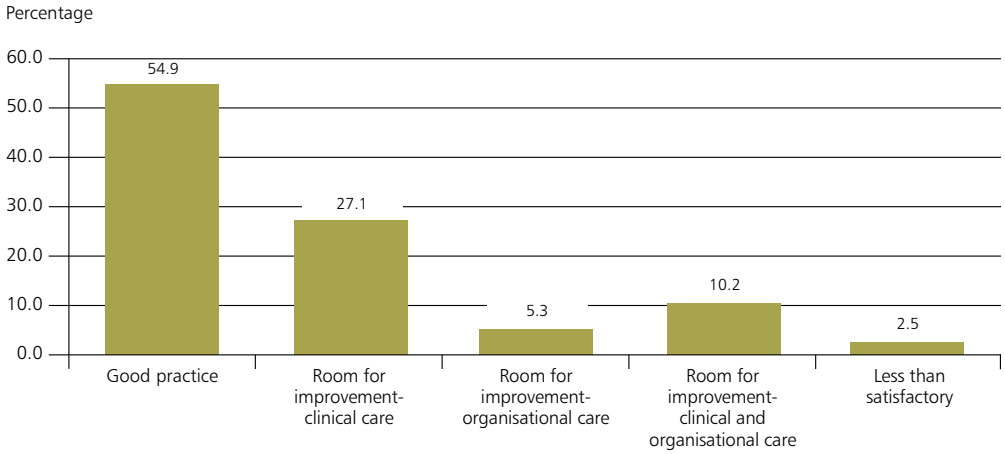

Figure 12.1 The overall quality of care provided to the patients in the study (n=284)

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Glossary

Term	Definition
Acute bowel obstruction	Bowel obstruction, also known as intestinal obstruction, is a mechanical or functional obstruction of the intestines which prevents the normal movement of the products of digestion. Either the small bowel or large bowel may be affected.
Acute kidney injury (AKI)	Acute kidney injury (AKI) is a sudden episode of kidney failure or kidney damage that happens within a few hours or a few days. AKI causes a build-up of waste products in the blood and makes it hard for the kidneys to keep the right balance of fluid in the body.
Adhesions	Adhesions are deposits of fibrous strands/scar tissue which can connect organs together. Organs in the peritoneal cavity (pelvic/abdominal space) normally slide freely against each other and adhesions can hinder this movement leading to such complications as pain and bowel obstruction.
Aspiration pneumonia	Aspiration pneumonia is a complication of pulmonary aspiration. Pulmonary aspiration is when someone inhales food, stomach acid, or saliva into their lungs.
CT with IV contrast	Intravenous (IV) contrast dye is injected to highlight blood vessels, organs, and other structures whilst the CT scan is performed. This will likely be an iodine-based dye.
Distention	A distended stomach is a term usually used to refer to distension or swelling of the abdomen and not of the stomach itself.
Faeculent vomiting	An important feature in clinically identifying the level of bowel obstruction Copious vomiting of bile stained fluid is suggestive of upper small bowel obstruction. Faeculent vomiting, which is thicker and foul-smelling, is suggestive of large bowel obstruction.
Gastrografin	Gastrografin is a contrast medium for the radiological examination of the gastrointestinal tract. It can be administered orally or as an enema.
Hypovolaemia	Hypovolemia is caused by a decrease in the blood volume resulting from loss of blood, plasma and/or plasma water.
Ischaemia	Ischaemia is a restriction in blood supply to tissues, causing a shortage of oxygen that is needed for cellular metabolism (to keep tissue alive). Ischemia is generally caused by problems with blood vessels, with resultant damage to or dysfunction of tissue.
Laparotomy	A laparotomy is a major surgical procedure that involves an incision being made in the abdominal wall. This allows the surgeon access to the contents of the abdomen in order to identify and repair any emergency problems that have occurred.
Large bowel	The large intestine, also known as the large bowel, is the last part of the gastrointestinal tract and of the digestive system in vertebrates. Water is absorbed here and the remaining waste material is stored as feces before being removed by defecation.
Level 2 care	High dependency care.
Level 3 care	Intensive care.

Term	Definition
Malnutrition Universal Screening Tool/Score (MUST)	'MUST' is a five-step screening tool to identify adults, who are malnourished, at risk of malnutrition (undernutrition), or obese. It also includes management guidelines which can be used to develop a care plan. It is for use in hospitals, community and other care settings and can be used by all care workers.
Mesentary	The mesentery is a contiguous set of tissues that attaches the intestines to the posterior abdominal wall in humans and is formed by the double fold of peritoneum. It helps in storing fat and allowing blood vessels, lymphatics, and nerves to supply the intestines, among other functions.
Resection	Bowel resection is surgery to remove part of the small intestine, large intestine or both. The large intestine includes the colon, rectum and anus. Depending on which parts of the intestine are removed, a bowel resection may also be called: a small bowel resection or small intestine resection.
ReSPECT guidelines	ReSPECT is a process that creates personalised recommendations for a person's clinical care in a future emergency in which they are unable to make or express choices. The ReSPECT process is a new approach to encourage people to have an individual plan to try to ensure that they get the right care and treatment in an anticipated future emergency in which they no longer have the capacity to make or express choices.
Risk assessment	Preoperative risk scores are designed to guide patient care by providing a means of predicting operative outcome.
Rockwood Score	The Clinical Frailty Scale (CFS), which uses clinical descriptors and pictographs, was developed to provide clinicians with an easily applicable tool to stratify older adults according to level of vulnerability
Small bowel	The small intestine (small bowel) is about 20 feet long and about an inch in diameter. Its job is to absorb most of the nutrients from what we eat and drink. Velvety tissue lines the small intestine, which is divided into the duodenum, jejunum, and ileum.
Stenting	A stent is a self-expanding, wire mesh tube that is designed to hold open the blocked area in the bowel.
Volvulus	A volvulus is when a loop of intestine twists around itself and the mesentery that supports it, resulting in a bowel obstruction. Symptoms include abdominal pain, abdominal bloating, vomiting, constipation, and bloody stool.

Appendices

Appendix 1 – Participation

Trust/Health Board	Number of participating hospitals	Number of organisational questionnaires returned	Number of selected cases	Number of clinician questionnaires returned	Number of case notes selected	Number of case notes returned
Aintree Hospitals NHS Foundation Trust	1	1	10	2	2	2
Airedale NHS Foundation Trust	1	1	8	5	4	2
Aneurin Bevan University Health Board	2	0	17	0	6	3
Ashford & St Peter's Hospitals NHS Trust	2	2	2	2	1	1
Barking, Havering & Redbridge University Hospitals NHS Trust	2	2	7	6	3	2
Barnsley Hospital NHS Foundation Trust	1	0	9	4	2	2
Barts Health NHS Trust	4	0	22	2	8	0
Basildon & Thurrock University Hospitals NHS Foundation Trust	1	1	8	8	2	2
Bedford Hospital NHS Trust	1	1	7	1	2	1
Belfast Health and Social Care Trust	2	2	9	2	5	1
Betsi Cadwaladr University Local Health Board	4	4	17	8	7	7
Blackpool Teaching Hospitals NHS Foundation Trust	1	1	7	5	2	2
Bolton Hospital NHS Foundation Trust	1	1	9	7	2	2
Bradford Teaching Hospitals NHS Foundation Trust	1	1	11	6	3	2
Brighton and Sussex University Hospitals NHS Trust	1	1	10	9	3	2
Buckinghamshire Healthcare NHS Trust	1	1	9	7	2	2
Calderdale & Huddersfield NHS Foundation Trust	2	2	9	3	3	2
Cambridge University Hospitals NHS Foundation Trust	1	1	7	4	3	2
Cardiff and Vale University Health Board	2	2	11	8	3	2
Chelsea & Westminster NHS Foundation Trust	2	2	13	10	4	4
Chesterfield Royal Hospital NHS Foundation Trust	1	1	8	8	2	2
Countess of Chester Hospital NHS Foundation Trust	1	1	5	5	2	2
County Durham and Darlington NHS Foundation Trust	2	2	14	12	4	5
Croydon Health Services NHS Trust	1	1	8	5	2	2
Cwm Taf University Health Board	3	2	9	8	4	4
Dartford & Gravesham NHS Trust	1	0	5	0	2	2
Doncaster and Bassetlaw Hospitals NHS Foundation Trust	2	2	13	5	3	2
Dorset County Hospital NHS Foundation Trust	1	1	4	2	3	1
East & North Hertfordshire NHS Trust	1	1	8	7	3	2
East Cheshire NHS Trust	2	0	9	0	3	2
East Kent Hospitals University NHS Foundation Trust	2	0	18	6	4	4
East Lancashire Hospitals NHS Trust	1	1	8	4	2	2

Trust/Health Board	Number of participating hospitals	Number of organisational questionnaires returned	Number of selected cases	Number of clinician questionnaires returned	Number of case notes selected	Number of case notes returned
East Suffolk and North Essex NHS Foundation Trust (ESNEFT)	2	1	18	12	5	4
East Sussex Healthcare NHS Trust	2	2	13	12	4	4
Epsom and St Helier University Hospitals NHS Trust	1	1	9	4	4	0
Frimley Health NHS Foundation Trust	2	2	17	15	4	4
Gateshead Health NHS Foundation Trust	1	0	1	0	1	0
George Eliot Hospital NHS Trust	1	1	4	3	1	1
Gloucestershire Hospitals NHS Foundation Trust	2	0	17	10	4	0
Great Western Hospitals NHS Foundation Trust	1	1	7	5	2	2
Guy's & St Thomas' NHS Foundation Trust	2	2	6	3	3	2
Hampshire Hospitals NHS Foundation Trust	2	2	11	3	4	4
Harrogate and District NHS Foundation Trust	1	1	5	5	2	2
Hillingdon Hospitals NHS Foundation Trust	1	1	7	6	2	2
Homerton University Hospital NHS Foundation Trust	1	1	8	7	3	2
Hull University Teaching Hospitals NHS Trust	2	2	8	6	2	2
Hywel Dda University Health Board	4	3	6	5	3	2
Imperial College Healthcare NHS Trust	3	3	11	11	6	6
Isle of Man Department of Health & Social Security	1	1	1	1	1	1
Isle of Wight NHS Trust	1	1	3	2	1	1
James Paget University Hospitals NHS Foundation Trust	1	1	7	5	2	2
Kettering General Hospital NHS Foundation Trust	1	1	9	9	2	2
King's College Hospital NHS Foundation Trust	2	2	15	5	4	4
Kingston Hospital NHS Foundation Trust	1	1	6	5	4	2
Lancashire Teaching Hospitals NHS Foundation Trust	2	0	8	0	3	2
Lewisham and Greenwich NHS Trust	2	0	15	0	4	2
Liverpool Women's NHS Foundation Trust	1	1	0	0	0	0
London North West University Healthcare NHS Trust	3	3	8	6	5	4
Luton and Dunstable Hospital NHS Foundation Trust	1	1	5	2	2	2
Maidstone and Tunbridge Wells NHS Trust	2	0	9	6	3	2
Manchester University NHS Foundation Trust	2	2	13	10	5	2
Medway NHS Foundation Trust	1	1	10	9	2	2
Mid Cheshire Hospitals NHS Foundation Trust	1	1	8	6	2	2
Mid Essex Hospitals NHS Trust	1	1	9	4	3	3
Mid Yorkshire Hospitals NHS Trust	2	0	9	1	2	2
Milton Keynes University Hospital NHS Foundation Trust	1	1	5	2	2	2
Newcastle upon Tyne Hospitals NHS Foundation Trust	2	2	8	5	3	3
NHS Ayrshire & Arran	2	0	9	0	4	4
NHS Borders	1	0	0	0	0	0
NHS Dumfries & Galloway	1	0	0	0	0	0
NHS Fife	1	0	0	0	0	0
NHS Forth Valley	1	1	4	0	2	0
NHS Grampian	2	2	13	10	4	3

Trust/Health Board	Number of participating hospitals	Number of organisational questionnaires returned	Number of selected cases	Number of clinician questionnaires returned	Number of case notes selected	Number of case notes returned
NHS Greater Glasgow & Clyde	4	0	0	0	0	0
NHS Highland	4	0	10	1	6	0
NHS Lanarkshire	3	2	20	4	7	0
NHS Lothian	2	0	0	0	0	0
NHS Orkney	1	0	1	1	1	1
NHS Shetland	1	0	0	0	0	0
NHS Tayside	1	1	0	0	0	0
NHS Western Isles	1	0	2	0	1	1
Norfolk & Norwich University Hospital NHS Trust	1	1	8	5	2	2
North Bristol NHS Trust	1	1	9	4	3	3
North Cumbria University Hospitals NHS Trust	1	1	5	2	3	0
North Middlesex University Hospital NHS Trust	1	0	7	4	2	2
North Tees and Hartlepool NHS Foundation Trust	1	1	7	4	2	2
North West Anglia NHS Foundation Trust	2	2	12	10	4	3
Northampton General Hospital NHS Trust	1	1	7	7	2	2
Northern Devon Healthcare NHS Trust	1	1	4	1	2	2
Northern Health & Social Care Trust	4	0	0	0	0	0
Northern Lincolnshire & Goole NHS Foundation Trust	2	2	14	11	5	4
Northumbria Healthcare NHS Foundation Trust	1	1	8	5	2	2
Nottingham University Hospitals NHS Trust	2	0	17	11	7	4
Oxford University Hospitals NHS Foundation Trust	3	3	12	12	5	3
Pennine Acute Hospitals NHS Trust	4	4	13	8	4	5
Poole Hospital NHS Foundation Trust	1	0	3	0	1	0
Portsmouth Hospitals NHS Trust	1	1	9	3	2	2
Rotherham NHS Foundation Trust	1	1	5	4	2	2
Royal Berkshire NHS Foundation Trust	1	1	8	6	2	2
Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust	1	1	8	7	2	2
Royal Brompton and Harefield NHS Foundation Trust	1	1	0	0	0	0
Royal Cornwall Hospitals NHS Trust	1	0	3	0	2	0
Royal Devon and Exeter NHS Foundation Trust	1	1	8	8	2	3
Royal Free London NHS Foundation Trust	2	2	17	9	4	4
Royal Liverpool & Broadgreen University Hospitals NHS Trust	1	1	7	2	2	2
Royal Surrey County Hospital NHS Foundation Trust	1	1	9	8	2	2
Royal United Hospitals Bath NHS Foundation Trust	1	1	10	8	3	3
Salford Royal Hospitals NHS Foundation Trust	1	1	9	6	2	2
Salisbury NHS Foundation Trust	1	1	8	8	2	2
Sandwell and West Birmingham Hospitals NHS Trust	2	2	6	4	3	3
Sheffield Teaching Hospitals NHS Foundation Trust	3	3	14	4	5	5
Sherwood Forest Hospitals NHS Foundation Trust	1	1	0	0	0	0
Shrewsbury and Telford Hospitals NHS Trust	2	0	11	2	3	3
South Eastern Health & Social Care Trust	1	1	6	3	2	2

Trust/Health Board	Number of participating hospitals	Number of organisational questionnaires returned	Number of selected cases	Number of clinician questionnaires returned	Number of case notes selected	Number of case notes returned
South Tees Hospitals NHS Foundation Trust	2	2	8	7	2	2
South Tyneside and Sunderland NHS Foundation Trust	2	2	15	11	4	2
South Warwickshire NHS Foundation Trust	1	1	6	4	2	2
Southend University Hospital NHS Foundation Trust	1	1	11	8	3	2
Southern Health & Social Care Trust	2	1	4	3	2	2
Southport & Ormskirk Hospitals NHS Trust	1	1	8	3	2	0
St George's University Hospitals NHS Foundation Trust	1	1	5	3	3	2
St Helens and Knowsley Teaching Hospitals NHS Trust	1	1	10	6	2	2
States of Guernsey Committee for Health & Social Care	1	1	2	2	2	2
States of Jersey Health & Social Services	1	1	4	3	3	2
Stockport NHS Foundation Trust	1	1	9	4	2	2
Surrey and Sussex Healthcare NHS Trust	1	1	10	10	2	0
Swansea Bay University Local Health Board	1	1	6	4	2	2
Tameside and Glossop Integrated Care NHS Foundation Trust	1	1	6	5	2	2
Taunton & Somerset NHS Foundation Trust	1	1	10	5	2	2
The Christie NHS Foundation Trust	1	0	1	0	1	0
The Dudley Group NHS Foundation Trust	1	1	8	4	2	2
The Leeds Teaching Hospitals NHS Trust	1	1	10	2	7	2
The London Clinic	1	1	2	0	1	1
The Princess Alexandra Hospital NHS Trust	1	1	4	3	2	2
The Queen Elizabeth Hospital King's Lynn NHS Foundation Trust	1	0	7	2	2	2
The Royal Marsden NHS Foundation Trust	2	2	8	0	4	4
The Royal Wolverhampton Hospitals NHS Trust	1	1	11	3	3	2
The University Hospitals of the North Midlands NHS Trust	2	2	11	0	3	3
Torbay and South Devon NHS Foundation Trust	1	1	9	3	3	2
United Lincolnshire Hospitals NHS Trust	3	3	13	2	5	4
University College London Hospitals NHS Foundation Trust	1	1	5	5	1	1
University Hospital Southampton NHS Foundation Trust	1	1	10	10	2	2
University Hospitals Birmingham NHS Foundation Trust	3	3	20	12	9	4
University Hospitals Coventry and Warwickshire NHS Trust	1	1	8	6	3	2
University Hospitals of Bristol NHS Foundation Trust	3	0	11	0	5	2
University Hospitals of Derby and Burton NHS Foundation Trust	2	2	14	5	4	4
University Hospitals of Leicester NHS Trust	2	2	19	13	4	4
University Hospitals of Morecambe Bay NHS Trust	2	2	11	7	4	4
University Hospitals Plymouth NHS Trust	1	0	6	2	2	1

Trust/Health Board	Number of participating hospitals	Number of organisational questionnaires returned	Number of selected cases	Number of clinician questionnaires returned	Number of case notes selected	Number of case notes returned
Velindre NHS Trust	1	1	0	0	0	0
Walsall Healthcare NHS Trust	1	1	6	6	3	2
Warrington & Halton Hospitals NHS Foundation Trust	2	2	9	1	2	2
West Hertfordshire Hospitals NHS Trust	1	1	9	9	2	2
West Suffolk NHS Foundation Trust	1	0	7	4	3	2
Western Health & Social Care Trust	2	0	7	4	5	3
Western Sussex Hospitals NHS Foundation Trust	2	2	18	11	4	4
Weston Area Health Trust	1	0	5	0	2	0
Whittington Health NHS Trust	1	1	4	1	4	2
Wirral University Teaching Hospital NHS Foundation Trust	2	0	0	0	0	0
Worcestershire Acute Hospitals NHS Trust	2	2	7	7	2	2
Wrightington, Wigan & Leigh NHS Foundation Trust	1	1	6	4	3	2
Wye Valley NHS Trust	1	1	5	5	2	2
Yeovil District Hospital NHS Foundation Trust	1	1	7	6	3	2
York Teaching Hospital NHS Foundation Trust	3	1	13	1	5	4

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