Implementation of a small bowel obstruction guideline improves hospital efficiency

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Background. We performed an internal review of triage decisions and outcomes for all patients admitted for small bowel obstruction (SBO). Concern for potential delays in operation led to formalization of an institution-wide SBO management guideline. We hypothesized that use of the guideline would improve initial triage and patient outcomes.

Methods. Members of the departments of surgery, medicine, and emergency medicine created a SBO service triage and initial management guideline that was instituted in 2011 after education and a multidisciplinary Grand Rounds on the subject. Administrative data from fiscal year 2010 (FY2010) was compared with the first 6 months of 2011. Time to computed tomography scan, the OR, general surgery (GS) consultation, and hospital duration of stay were collected and compared for those admitted to a medicine service before (Med2010) and after (Med2011) the guideline and those admitted to a general surgery service before (GS2010) and after (GS2011) the guideline. Groups were compared with Student t test and χ² analysis.

Results. There were 490 SBO admissions in FY2010 and 240 in the first 6 months of 2011. After implementation of the guidelines, the percent of SBO patients admitted to GS2011 increased from 55 to 66% (P < .01). The percent of patients admitted to a medicine service requiring operation for SBO did not change from 14 to 7% for Med2011, but there was a shorter time to GS consultation (P < .001). Time from admission to operation decreased from 0.9 to 0.4 days (P < .05) with a mean decrease in hospital duration of stay of 2 days (8 ± 6 compared with 6 ± 4 days, P < .001) for those admitted during GS2011.

Conclusion. Implementation of a hospital-wide SBO guideline that addressed initial management and triage shortened time to operative intervention and hospital duration of stay for patients requiring operative therapy for SBO. (Surgery 2012;152:626-34.)

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Small bowel obstruction (SBO) remains a major problem for hospitalized patients. Although most patients with SBO do not require operation, there is no uniform approach to the diagnosis and management of SBO. The older dictum that, “The sun should never rise and set on a complete bowel obstruction,” assumes that it is clear who has a complete SBO. Although controversy exists on the best way to diagnose a complete SBO in addition to the reliability of a clinical examination, once the diagnosis is made, the condition is usually treated by a general surgeon.

Because many bouts of SBO will resolve without operation, there is variation as to where a patient may be admitted at the time of presentation to the hospital. Not all patients are treated on a surgery service, and there is no agreement as to the absolute management of SBO. In our institution, there controversy has occurred as to where patients should be admitted if not directly to the operating room because this decision affected time in the emergency department and potentially the need for more imaging. In addition, there was a perception that patients who did not improve with nasogastric decompression and hydration with intravenous fluid and required later operation for their SBO had been inappropriately triaged if admitted to a medicine service, despite a consultation from a surgery service.
To address these concerns, the Surgical Quality Improvement Committee (SQIC) of the University of Michigan, Department of Surgery reviewed the practice patterns for patients admitted to the hospital for the diagnosis of SBO for FY2010. After establishing a baseline of information, the SQIC partnered with members of the departments of internal medicine and emergency medicine to create a system-wide guideline (Figure) that addressed the basic care of patients with SBO, to which service a SBO patient should be admitted, and the timing of surgical assessment.

In preparation for this guideline, a multidisciplinary Grand Rounds was held that presented the baseline data, scope of the problem, and the new guideline. The educational process also stressed the importance of communication among attendings if there were concerns for any given patient’s management strategy. The multidisciplinary team hypothesized that the new guideline would improve the initial admission process and early care of patients with SBO requiring operation and decrease the overall time in the hospital for these patients. The committee also postulated that the guideline would improve the perception of how care was delivered to SBO patients.

METHODS

All patients admitted to the hospital with a diagnosis of SBO were identified from the hospital-wide administrative data set for both the preguideline time period of fiscal year 2010 (FY2010) and the postguideline period of the first 6 months of 2011. The CPT diagnosis codes

EVALUATION

1. Patients with symptoms consistent with possible small bowel obstruction should have the following:
   a. Complete physical examination, including a digital rectal examination and gynecologic examination if appropriate
   b. Acute abdominal series
   c. CBC, comprehensive panel, lactate, and urinalysis
2. CT scan is not required for all patients, but if the history, physical examination, and initial imaging are supportive of a possible bowel obstruction and there is no absolute indication for an emergent surgical consultation (free air, peritonitis, nonreducible symptomatic hernia, abdominal surgery in the last 30 days), then an abdominal CT with IV and PO contrast should be performed unless there is a contraindication to the study. The study can be done without IV contrast for those with contrast allergy or high creatinine. Relative contraindications to CT imaging may include multiple recent studies or recent surgery and reimaging should then be left to the discretion of the care providers.

INITIAL TREATMENT

3. Initial therapy for all patients diagnosed with complete or high-grade partial bowel obstructions should be:
   a. Placement of a 18-F nasogastric tube on continuous suction
   b. IV fluid with NPO status
   c. Careful monitoring of urine output
   d. Serial abdominal examinations
   e. Early general surgery consultation to determine need for operative management
4. Initial therapy for partial small bowel obstructions patients should include:
   a. Placement of a nasogastric tube on continuous suction if ongoing vomiting
   b. IV fluid with NPO status
   c. Careful monitoring of urine output
   d. Serial abdominal examinations
   e. General surgery consultation if no improvement in 48 hours or with change or worsening of the patient’s condition or abdominal examination.

ADMISSION

5. If a transition point is identified on CT or the patient is deemed an emergent operative candidate or the patient has had an abdominal surgery within the last 30 days, the patient will be admitted to a surgical service. Exceptions which may warrant a medical service admission could be:
   a. Patients with intra-abdominal metastases.
   b. Patients with active inflammatory bowel disease who are to have a trial of systemic therapy
   c. Acute, severe medical conditions requiring stabilization (ie, acute myocardial infarction, severe exacerbation of chronic obstructive pulmonary disease).
6. Patients with known dilated bowel secondary to dysmotility problems or other medical conditions can be admitted to medicine. Examples of this include:
   a. chronic narcotic-induced obstruction;
   b. dysmotility or constipation from chronic psychotropic use or mental/developmental disorders;
   c. cystic fibrosis patients; and
   d. collagen vascular diseases with bowel involvement.

Figure. SBO initial triage and management guideline.
included 560 through 560.9 (intestinal obstruction codes), 552 through 552.9 (abdominal hernias with obstruction), 557.3 (duodenal obstruction), and 550 and 550.1 (inguinal hernias with obstruction). The list was reviewed to ensure that patients had the diagnosis of SBO. The admitting clinical service, time of general surgery (GS) consultation, time of computed tomography (CT) scan of the abdomen, if obtained, days from admission to operation, if performed, and outcomes were abstracted.

The documented reasons for admission to the medical service were identified from the computerized medical record. Outcomes such as death and hospital length of stay were noted. Costs of the hospitalization in which a SBO was included were compared by the use of the hospital data warehouse. Acuity of patient illness was defined with APR-DRG (“All Patient-Refined” Diagnosis-Related Group) coding,17,18 which is a means to adjust for case mix severity and mortality across populations with scores from 1 through 4. A level 1 severity is considered uncomplicated, a level 2 case is moderately complicated, a level 3 patient has major complexity and a level 4 classification is extremely severe with the highest likelihood of mortality. This methodology has been applied for adjusting for case mix complexity in a variety of setting since 1991.17,18

A multidisciplinary team consisting of surgeons, gastroenterologists, hospitalists from internal medicine, and emergency room physicians met to discuss the basic parameters for a SBO guideline. After agreement on the final guideline, a multidisciplinary Grand Rounds was held for the departments of surgery, medicine, and emergency medicine that included case presentations that had been reviewed by risk management department, the data from FY2010 SBO patients, and the proposed guideline. The guideline was then made available through the emergency department’s website. Intradepartmental education at faculty and resident meetings was also provided prior to the initiation of the guideline. Statistical analysis was performed using Student t tests and χ² comparison where \( P < .05 \) was considered significant. There was institutional review board approval for this study.

RESULTS

There were 490 patients admitted with a SBO diagnosis in FY2010. Of these hospitalized patients, 270 (55%) were admitted to GS2010 of which 162 patients (60%) underwent operative intervention. Of the remaining 220 patients admitted to Med2010, 26 (14%) required operation which was 5% of the total number of patients admitted with a SBO diagnosis (Table I). The operative intervention rate for SBO during this time period was 36%. For patients admitted to Med2010 requiring operation, the mean time to GS consultation was 3.4 days (Table I), and all of these patients underwent abdominal CT before the operation. There were no differences in mean age or gender between groups or time periods (Table II). Patients admitted to Med2010 did have greater APR-DRG scores than those admitted to Med2011 (Table II).

The majority of patients requiring operation in either time period, whether admitted to medicine or surgery, were diagnosed as either having a ventral wall hernia of some type or adhesions (Table III). For 2010, patients admitted to medicine who later required surgery were more likely to have the diagnosis of adhesions for the source of SBO. Patients with the diagnosis of hernia were more likely to be admitted to a surgery service (Table III).

For the 26 patients admitted to Med2010 who later required operation, one-half had active medical issues, including 4 with metastatic cancer, 3 with severe pulmonary complications, 2 with acute myocardial infarction or arrhythmia, 2 with active inflammatory bowel disease, and 1 each with pyelonephritis and liver failure during chemotherapy. Of the remaining 13 patients, 4 did not have the diagnosis of SBO made in the emergency department despite presenting with signs and symptoms. Another 4 patients had a delay in GS consultation despite SBO being in the differential diagnosis upon medical admission. The remaining 5 patients had no documented reason to be admitted to a medical service, and all went to the operating room within 48 hours of admission.

After development of the SBO guideline and education, only 7 patients were admitted to Med2011 who later required operation. All 7 of these patients had active medical issues documented, and there were no delays in SBO diagnosis. The majority of patients who underwent operation after admission to Med2011 underwent abdominal CT (Table I). Time to GS consultation was shorter, at 1.7 days (\( P < .001 \)) for those admitted to Med2011 requiring operation. The hospital length of stay was shorter for patients admitted to GS2011 compared with GS2010 (\( P < .001 \)), Med2010 (\( P < .001 \)), or Med2011 (\( P < .001 \)). There was also a shorter interval between admission and operation for those admitted to GS2011, compared to the GS2010 group, (\( P < .05 \)), or compared to either Med2010 or Med2011 (\( P < .001 \);
Table I. Admissions for operative small bowel obstructions

<table>
<thead>
<tr>
<th>Operative admission/ date</th>
<th>Service</th>
<th>OR n (% of total for the time period)</th>
<th>CT % (of patients)</th>
<th>Time to CT (days) mean [range]</th>
<th>Time to surgery consult mean [range]</th>
<th>Time to OR (days) mean [range]</th>
<th>Hospital length of stay (days)</th>
<th>Mortality n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 188, FY2010 GS2010</td>
<td>OR</td>
<td>162 (86)</td>
<td>39</td>
<td>1 [0–10] 0 n/a</td>
<td>0.9 [0–13] 0</td>
<td>8 ± 6</td>
<td>2 (1.2)</td>
<td></td>
</tr>
<tr>
<td>N = 107, FY2011 GS2011</td>
<td>OR</td>
<td>99 (93)</td>
<td>31</td>
<td>0.7 [0–15] 0 n/a</td>
<td>0.4 [0–5] 0</td>
<td>6 ± 4</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

*P < .001 for GS2011 compared with GS2010, and compared with Med2010 or Med2011.

| FY2011 GS2011 Med2011  | OR      | 26 (14)                             | 100               | 3 [0–44] 1 3.4 [0–17] 2       | 7.6 [1–33] 5                   | 21 ± 14                      | 1 (3.8)                      |
| FY2011 Med2011  | OR      | 8 (7)                               | 83                | 1.9 [0–10] 1 1.7 [0–4] 1.5     | 3.6 [1–6] 3.5                  | 13 ± 4                       | 0                             |

CT, Computed tomography; OR, operating room.

Table II. Basic demographics of patients admitted with small bowel obstruction

<table>
<thead>
<tr>
<th>Time period</th>
<th>Demographic</th>
<th>Admit surg with OR</th>
<th>Admit med with OR</th>
<th>Admit surg no OR</th>
<th>Admit med no OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2010</td>
<td>Age, years</td>
<td>58 ± 15</td>
<td>60 ± 15</td>
<td>56 ± 18</td>
<td>55 ± 19</td>
</tr>
<tr>
<td>2011</td>
<td>Age, years</td>
<td>57 ± 13</td>
<td>54 ± 15</td>
<td>57 ± 23</td>
<td>59 ± 18</td>
</tr>
<tr>
<td>FY2010</td>
<td>Male/female</td>
<td>83/82</td>
<td>11/14</td>
<td>54/54</td>
<td>96/98</td>
</tr>
<tr>
<td>2011</td>
<td>Male/female</td>
<td>44/55</td>
<td>1/7</td>
<td>33/27</td>
<td>30/43</td>
</tr>
<tr>
<td>FY2010</td>
<td>APR-DRG index</td>
<td>1.78</td>
<td>3.52*</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>2011</td>
<td>APR-DRG index</td>
<td>1.56</td>
<td>2.23</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

*P = .015 compared with 2011 Medicine with OR group.

APR-DRG, All Patient-Refined Diagnostic-Related Group; OR, operating room.

Table III. Diagnoses of operative small bowel obstruction patients

<table>
<thead>
<tr>
<th>Service/time period</th>
<th>Hernia, n (%)</th>
<th>Adhesions, n (%)</th>
<th>Volvulus, n (%)</th>
<th>Impaction/intussusception, n (%)</th>
<th>Cancer/metastases, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS2010</td>
<td>162</td>
<td>94 (58)*</td>
<td>51 (32)*</td>
<td>10 (6)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Med2010</td>
<td>26</td>
<td>3 (12)</td>
<td>20 (76)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>GS2011</td>
<td>99</td>
<td>69 (70)</td>
<td>21 (21)</td>
<td>3 (3)</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Med2011</td>
<td>8</td>
<td>2 (25)</td>
<td>2 (25)</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

*P < .001 for GS2010 compared with Med2010.

Table I). Of the 3 deaths for the operative FY2010 admissions, none were related to their SBO management. There were no deaths in the operative SBO patients in FY2011.

The percentage of SBO admissions admitted to surgical services increased from 55 to 66% from FY2010 to 2011. This was associated with an increase in the percentage of operations performed from 36% in FY2010 to 45% in 2011 (P < .05). Readmissions related to SBO decreased from 16% in FY2010 to 6% in 2011 (P < .001).

The costs of treating SBO after initial admission to a surgery service did not change between FY2010 and 2011, with a mean cost of $20,550 for GS2010 and $22,554 for GS2011 (P = .38). The cost of hospitalization was also no different for the medical patient population undergoing operation, with a mean cost of $49,956 for Med2010 compared to $36,726 for Med2011 (P = .31). The severity of illness as measured by APR-DRG methodology did show that operative patients admitted to Med2010 had a greater acuity index score than those in Med2011 (P = .015).

For patients who did not require an operation for their SBO, there were no differences in time to GS consult or hospital length of stay for FY2010 compared with 2011 (Table IV). There was a significant increase in the use of abdominal CT for patients who did not undergo operation but were admitted to surgery (P < .01; Table IV). There was no difference in CT use for those admitted to medical services.
DISCUSSION

SBO is a common condition encountered in hospitalized patients. Although high-resolution abdominal CT has improved radiographic sensitivity for making a diagnosis of SBO, the timing of operative intervention and best avenue for care remains controversial for patients who do not have acute abdominal findings mandating urgent operation. To further examine whether our own institution was providing timely care and to assess the outcomes of our own patients, we studied all patients with SBO admitted before and after a formal institution-wide guideline was implemented.

Although there is little argument about performing an operation for a patient with a SBO and peritoneal findings, free air or overt abdominal catastrophe, there is not much data on the management of SBO patients who do not require emergent intervention. The majority of studies focus on avoiding bowel necrosis and mortality through timely diagnosis, or which clinical signs or radiographic signs warrant laparotomy, but few examine the resources used for management of a SBO patient. In fact, on the basis of information in the literature, it is unclear who cares for patients with SBO. Are all SBO patients admitted to a surgical service whether or not they require operation? Despite this question, the literature supports that protocols and guidelines for many varied conditions from trauma to elective colon resections improve patients’ outcomes.

In our current study, we defined our baseline for SBO admissions before any intervention. Although there was concern that patients were not receiving timely operations and that most SBO patients were being admitted to medicine, the data did not entirely support these perceptions. Only 14% of patients admitted to a medical service required an operation, or 5% of all SBO patients admitted. In addition, 55% of SBO patients were admitted to a surgical service. At first glance, without a guideline, it did appear that patients were being triaged fairly well in the emergency department. However, on further inspection, one-half of the patients admitted to medicine with an operative SBO did not have appropriate evaluation, had a delay in consultation, or were inappropriately admitted to a medical rather than a surgical service. In addition, there was a delay in the time to GS consultation up to 3.4 days after admission. Our concerns were similar to studies from New York, where initial delays in the emergency department were associated with longer times to treatment and greater rates of small bowel resection. Malangoni and colleagues also showed that those admitted to medicine had a longer hospitalization period before operation and longer hospital stays. The study, which was from the mid 1990s, did not address CT use and how this modality may have affected the admission service or decision to operate.

After concerns about the overall management of patients with SBO were discussed, a multidisciplinary team met to formulate a plan which would aid in emergency department triage and initial evaluation and treatment. With the approval of the SBO guideline, there was institutional education to facilitate dissemination of the guideline and its use in December 2010.

The management of SBO patients admitted in the first half of 2011 did show improvements in many facets of care. Of the operative patients with SBO who were admitted to the medicine department, either SBO symptoms developed after admission or there was a clear discussion as to the plan for operation between the medical and surgical services. There was also a shorter time to operation for patients admitted to surgery, similar to earlier studies. The hospital lengths of stay decreased for all patients admitted to either Medicine or Surgery in 2011 compared with FY2010, with a shorter time to GS consultation for those on medical services.

Table IV. Admissions not requiring operation for bowel obstruction

<table>
<thead>
<tr>
<th>Time</th>
<th>Group</th>
<th>N</th>
<th>% SBO Dx at admission</th>
<th>% CT scan</th>
<th>Time to CT (days) mean [range]</th>
<th>Time to gen surg consult (days) mean [range]</th>
<th>% gen surg consult</th>
<th>Hospital length of stay, days</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 2010, GS2010</td>
<td>108</td>
<td>66</td>
<td>47</td>
<td>0.6 [0–4] 0</td>
<td>n/a</td>
<td>n/a</td>
<td>6 ± 6</td>
<td></td>
</tr>
<tr>
<td>N = 302 Med2010</td>
<td>194</td>
<td>50</td>
<td>72</td>
<td>0.6 [0–7] 0</td>
<td>1.4 [0–11] 1</td>
<td>32</td>
<td>6 ± 7</td>
<td></td>
</tr>
<tr>
<td>2011, GS2011</td>
<td>60</td>
<td>60</td>
<td>85</td>
<td>0.5 [0–1] 0</td>
<td>n/a</td>
<td>n/a</td>
<td>6 ± 3</td>
<td></td>
</tr>
<tr>
<td>N = 133 Med2011</td>
<td>73</td>
<td>73</td>
<td>75</td>
<td>0.6 [0–5] 0</td>
<td>2.4 [0–7] 2</td>
<td>34</td>
<td>5 ± 4</td>
<td></td>
</tr>
</tbody>
</table>

CT, Computed tomography; SBO, small bowel obstruction.
in-hospital deaths for any operative patients in 2011, which compares favorably to the rates reported in the literature.9,16,20

Decreased time to GS consultation and hospital length of stay were not seen in patients admitted with nonoperative SBO. For these patients, lengths of stay were fairly brief, which was similar to other reports in which nonoperative patients had shorter lengths of stay4,16,24,25 but were prone to greater rates of reobstruction, in some cases as much as 34% in 1 year.24 In our study, there was more than double the number of readmissions in patients with SBO in FY2010 compared with 2011. The decrease in readmissions for recurrent SBO symptoms for 2011 may be related to the greater rate of operative intervention in 2011 where 45% of SBO patients underwent operation compared to 36% in FY2010.

Another concern over the initial SBO guideline was the potential overuse of abdominal CT for SBO diagnosis. Because our guideline did recommend CT in some cases to help with triage decisions, we predicted that there may be an increase in the performance of CT, which may not be necessary. For the operative patients, whether admitted to medicine or surgery, the percentage studied with CT was not greater. For those treated without operation and admitted to surgery, more CTs were performed, with an increase of 38%. However, for patients admitted to GS2011, 60% had the admitting diagnosis of SBO compared with 66% of admissions in GS2010. It is unclear whether the use of CT can be considered unnecessary if a SBO diagnosis is in question. Many advocate CT to distinguish complete versus partial SBO or use CT to predict need for operation.6,11,14,15 We did not see an increase in CT use for operative patients who may have had symptoms or plain films which drove intervention and did not require more imaging.

Although this institutional SBO guideline appeared to reduce lengths of stay and delays to definitive operation and improve the initial triage to the correct service, there are weaknesses to this study. Because one of the improvements of the study was time to operation, it does appear that surgeons performed operative interventions in a more timely fashion after the guideline was initiated, both when patients were admitted to surgery or medicine. It is unclear whether this was due to a “Hawthorne effect,” or because of an unmeasured improvement which was a consequence of the new guideline. The times to CT, GS consultation, and operation would be more accurately reflected in hours rather than days and may have over- or underestimated the differences between the 2 time periods. We also did not obtain dwelling times in the emergency department for patients before inpatient admission and whether there were delays related to admission to one service compared to another service.

Our study did not specifically compare the type of operation performed but used length of stay and mortality as surrogate markers for delays in operation and poor outcome. Although there is a relatively short interval between the start and end of this study, changes in other conditions could have affected lengths of stay and costs. Finally, the driving force behind the implementation of this guideline was perceived dissatisfaction and frustration with patient care among caregivers. We did not formally measure caregiver satisfaction prior to or after our guideline implementation.

Despite these weaknesses and the fact that our guideline made no attempt to mandate the timing of operative intervention, there were clear benefits to using a guideline for the initial treatment and triage of SBO patients. There were no inappropriate admissions to Medicine who required operation for SBO, which was one of the goals of the guideline. There were improvements in patient throughput for surgery admissions, with shorter times to operation and hospital lengths of stay. It also appears, in the limited time of follow-up, that there were fewer readmissions for SBO symptoms after implementation of the guideline. Although there were no formal evaluations for caregiver satisfaction, informal discussion supported that the SBO guideline was working well for all providers.

The success of this guideline is most likely related to understanding the baseline process for SBO admissions within the institution and obtaining input for the guideline from all caregivers who frequently evaluate and admit SBO patients.

REFERENCES
DISCUSSION

Dr Fred Luchette (Chicago, IL) [Read by Dr Christopher McHenry]: SBO remains a major health problem, accounting for 15% of admissions to surgical services in this country. The most common cause is adhesions from previous operation, whereas 20–50% are the result of neoplastic disease, hernias, inflammatory bowel disease, and other causes.

The annual health care cost for treating these patients is estimated to be greater than $1 billion. Therefore, the improvement in caring for these patients with your guideline is a step in the right direction for improving patient outcomes.

Now for the questions.

The guideline suggests selective use of CT, but your results indicate there was a very liberal use of CT scan by the medical service. I’m not critical of this practice because, at Loyola, if you present to our emergency department complaining of abdominal pain, you will not be discharged without having a CT scan.

It is the new gold standard for differentiating a complete SMO from a partial obstruction or ileus. It may also help identify a nonadhesive cause for the obstruction, which will guide management.

The question I have is as follows: what was the compliance by the various services with the use of the various steps? My second question deals with the timing of laparotomy. Past president Mark Malangoni presented a study on SBO at this meeting in 2001. He also concluded that length of stay and time to laparotomy were reduced when patients were admitted to the surgical service. They did not report on the use of CT scan in the evaluation of patients.

With the high use of CT scan in your study, the diagnosis of a complete or high-grade obstruction was known. Why would the medical service wait one-and-a-half to two days before consulting surgery?

Similarly, when your service was consulted, the patient did not undergo laparotomy until more than 3 days later. What explanation do you have for this delay, when the patients admitted to your service underwent operation the same day?

My last question is a philosophical one. I believe that SBO is an operative disease and surgeons should be involved with the patient’s management. As Dr Malangoni’s studies showed, outcome was improved when the patients are admitted to a surgical service.

Why do you allow the medical service to admit any patient with a bowel obstruction?

Dr Wendy Wahl: I think the use of CT scan for the medicine service was liberal, but remember, a lot of those patients were evaluated in the emergency department before surgeons saw them. And, if they had had a clear indication to go to surgery, they probably would have gone to surgery. Therefore, CT was used to differentiate what should happen with them.

And again, the vast majority of the patients had some other issue going on with them. Therefore, we wanted to get a CT scan to see whether they really have to go right
now, or whether we can stabilize this medical issue. So I think that explains the CT scan issue.

I don’t have data on compliance, however, for the 3 parts of the article, but that’s an excellent idea.

Regarding the timing of laparotomy, for surgical patients, it’s obviously very short. For the patients who went to medicine, particularly those in the latter half of the study, after the guidelines, they all had significant medical issues.

One was having acute myocardial infarction and needed cardiac catheterization. One was experiencing rejection after a lung transplantation. A couple patients had inflammatory bowel disease. And there were attempts to see whether they would improve with treatment.

So they all really had issues that needed stabilization. They were followed carefully. And I think the difference was that was not stated is a lot of these patients had high grade although not necessarily complete bowel obstruction, so the service felt comfortable waiting to see whether these other issues would improve, and then intervene when they thought they were medically ready.

I also agree with Dr Luchette that SBO is an operative disease. And I was somewhat surprised, when we pulled the data, how many patients actually did go to medicine with bowel obstructions. But you have to remember that many in this patient population with SBOs were those patients who felt a little urpy, who never really manifested full-blown symptoms. And these were not patients who were in great need for an operation.

And I think if anybody looks at their hospital admission, there’s probably a lot of people with bowel obstructions who are never seen by a surgeon that don’t really know about it until you look, unfortunately. I think, in this day and age, when there is a limit to the amount of residents and physician capacity, you really want patients to go where they best need to go.

In addition, this resulted in increased workload for surgery. The patients actually stayed in the hospital for a shorter period of time, but you wouldn’t want 100 more patients to go to surgery that had partial SBOs and had congestive heart failure and other medical diagnoses that you’re not going to best treat.

So I think I agree with Dr Luchette, those that really need an operation should be on a surgery service. And those that have mostly primarily a medical diagnosis should go to medicine. And that was one of the reasons why we formulated this guideline.

Dr Thomas Stellato (Cleveland, OH): Am I correct, does your protocol say that everyone gets an abdominal series, plain x-rays?

Dr Wendy Wahl: Yes. That’s a starting point. And that’s why a lot of the surgical patients never went on to get a CT scan.

Dr Thomas Stellato (Cleveland, OH): That being the case, it looked like 100% of your medical patients got CT scans, so there’s a disconnect here. If you went back and looked at those patients who had both abdominal series and CT scans, did the CT scans add anything to those patients in whom it was mandated to have an abdominal series? It seems like the advanced technology should replace the plain films. Can you comment on that?

Dr Wendy Wahl: Yes. If you look at the literature now, if you can make the diagnosis on plain radiographs, CT really does not add a lot. CT is only for those patients in whom it’s unclear. For the people that went to medicine and had an operation, I actually went through their charts in a lot of detail. And in some cases, it was not clear, based on their plain films, that they had an obstruction. And in some cases, they did have a CT scan, and they were not completely obstructed. And then over days, they needed an operation. That was some of the patients.

So, I think in those cases, CT did add information, but remember, it’s a very small percentage. Although it was 100% of the patients going to medicine needing an operation, it was only 14% of patients with a bowel obstruction. So although it looks like a big number, it really isn’t, compared with 30% use in the surgery patients.

Dr Gerald Larson (Louisville, KY): I would applaud you on the setting up this guideline, and then the effort it must have taken to reach all of the providers. You think of all of the residents and the medical services and in the surgical services who had to buy into this.

My question has to do with how you prepared to set up this guideline and get compliance and buy-in throughout your institution.

Now, I gather this was all at 1 hospital, and everybody was full-time at this hospital. So once they got it, they got it. But, still, just the number of residents you had to reach with this message, and attendings, it had to be a fairly large number. How did you manage that?

Dr Wendy Wahl: I think the most important thing about this was there was a problem. People sensed there was a problem. And they were more likely to cooperate in fixing the problem because they believed there was a problem.

If we had just said, “We want to do this guideline and you need to do this,” probably people wouldn’t have bought in. But everybody believed that something should be done to improve things. And so there was buy-in to the project to begin with.

In terms of disseminating the information, basically went through the general surgery faculty meetings, we had a grand rounds. I went to the residents’ educational sessions. And then, the emergency department did the same thing at their meetings. And so did medicine. Because they really wanted this.

The medicine people and the emergency medicine people really wanted this. So they really worked hard to disseminate the information. And then, the guideline was actually on the Web site. So everybody was able to see this.

And I said, you know, “if there’s a problem, and anyone is having a problem with this, feel free to call me, 24 hours a day, 7 days a week.” And so that helped with the residents. But a lot of work. And you have to just figure out how you’re going to disseminate the information.
Dr Janice Pasieka (Calgary): Can you tell us what the pathology was on the surgical patients? And how many near-misses that there were? How many bowel resections versus lysis of adhesions?

I’m always concerned, when the patient is not on the surgical unit, that we miss it. And we miss the opportunity to go in and save the piece of bowel that’s obstructed or a closed loop early on in its course, and we’re waiting for the patient to really deteriorate before the penny drops and we say, “ah, this patient’s sick and needs an operation.”

Dr Wendy Wahl: I don’t have the numbers to stay statistically there was a difference. The medicine patients did look like they had a high resection rate, but some of them were cancer related. So that may have contributed.

So it’s hard to compare, when you get down to really small numbers, in terms of saying what is significant or not.