Report of the

National Audit of Small Bowel Obstruction

2017

NASBO

Steering Group

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Foreword

The Stephen Gordon Catto Charitable Trust is proud to have sponsored the National Audit of Small Bowel Obstruction (NASBO) through the Bowel Disease Research Foundation.

Small bowel obstruction is a common cause of hospital admission. Patients needing surgery face a significant risk of complications and death. We know much less about those patients who are managed without surgery.

The NASBO Report provides robust data on all patients with small bowel obstruction and makes sensible recommendations that will improve outcomes for future patients. The Report particularly highlights the amount of time patients with small bowel obstruction go without food. The need for nutrition support is a key finding to come out of this study, and will hopefully be a focus for future research.

We really value the fact that patient views and input have been central to the design and running of this audit – a unique approach that undoubtedly will become best practice.

Tribute must be given to the surgical trainees who have demonstrated that they can harness the power of research collaboratives to conceive and deliver truly high quality prospective audit data. The number of professional organisations supporting this project is also laudable.

The NASBO Report is just the start of improvements that must now surely follow. We applaud all those involved in helping to bring these recommendations to light.

The Honourable A G Catto

On behalf of the
Stephen Gordon Catto
Charitable Trust

Introduction

Blockage of the small intestines is known as small bowel obstruction. The blockage may be caused by scar tissue from previous surgery known as adhesions, abdominal wall hernia, or cancer. Small bowel obstruction accounted for 12,000 major emergency operations in England and Wales between 2015 and 2016. Up to 13% of those who need an emergency operation for small bowel obstruction die within 3 months of surgery.

Small bowel obstruction is managed by general surgeons in the United Kingdom.

Patients will typically need intravenous fluid for resuscitation, nasogastric tubes to drain their stomachs, and urinary catheters in the bladder to measure urine and guide fluid balance.

Diagnosis is confirmed using abdominal X-ray or CT scan. The underlying cause and additional information from tests informs the surgeon as to whether an operation is required immediately, or whether a period of conservative management with bowel rest is required. An additional test using X-ray dye administered into the gut may predict whether the blockage will resolve on its own without surgery. When affected by this condition, the patient is unable to eat as their intestines are blocked. The need for nutritional support is agreed, but the optimum method to support nutrition in patients with small bowel obstruction is not clear.

Healthcare costs for small bowel obstruction are high as it is a common cause of emergency admission to hospital, and is associated with high rates of death and complications. National initiatives like the National Emergency Laparotomy Audit (NELA) have provided information about patients who have had an operation, but we know little about what happens to those patients managed “conservatively” without an operation. This report outlines the methods and key findings of a UK wide study of patients treated for small bowel obstruction between January and March 2017.

What is wrong with me?

What caused this blockage?

What tests do I need?

What treatment do I need?

When will I be able to eat?

Process

The National Audit of Small Bowel Obstruction was designed and delivered through trainee research collaboratives. The collaboratives have a proven record in delivery of high quality snapshot data. The major charitable donor supporting this Audit is the Bowel Disease Research Foundation, with additional financial and advisory support from the Royal Colleges and specialty professional organisations representing clinicians involved in managing patients with small bowel obstruction.

Surgeons and trainees from across the UK were invited to register their hospital to participate in the Audit through specialty association mailing lists and social media. As part of site registration, each local lead was required to provide evidence of local audit and information governance approvals. Local leads also completed a site profile questionnaire, and encouraged consultants to complete a questionnaire on management preferences. Leads were supported by local teams; in total, 461 collaborators supported the Audit.

Surgeons from 131 hospitals across the UK identified patients with small bowel obstruction during an eight week audit period from January to March 2017. They also recorded key outcomes for patients for 30 days after inclusion in the study, including after discharge from hospital. Patients were only included in the Audit if they were aged over 16, and had either a clinical or radiological diagnosis of small bowel obstruction. Patients were later excluded if the diagnosis was found to be incorrect after further assessment. Patients with large bowel obstruction were not included, as management of this condition is fundamentally different.

Collaborators contributed data on 2,434 patients with confirmed small bowel obstruction. The data was then double checked by independent validators using standard validation techniques to ensure that it was correct.

This process confirmed the exceptionally high quality of data collated in the Audit.

131 Hospitals

2,434 Patients

461 Collaborators

8 week
study period

30 day
follow up

Overview

The median (most common) age of patients treated for small bowel obstruction was 71 years old (range 18-101). Patients were typically referred to surgeons from the emergency department (68%), or admitted after referral from primary care (18%). The patient was referred to the surgical team by another inpatient team e.g. general medicine in 12% of cases. Patients already in hospital often experienced delays in diagnosis and management of small bowel obstruction that then had an impact on their further investigation and management.

The commonest causes of small bowel obstruction observed in the Audit were adhesions caused by previous surgery (54%), abdominal wall hernia (19%) and cancer (10%). This is in keeping with previous studies, and suggests that the included patients included in NASBO are broadly representative of all patients with small bowel obstruction.

Following initial assessment, patients were mostly managed in one of four ways:

- Early or immediate surgery, within 24 hours of review, was the treatment strategy for 24% patients.
- A trial of conservative supportive management was undertaken in 69% patients, and succeeded in two thirds where the obstruction resolved without need for surgery.
- One third of patients initially managed with a conservative approach did require an operation to relieve the small bowel obstruction. Half of these operations happened within three days, and the other half took place between 3 and 64 days.
- Around 3% patients were treated with palliative or best supportive care, either because they were too unwell to survive any intervention, or had obstruction due to an irreversible cause such as widespread cancer.

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28% had
early surgery

49% had
conservative
management from
start to finish

20% had delayed
surgery after
initial conservative
management

3% had end
of life care

Radiological Assessment

Abdominal X-rays were taken in 84% of patients with small bowel obstruction, usually on the day of admission. Abdominal CT scanning was also performed for the majority (80%) of patients, with median time to CT scan of 2.2 days. The proportion of patients having a CT scan was similar for all causes of obstruction. CT scans offer significant benefits over X-rays, as they confirm diagnosis and cause of obstruction, but also give early warning of complications that may guide appropriate and timely management.

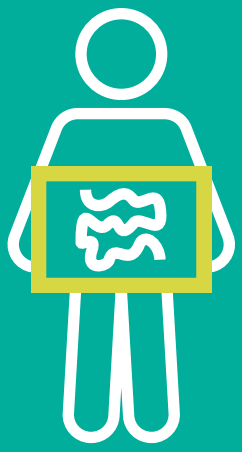
The Audit showed that nearly two thirds of patients (65%) had both a CT and abdominal X-ray for diagnosis.

Early assessment of suspected SBO by an experienced surgeon and early access to CT, without use of the additional X-ray, could potentially minimise unnecessary radiation exposure for patients and healthcare costs for the National Health Service, as well as ensuring optimal management for patients.

Use of water soluble contrast agents (radiological dye administered into the stomach) can accurately predict whether adhesional small bowel obstruction will resolve, and its use is supported by evidence from randomised trials. Water soluble contrast agents often have a therapeutic effect as well and may expedite resolution of obstruction, allow earlier discharge and reduce the need for surgery in some patients. In the NASBO clinician survey, just over a quarter of surgeons regularly used water soluble contrast agents in adhesional small bowel obstruction, and many also reported its use in other causes of obstruction.

The Audit data demonstrated that 28% of conservatively managed patients, and just 1 in 3 of all patients with adhesional small bowel obstruction, received water soluble contrast agents. Water soluble contrast agent was also used in 16% of patients with obstruction due to cancer and in 19% with obstructed hernias.

Radiological Assessment



Abdominal X-ray **84%**

CT scan **80%**

Abdominal X-ray and CT scan **65%**

Water soluble contrast agent study **21%**

Average time to CT scan was **2.2 DAYS**

Patient Outcomes

Small bowel obstruction may have serious effects on other organs. 22% of patients had an acute kidney injury on admission. Acute kidney injury is caused by dehydration from vomiting, and lack of fluid absorption from the blocked bowel. Kidney injury is associated with increased rates of death, and requires early targeted treatment to reverse its effects.

Many patients with small bowel obstruction also had evidence of an acute inflammatory process from their blood tests. 39% patients had a C-reactive protein greater than 30 mg/L, and 43% patients had a white blood cell count greater than 12x103/mm3. Both of these tests are important inflammatory markers. Recognising inflammation is important as it is often a marker of poor blood supply to the bowel (ischaemia) which is a major reason for needing emergency surgery.

Patients with small bowel obstruction stayed in hospital for an average of 10.7 days (range 1-100). After discharge, 13% of patients were re-admitted to the same hospital within 30 days. Reasons for readmission include recurrence of small bowel obstruction or of the original underlying pathology, or complications associated with management.

Overall, 8% of all patients admitted with small bowel obstruction died in hospital.

These outcomes highlight why improving care for patients with small bowel obstruction is a such a high clinical priority.

Patient Outcomes

22% had acute kidney injury at admission

8% died in hospital

13% were re-admitted to hospital in 30 days

Average length of hospital stay was **10.7 days**

Operative Management

Just under half (48%) of all patients admitted with small bowel obstruction had an emergency operation. The median time to surgery was 1 day, although 20% of patients who underwent surgery waited more than 4 days. Operations were performed for 73% of patients with hernias, 51% with cancer, and 38% with adhesions. Patients with hernias typically had surgery within one day of seeing a surgeon. Patients with cancer typically underwent surgery 3.5 days after admission, and patients with adhesions underwent surgery at 3.9 days.

In patients needing surgery for small bowel obstruction, a keyhole (laparoscopic) technique was used for 1 in 7 cases, although half still then needed an open operation to actually carry out the procedure.

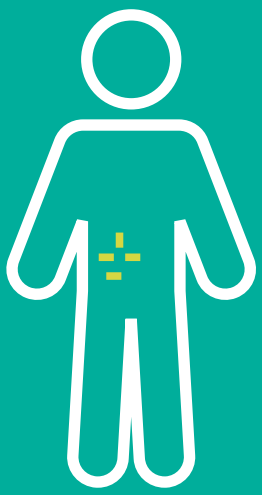
At the time of surgery, one third (34%) of patients required a bowel resection. Most patients had their bowel re-joined during the operation.

Overall, just 9% of patients having surgery had a stoma formed. Stomas were formed during 5% of operations for adhesional obstruction, 4% of operations for obstructed hernia, and 28% of operations for obstructing cancer.

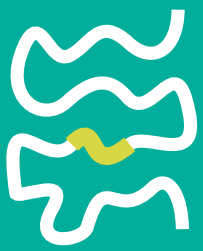
Operative Management

48% of all patients had surgery

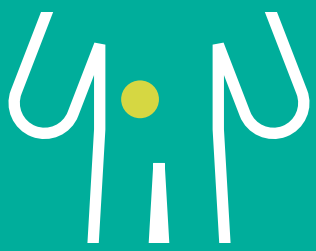
Average time to surgery **1 day**



A keyhole technique was used for **1 in 7** patients, although half required an open operations



34% of patients having surgery had a bowel resection



9% of patients having surgery had a stoma formed

Nutritional Management

Obstructed bowel cannot fulfil its proper function to absorb fluid and nourishment, as the patient cannot drink or eat sufficiently to meet their basic requirements. As a result of this, small bowel obstruction causes intestinal failure, and may result in malnutrition. Malnutrition is in turn associated with poorer hospital outcomes in all patients. In surgical patients, malnutrition is responsible for higher rates of complications and death, longer hospital stays and greater healthcare costs. Early identification and treatment of malnutrition is a key component of care in small bowel obstruction.

Most (98%) of patients in the Audit had a nutritional screening assessment on admission. The majority (90%) were screened using the Malnutrition Universal Screening Tool (MUST). Screening identified that one third (32%) of all patients with small bowel obstruction were at risk of malnutrition. A quarter (26%) of patients received oral nutritional supplements and 14% patients received parenteral (intravenous) nutrition support during their admission with small bowel obstruction.

In this group, 20% received oral nutritional supplements, 5% had enteral feeding via a nasogastric tube placed through the nose and into the stomach, and 25% had parenteral nutrition. Of the patients who were unable to eat for 5 or more days, the remaining half (50%) did not receive any nutritional supplementation. In patients at risk of malnutrition, those having an operation were much more likely to receive parenteral nutrition (46%) when compared to patients managed conservatively (16%).

Overall, the National Audit of Small Bowel Obstruction found that screening for nutritional status on admission to hospital is appropriate, but that levels of nutritional intervention were low, especially as patients with small bowel obstruction are often unable to eat or drink for significant periods of time.

Half of all patients (49%) were unable to eat normally for 5 days or more.

Nutritional Management

98% of patients were assessed for malnutrition

90% of patients assessed using **MUST** score

32% of patients were indentified at risk of malnutrition

49% of patients were unable to eat normally for 5 or more days

26% of patients received oral supplements

14% of patients received parental (intravenous) nutrition

Complications

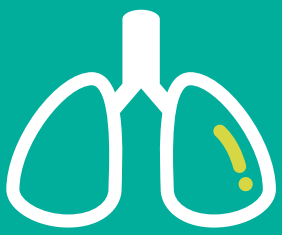
Patients with small bowel obstruction admitted to hospital often develop further problems. Pneumonia was the most common complication observed in 12% patients in the Audit. Although pneumonia was more common in patients after surgery, it also affected 1 in 11 patients managed without surgery. Cardiac (heart-related) complications, including new arrhythmias (rhythm disturbances) and cardiac ischaemia (angina and heart attacks) occurred in 6% patients in the Audit. Cardiac complications occurred more frequently in the group who had undergone surgery. Delirium (confusion) was identified in 5% of patients, and was again seen more frequently in the operated group. Deep vein thrombosis occurred in 1% patients during the Audit.

Many patients having surgery for small bowel obstruction will have a planned admission to critical care after surgery. In addition, 10% patients in the Audit had an unplanned admission to critical care. This was observed in patients treated both with and without surgery. Of those who underwent surgery, 6% required another operation during the same admission. Half of these further operations were related to abdominal wall dehiscence, where the abdominal wound breaks open.

Overall a significant number of patients developed complications during treatment for bowel obstruction.

Many occurred as a direct consequence of needing surgery, but complications also occurred in patients who did not have an operation. Proactive prevention of complications with enhanced recovery protocols, coupled with early recognition and treatment of complications that do occur, may ultimately result in better outcomes, reduced length of hospital stay, and lower healthcare costs.

Complications



12% patients developed pneumonia

6% experience cardiac complications

5% delirium

10% unplanned critical care admission rate

6% in hospital reoperation rate

Recommendations

The National Audit of Small Bowel Obstruction has provided high quality prospective data on the management and outcomes of patients admitted with small bowel obstruction, providing a platform for further quality improvement initiatives that must now follow.

Our recommendations for inclusion in future protocols guiding management of patients with small bowel obstruction are:

- Early use of CT scanning in patients with small bowel obstruction offers both confirmation of diagnosis and prognostic information as to which patients may benefit from emergency or early surgery.
- In those patients who do not need emergency surgery for adhesional obstruction, water soluble contrast should be embedded in clinical management for both prognostic and therapeutic purposes.
- Small bowel obstruction is a major cause of intestinal failure. Early assessment of nutritional status is an essential component of care, and involvement of specialist nutritional services should be considered in all patients. Nutritional support should be planned from diagnosis, and tailored to the individual patient's requirements and nutritional status.
- Patients who are initially managed conservatively require ongoing close assessment to ensure that obstruction is resolving; if not, surgery should be recommended and carried out within 72 hours to optimise outcomes.
- Patients undergoing surgery for small bowel obstruction need risk assessment to ensure that high and moderate risk patients are proactively admitted to critical care facilities.
- There may be benefit in applying the principles of enhanced recovery to patients with small bowel obstruction managed both conservatively and operatively.

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Recommendations

CT scan

Water soluble contrast agent

Nutrition

Early surgery

Critical Care Admission

Enhanced Recovery

Glossary

Abdominal wall dehiscence – rarely, the wound made to close the skin after an operation can break apart, and the bowel can be exposed. When this happens, an urgent return to theatre is needed to repair the wound.

Acute kidney injury (AKI) - sudden impairment in the ability of the kidney to produce urine, which may lead to long-term kidney damage if it persists untreated for a long duration.

Adhesions – scar tissue which can become sticky and so potentially cause problems. This can be present from birth (congenital), or can occur following inflammation within the abdomen, particularly after surgery.

Arrhythmia – this is when the heart beats with an irregular or abnormal rhythm.

Audit – a systematic assessment of clinical practice, with reference to clinical practice standards. Where no guidelines exist, an audit can be used to benchmark standards of care.

C reactive protein (often abbreviated to CRP) – a blood marker of inflammation. Higher numbers mean more inflammation and so it can be important to monitor changes in levels over a period of time.

Computed tomography (CT) - medical imaging technique using x-rays to build a 3-dimensional picture of an area inside the body, for example, organs, tissues, blood vessels, bones. It is a helpful way to visualise any abnormalities in anatomical structures

Conservative management – in small bowel obstruction, this means management without surgery. This takes the form of drainage of the built-up stomach contents with a nasogastric tube, monitoring of kidneys with a bladder catheter, and administration of fluids into veins to either prevent, or correct, dehydration.

Deep vein thrombosis – a clot in the deep veins of the leg. This causes swelling of the leg and requires treatment with blood thinning drugs. Sometimes, a piece of clot can break off and travel to the lungs, causing difficulty breathing and potentially blocking off a blood vessel.

Delirium - an acutely disturbed state of mind characterized by restlessness, hallucinations, and confusion. Delirium may be caused by ill health (injury, infection or inflammation), or it may be a side effect of certain strong medications.

Hernia – a condition where an organ or tissue bulges out through a hole or weakness. This can occur when bowel passes through a small weakness in the abdominal wall and becomes trapped. A hernia may be felt and seen as a lump protruding under the skin.

Ischaemia – this means that the tissue or organ is not receiving sufficient oxygen and may be damaged irreversibly as a result.

Laparoscopy – also known as keyhole surgery, laparoscopy involves insertion of a telescope into the abdomen to allow surgery to take place without making large cuts in the skin to expose the organs and tissues

Malnutrition Universal Screening Tool (often abbreviated to MUST) – this is a widely used tool to screen patients for malnutrition. It asks about current weight, weight loss, and acute illness to identify those at risk of malnutrition.

Median – a median is a value found at the mid-point of a set of numbers, so that half of all numbers are above, and half are below this value.

Nasogastric tube – a hollow plastic tube inserted through the nostril and passed down the oesophagus to drain the stomach.

Parenteral nutrition (often abbreviated to PN) – nutritional support delivered directly into the veins via a tube to provide calories when a patient cannot eat. Sometimes called tube feeding.

Pneumonia – infection in the lungs. This may cause a fever, productive cough, and difficulty breathing. It can often be treated successfully with antibiotics.

Radiograph – an image produced by the use of X-Rays which can 'see though' into the inside of the body.

Small bowel obstruction (SBO) - blockage of the bowels from mechanical causes, which causes colicky abdominal pain and cramps, bilious (green) vomiting, inability to keep down oral food or drink, stoppage of bowel movements, and abdominal distension/bloating.

Stoma – in clinical practice, a stoma is a connection created surgically between a piece of bowel and the skin. These are named after the piece of bowel connecting to the skin i.e. colon = colostomy, ileum (small bowel) = ileostomy.

Water soluble contrast agent – a special dye which can which helps to make X-rays clearer to look at. This is given to patients as a small drink. In small bowel obstruction if it is seen in the colon after a few hours, a patient is likely to avoid an operation. It is also thought to draw water inside the bowel from surrounding tissues and so assist in resolution of obstruction.

Validation – systematic checking of data. In NASBO, we confirmed our data was accurate by asking a separate team member to re-collect and re-enter the data onto our database.

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Collaborators

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