

“Right place at the right time” impacts outcomes for acute intestinal obstruction

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Background. *The purpose of this study was to measure how the duration of nonoperative intervention for intestinal obstruction impacted patient outcomes and whether hospital characteristics influenced the timing of operative intervention.*

Methods. *The State Inpatient Database (Florida) of the Health Care Utilization Project and the Annual Survey database of the American Hospital Association were linked from 2006 to 2011. Included were patients ≥ 18 years of age with a primary diagnosis of intestinal obstruction. Patient factors included age, sex, socioeconomic factors, and comorbid conditions.*

Results. *A total of 116,195 patients met our inclusion criteria, and 43,079 underwent operative intervention (37.1%). Patients who required operative correction of the intestinal obstruction after the fifth day of hospitalization, compared with patients who underwent an operation on the day of admission, had increases in mortality (6.1% vs 1.8%, $P < .001$), complication rates (15.4% vs 4.0%, $P < .001$), and postoperative hospital stay (9 vs 5 days, $P < .001$). Patients cared for at a large teaching facility (with surgery residents) had increased odds of early operative intervention by 23% (odds ratio 1.23, [1.20–1.28]), whereas patients at low-volume hospitals had decreased odds of early intervention (odds ratio 0.88, [0.73–0.91]).*

Conclusion. *Initial nonoperative treatment in patients with uncomplicated intestinal obstruction is an important strategy, but the odds of having an adverse event increase as intestinal obstruction is delayed. Importantly, the presence of surgery residents and increasing bed size are hospital characteristics associated with earlier operative intervention, suggesting a quality benefit for care at large teaching hospitals. (Surgery 2015;158:1116-27.)*

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INTESTINAL OBSTRUCTION accounts for 20% of all acute operative admissions and can account for as many as 3.1% of emergency surgical admissions.^{1,2} The optimal outcome for patients presenting with intestinal obstruction is influenced by several factors, such as whether the obstruction is partial or complete, the presence of ischemic or gangrenous bowel, perforation, duration of symptoms, development in the early

postoperative period, the admitting service, and etiology.^{3,4} In patients without evidence of ischemia (uncomplicated intestinal obstruction) and with a clinically stable examination, there is a role for a trial of nonoperative management as an alternative to prompt operative intervention.

The adage, “don’t let the sun rise and set on a bowel obstruction” is evolving into a phrase with mostly historic relevance. In 1981, Bizer et al⁵ demonstrated the safety of initial nonoperative management for patients with intestinal obstruction. Since that time with appropriate patient selection, several groups have performed both prospective and retrospective studies with outcomes that support those findings.^{2,6,7} Most experts agree that the majority of patients managed initially with bowel rest, gastric decompression, and fluid

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Table I. Inclusion ICD-9-CM diagnosis and procedure codes with corresponding CCS codes

Diagnosis	ICD-9 CM code	CCS code
Adhesions	560.81, 560.9	
Obstructed Ventral/ Incisional Hernias	551.2, 551.20, 551.21, 551.29, 552.2, 552.20, 552.21, 552.29	
Intussusception	560.0	
Volvulus	560.2	
Other specified	560.89	
Inflammatory Bowel Disease	560.89 AND 555.0 or 555.1 or 555.2 or 555.9 or 556.0 or 556.1 or 556.2 or 556.3 or 556.4 or 556.6 or 556.8 or 556.9	
Malignant	560.89 AND AHRQ Comorbidity Indicator (Metastatic Disease)	
Surgical procedure		
Exploratory laparotomy	54.11	09.21
Exploratory laparoscopy	54.21	09.19
Lysis of adhesions	54.5, 545.1, 545.9	09.22
Small bowel resection	45.61, 45.62, 45.6.3	09.07
Colon resection	17.33, 45.75, 17.35, 45.75, 17.36, 45.76, 17.31, 17.32, 17.34, 17.39, 45.71, 45.74, 45.79, 45.8, 458.1, 458.2, 458.3	ICD-9-CM code used
Repair of obstructed or gangrenous ventral hernia	53.59, 53.63, 53.69	ICD-9-CM code used

AHRQ, Agency for Healthcare Research and Quality; ICD-9-CM, *International Classification of Diseases*, 9th Revision, Clinical Modification.

resuscitation should be expected to have resolution of the intestinal obstruction.⁸

The appropriate duration of time to continue with nonoperative management, however, remains controversial. Seror et al⁹ found that non-operative management for up to 5 days duration resulted in a 73% rate of resolution of obstruction with no significant increase in mortality rate or incidence of strangulated bowel, including those presenting with a complete obstruction. Bickell et al¹⁰ found the risk for bowel resection increases substantially if operative intervention is postponed beyond 24 hours and remains increased through 96 hours of unresolved symptoms.

Taken together, current literature suggests that nonoperative management can be delayed safely for as long as 5 days. Importantly, this period of time does not come without risk to the patient for increased mortality and morbidity, especially for patients eventually requiring operative intervention for an intestinal obstruction.¹¹ The purpose of our study was to characterize the magnitude of risk associated with delay in operative treatment of intestinal obstruction by comparing early vs late operative intervention. Our group was specifically interested in evaluating the association between hospital-specific factors and timing of operative treatment of intestinal obstruction.

MATERIALS AND METHODS

This was a cross-sectional, retrospective review in which we used data from 2006 to 2011 from the

Health Care Utilization Project State Inpatient Database (HCUP SID) for the state of Florida. The development of HCUP SID was sponsored by the Agency for Healthcare Research and Quality to inform health-related decisions. HCUP SID includes all patient discharge records for all payers for 47 states that participate in the project. Each SID is unique to its individual state. Data are deidentified, protected, and include more than 100 clinical and nonclinical variables.¹² The study was deemed exempt from institutional review board approval based on the use of de-identified records.

Patient selection. Included were patients 18 years of age or older who presented with a primary diagnosis of intestinal obstruction. We defined intestinal obstruction as an acute bowel obstruction related to etiologies resulting in a mechanical intestinal obstruction including post-operative adhesions, incarcerated ventral/incisional hernia, inflammatory bowel disease, malignancy, volvulus, and intussusception. Patients were identified by use of the *International Classification of Diseases*, 9th Revision, Clinical Modification (ICD-9-CM) codes. ICD-9-CM codes used to define the study population are listed in [Table I](#).

Patients who underwent operative treatment were identified using both Clinical Classification Software (CCS) codes and individual ICD-9-CM procedure codes. CCS is a uniform, standardized, and validated coding system used to collapse

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