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## Surgeon Attitudes and Practice Patterns in Managing Small Bowel Obstruction: A Qualitative Analysis

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### Abstract

**INTRODUCTION**—Historical training instructs surgeons to, “never let the sun set on a small bowel obstruction (SBO)” due to concern for bowel ischemia. However, the routine use of CT scans for ruling out ischemia provides the opportunity for trial of non-operative management, allowing time for resolution of adhesive SBO. In light of advances in practice, little is known about how surgeons manage these patients, in particular, whether there is consistency in the stated duration for safe non-operative management.

**MATERIAL & METHODS**—Using a case vignette (a patient with CT-scan diagnosed complete SBO without bowel ischemia), we interviewed a purposive sample of general surgeons practicing in Washington State to understand stated approaches to clinical management. Interview questions addressed typical practice, preferred timing of surgery, and approach. We conducted a content analysis to understand current practice and attitudes.

**RESULTS**—We interviewed 15 surgeons practicing across Washington State. Surgical practice patterns for patients with SBO vary widely. The period of time that surgeons were willing to manage patients non-operatively ranged from 1–7 days. Interviews revealed insight into surgical decision making, the importance of patient preferences, variation in practice, and evidence gaps.

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Thornblade: study design, surgeon recruitment, conduct of interviews, data analysis, manuscript writing

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Thornblade: none

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All surgeons acknowledged a lack of evidence to support appropriate management of patients with SBO.

**CONCLUSIONS**—Interviews with practicing surgeons highlight a changing paradigm away from routine early surgery for patients with adhesive SBO. However, there is lack of consensus in the appropriate duration of non-operative management and practices vary considerably. These revealed attitudes inform the feasibility and design of future randomized studies of patients with adhesive SBO.

### Keywords

small intestine; intestinal obstruction; clinical practice patterns; clinical decision-making; diagnostic imaging; small bowel obstruction

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## INTRODUCTION

Small bowel obstruction (SBO) is a common problem. It is estimated that one fifth of patients who undergo abdominal or pelvic surgery will later develop an obstruction related to adhesions.<sup>1,2</sup> Hospital stays for treating SBO average 8 days in length and number over 350,000 annually in the US at a cost of \$2.3 billion.<sup>3–5</sup> A minority of SBOs are complicated by intestinal ischemia that requires emergency surgery. As a result, the historical convention was to “never let the sun rise and set on a small bowel obstruction.”<sup>6</sup> However, the increasing availability and accuracy of imaging in the emergency department, as well as other diagnostic tools, has allowed surgeons to more carefully triage those with complete obstruction and concerns for ischemia.<sup>7</sup> New evidence for the use of enteral contrast studies (e.g. Gastrografin®, Braco Diagnostics Inc., Monroe Township, NJ) in the diagnosis and prognosis of SBO has also facilitated the practice of selecting some patients for non-operative management.<sup>8</sup> As a result, many surgical practices now include a period of non-operative management including nasogastric decompression, IV fluids, and bowel rest, in those patients without signs of bowel ischemia. In recent studies, findings suggest that a proportion of patients (28–75%) with complete bowel obstruction may not require surgery.<sup>9–12</sup> However, a review of the literature revealed no published randomized trials comparing early operation with expectant management, thus evidence to guide surgeons in this practice is limited. Despite a change in the paradigm of the timing of surgery for SBO, current practice patterns among general surgeons in the United States is not known.

We have observed that the duration of non-operative management varies among surgeons caring for patients with SBO. Using a qualitative approach, we sought to understand how surgeons’ decide to operate on patients with SBO, their preferences for in-hospital care and operative approaches, and their attitudes regarding the duration of non-operative management. Qualitative research methods are suited to understanding stakeholder perspectives, especially in the context of diverse opinions. The aim of this study is to understand variability in the stated approach to SBO management and to allow surgeons’ voices to shape possible areas for future research that will guide care for patients with SBO.

## MATERIALS & METHODS

As part of our ongoing efforts to engage practicing clinicians in research, we conducted interviews with general surgeons participating in the Surgical Clinical Outcomes Assessment Program (SCOAP), a statewide physician-led initiative for quality improvement in surgery at 38 hospitals in Washington State (WA) and Oregon (OR).<sup>13,14</sup> We performed purposive sampling to include surgeons from both academic and private practices and in both urban and suburban settings. Surgeons were interviewed in person or by phone until thematic saturation—the point where additional interviews did not reveal new information—was achieved. All participants provided verbal consent. This study was reviewed by the University of Washington Internal Review Board and exempted as low risk.

A semi-structured interview guide was developed to frame discussions with participants around their clinical management of SBO (Appendix 1) (LT, AT, DF, GD, & DL). Interviews were conducted by three investigators (LT, AT, & DL). The topics discussed in each interview are summarized in Table 1. In order to focus the discussion on clinical management, each surgeon was presented with a standardized case vignette of a patient with suspected adhesive SBO without signs of intestinal ischemia (Table 2). All interviews were audio-recorded and transcribed, after which transcripts were reviewed for accuracy by two researchers (LT & AT).

We performed a conventional content analysis of surgeons' opinions on managing patients with small bowel obstruction.<sup>15</sup> After review of all transcripts, the research team developed a set of codes representative of key concepts present throughout the interviews. Two researchers then independently coded all transcripts for recurring textual concepts (LT & AT). A consensus process was applied to resolve any conflicts in coding. Once review and coding of all interview transcripts was complete, the research team identified central themes that emerged among the majority of subjects (LT, AT & DL). All coding was performed using commercially available computer-assisted qualitative data analysis software (Dedoose v. 7.5.4).<sup>16</sup>

## RESULTS

We interviewed 15 general surgeons practicing at 11 hospitals in WA State and one hospital in Oregon. Participants were 47% female (n=7) and had a mean of 11 years of practice (standard deviation: 9 years) experience since completing residency. More than half of subjects had some subspecialty training (colorectal surgery (n=8), minimally invasive surgery (n=1), trauma & critical care (n=2)). Interviews lasted between 8 and 29 minutes. Characteristics of surgeons interviewed in this study are summarized in Table 3. Surgeons reported frequent experience treating patients with SBO (ranging from 12 to 100 patients annually). We describe surgeons' use of diagnostic imaging, the role of early surgeon involvement, factors influencing surgical decision making, time to operative management, preferences in surgical approach, accepted variation in practice, and respect for surgeon autonomy.

### Use of cross-sectional imaging

Most surgeons agreed that, while CT scans may not be necessary for all cases, they have become a standard part of the workup of patients with suspected SBO. One surgeon said, “Almost everybody, by the time the ER consults me, has had a CT scan...[but] plain abdominal radiographs I think are just as good in most cases.” The majority of surgeons interviewed indicated that they use enteral contrast studies (e.g., Gastrografin®) either selectively (n=5) or routinely (n=8) in patients with suspected SBO whereas only one surgeon reported not using any enteric contrast studies. Contrast studies were commonly cited as a deciding point for selecting operative therapy. One surgeon stated, “if [the Gastrografin] goes through them, then I think I’ve speeded up their recovery...and if it doesn’t...I more quickly come to the decision that, ‘yep, you need surgery.’”

### Choice of medical service

Surgeons discussed the choice of managing patients with SBO as a consultant to an inpatient medicine service or as a primary patient on a surgical service. Most preferred managing patients directly on their own surgical service. One surgeon stated, “I was trained [that] small bowel obstruction patients were admitted through a medical service, and the surgeons were only consulted. And, for a number of reasons, I think that that’s not the best thing for the patients.” The importance of early surgeon involvement was often mentioned, highlighting the added value of serial physical exams and experienced clinical decision making. One surgeon said that, “serial abdominal exams are critically important, rather than coming late on the case.” Several surgeons cited “*subtle*” changes in clinical status as being important in recognizing when to operate.

### Duration of expectant management

The duration of expectant non-operative management varied widely among surgeons. Given the standardized clinical vignette of a patient with adhesive SBO without signs of ischemia (Table 2), a third of surgeons stated that they would wait no longer than 24 hours prior to operating (n=5). Another third would wait up to 48 hours for that patient’s obstruction to resolve (n=5). Three surgeons were comfortable waiting up to 72 hours and one surgeon stated that they would wait up to one week. One surgeon favoring early operative management stated, “She’s vomiting and she’s had no passage... I’d probably give her less than 12 hours.” In contrast, another surgeon stated, “As long as their vital signs and everything else is normal, their labs are pretty stable, I will wait and wait and wait.” Differences in stated duration of non-operative management may be related to surgeons’ prior experience. A number of surgeons cited recent experience in caring for a patient with SBO as the reason for preferring either early or delayed surgery.

### Surgical decision making

Surgeons identified several factors that were important in supporting their surgical decision making for patients with SBO. Distinguishing between partial and complete bowel obstructions was raised and several surgeons indicated that a complete bowel obstruction was a stronger reason to proceed to the operating room than a partial obstruction. One surgeon stated, “Are they complete or partial? That’s the most important question” While

other surgeons voiced doubts about the importance of this distinction. One said, “All the time [people] come in with a complete obstruction. Yet they get better. I’ve certainly had that experience. So I don’t really care about this radiographic read of complete obstruction.” Other important decisional factors for proceeding to the operating room included changes in clinical exam. One surgeon stated, “if they’re painful or tender then that changes the algorithm [and] we’re more likely to take them to surgery.” Another said, “getting a sense of... how their exam is progressed, how quickly the symptoms have onset, I think it’s really important in trying to decide how much time you have to play with before you progress to surgery” The most common reason that surgeons cited for deciding when to operate was a patient’s failure to “*progress*” after a period of observation. Lastly, surgeons often reported that institutional factors such as operating room availability play a role in surgical decision making.

### Patient preferences

Another important factor in surgical decision making was patient preferences. Several surgeons identified delayed surgery as a potential burden on patients but also acknowledged that patient-centered outcomes including “[surgical] complications...scar tissue, speed to return back to normal activities” may outweigh length of hospital stay. One surgeon said, “As a patient I wouldn’t want to wait more than about a week [laughter], I think, because if you’ve been waiting that long, and then you go to surgery, you’re going to be in the hospital for an extra week. Then you’re talking about two weeks of being hospitalized.” Surgeons also point out that not all patients will have the same set of preferences. One said, “there are patients who have a low tolerance for sitting around and waiting. And then there’s people who don’t want to have surgery basically at all costs”

### Use of laparoscopy

Nearly half of those interviewed (n=7) indicated a clear preference for routine open surgery. Others use laparoscopy either selectively (n=4) or routinely (n=4). Treating patients with a history of only one prior surgery was reason to consider laparoscopy as a viable option. Reasons for favoring open surgery included significant bowel dilation, difficulty establishing pneumoperitoneum, and presence of existing adhesions. One surgeon said that, although they often consider it, they have “*never been successful operating laparoscopically [for SBO]*”. Some took a pragmatic approach, stating: “generally I find making a relatively small incision would get you the same thing done a lot faster and more safely” while others use open surgery as rule: “I don’t usually do bowel obstructions laparoscopically. That’s one of the few areas where I’m fairly adamant.”

### Acknowledged variation in practice

Not only did we observe a range of practice preferences for managing SBO, a recurring theme was surgeon acknowledgement and acceptance of this variation. One surgeon simply stated, “We all have our own opinions about how we think people are going to do.” Another said, “I think there is a lot of variability...so it’s hard to say that one way is going to be right or wrong.” Many surgeons agreed that to “never let the sun rise and set on bowel obstruction” is no longer the standard of care. When asked to identify the standard of care in SBO management one surgeon said, “I think the standard of care used to be the “don’t let

the sun rise and set on a complete obstruction”. And I think that's changing. So I wouldn't say that's certainly the legal definition of standard of care anymore. I think it's more open to if you're willing to follow the patient closely, and you have a reason for not operating, then I think that's fair.”

When asked to explain this variability, one surgeon noted, “I think that the way I was trained was probably not the way [SBO management] should be practiced.” Another suggested that geographic and facility factors are a reason for variation in surgical approach: “Some of the smaller [hospitals] further away, they may not be used to it so they're going to probably go more to an open [operation].” Other surgeons also acknowledged differences between hospitals, saying: “We tend to be more aggressive than other [hospitals] will be.”

### Evidence Gaps

Surgeons were asked to identify evidence gaps as priorities for future research in the management of SBO. A commonly cited issue was the lack of hard signs to indicate the need for surgery. One said, “the problem is, we don't have great clinical indicators, which push us [to operate].” A common concern was the “discordance between what your clinical impression is and what might be going on in their belly.” Another relevant evidence gap that was identified was the uncertainty about management of patients with recurrent SBO. One surgeon said, “we don't know, in people who do eventually open up [after expectant management] how many times is it reasonable to let them keep doing that?...people come in every six months or year [...] in those people I struggle.”

Surgeons cited a lack of rigorous evidence to support decision making and some reported guidance by “*anecdote*” alone. One said, “we don't have any idea of what we're doing as far as a standardized approach, it is all on the job learning that we've had for the most part.” One potential area for future research included clarifying the appropriate timing of surgery for patients with SBO. One surgeon asked, “Could I wait a week... [or] should I have just gone [to the OR] at 24 hours?” Another surgeon said they would like to “figure out if there is something that predicts a response [to expectant management] within 24–48 hours”.

### Respect for surgeon autonomy

While exploring these evidence gaps and variation in the management of SBO, a common theme emerged of surgeon autonomy. Often surgeons placed emphasis on the importance of independent surgeon judgement in light of limited evidence and standards for managing patients with SBO. One surgeon said, “I would not second-guess somebody who's standing there looking at the patient [...] because that's the person who's going to be operating on the patient.” Surgeons also highlighted the importance of “trust” among their clinical partners. One surgeon said, “I work in an acute care model so I hand over my patients all the time and I have to trust my colleagues to manage patients the way they want to [...] so I mostly let other people make their decisions.” Another surgeon emphasized autonomy, saying, “I would have to respect the judgement of another surgeon making an independent decision about what they think is right.”



## DISCUSSION

We sought to understand surgeons' practice patterns in the care of patients with SBO. By conducting interviews, we gained insight into choice of preoperative imaging, factors that influence surgeons' decision making, the timing of surgery, operative approach and critical gaps in evidence. We found that there was general agreement in use of CT scans and enteral contrast (i.e. Gastrografin®) in workup and the importance of early surgeon involvement in the care of patients with SBO. We observed that surgeons report a wide range of practice in duration of non-operative management (between 1 and 7 days). While some surgeons choose laparoscopy, half prefer an open approach to exploring SBO. We have identified that surgeons accept some degree of variation in practice and that there is a common value of surgeon autonomy in areas where evidence is lacking.

Many past studies have advocated for the use of early surgical intervention for patients with SBO.<sup>17-20</sup> Concern about increased morbidity and mortality due to delay in treatment of intestinal ischemia associated with obstruction led surgeons to adopt the maxim of "never let the sun rise and set on a bowel obstruction".<sup>6,21</sup> However, this practice of routine early surgery may have been most appropriate in an era when it was difficult to identify obstructions due to hernia, closed bowel loops, tumor, or with possible bowel strangulation. CT scans have been shown to have high sensitivity for intestinal ischemia in the setting of SBO,<sup>7,22,23</sup> and given increases in the use of CT scans to support decision-making, a number of studies have demonstrated resolution of SBO in 28-75% of patients during a period of non-operative expectant management.<sup>9-12,24-26</sup> The use of enteral contrast studies (i.e. Gastrografin®) has also changed the paradigm of selecting patients who may be most appropriate for a trial of non-operative management.<sup>8</sup> While there has been a change in practice away from strict early surgery, it is not known whether delaying operative intervention is associated with differences in either clinical and patient reported outcomes or cost. In fact, current guidelines from the Eastern Association for the Surgery of Trauma (EAST) regarding non-operative management of three to five days for patients with SBO are based upon level 3 evidence (i.e. adequate scientific evidence is lacking).<sup>27</sup> In our study, we identified that general surgeons vary widely in the length of time they are willing to manage patients with SBO non-operatively.

The importance of early surgeon involvement was emphasized by many of the surgeons interviewed in this study. Recent findings from retrospective studies indicate that management of patients on a surgical service rather than a medical service is associated with improved outcomes and lower costs.<sup>28,29</sup> In our study, surgeons expressed a concern about subtle changes in physical exam which might be missed by clinicians who have less experience in caring for patients with SBO. The emphasis on early surgeon involvement and serial abdominal exams led many to indicate a preference for patients with SBO to be managed on a surgical service.

Use of laparoscopy in surgical exploration for SBO has been examined and has been shown to have favorable outcomes and shorter length of stay compared with conventional open approaches among select patients.<sup>30,31</sup> In our study, we found nearly half of surgeons interviewed prefer open surgery for patients with SBO as described in our scenario. For

those surgeons who use laparoscopy selectively, the degree of bowel distension and the ease of visualizing the site of obstruction was commonly cited as a reason for choosing an open approach over laparoscopy. While the EAST guidelines indicate that laparoscopy is a viable alternative to laparotomy,<sup>27</sup> these findings reveal that practice patterns in our region vary. Several surgeons cite institutional practice as the reason for their choice of surgical approach.

Qualitative methods provide an opportunity to understand contextual factors that may explain practice patterns not achieved through other quantitative methods. By applying a qualitative content analysis of data from surgeon interviews, we are able to identify and describe contextual factors that inform practice variation. For example, surgeon autonomy emerged as central to clinical decision making in the absence of clinical evidence.<sup>32</sup> When we asked surgeons about variation in practice among other surgeons in their communities, most indicated a respect for others clinical judgement, even if it differed from their own. Although no established standard of care exists in the timing and approach to surgery for SBO, most surgeons indicated that the insight of the surgeon at the bedside trumps other clinical standards. By acknowledging variation in practice patterns and by highlighting evidence gaps in the management of SBO, surgeons participating in this study have set the stage for further in research on this this topic.

There are important limitations to qualitative research methods. First, by employing an interview-based methodology we did not seek statistical power to address questions such as the association of years in practice with practice patterns. Second, in this study we have gathered a range of opinions from surgeons who are active in SCOAP and who care for patients with SBO. It is difficult to know whether these opinions are generalizable to the greater surgical community such as hospitals not participating in a state-wide surgical collaborative. To address this concern, we continued recruitment of surgeons until it appeared we achieved thematic saturation. We also used a sampling strategy that resulted in an even gender balance and a sample of general surgeons both with and without subspecialty training. We feel our sampling indicates successful outreach into the surgical community and thus our findings retain validity. Third, there is a risk that, in the process of conducting interviews and coding interview transcripts, researchers may introduce their own biases into the data. We worked to minimize this bias by assigning separate researchers to code transcripts; both from clinical and non-clinical backgrounds with established processes for resolving disagreements in coding.

## CONCLUSIONS

When treating patients with presumed adhesive SBO, general surgeons apply varied practices and tolerate a wide range of time to operative management. As the paradigm of strict early surgery for SBO has changed, some surgeons express uncertainty about the optimal management of patients with this condition. A future randomized trial of early versus delayed surgery for adhesive SBO may clarify the choice of surgical treatment for these patients.



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## **Appendix 1: Semi-structured Interview guide for interviews with surgeons on attitudes and practice patterns on management of small bowel obstruction (SBO)**

This interview is part of a study on management of small bowel obstruction. Because of your clinical expertise, I'm hoping to get some insight into how you manage patients with SBO. Taking part in this study is totally voluntary and you can choose whether or not to provide an answer to any of the questions. I expect that this will take 10–15 minutes.

And just to clarify, I won't use your name or identifying information in any publication that comes out of this study.

Before we start, are you ok with this interview being recorded?

I want to start by getting a little information about you and your practice:

In what year did you complete your surgical training?

Do you have any subspecialty training, such as in colorectal surgery, MIS, or trauma/critical care? Or other?

On average, how many patients with SBO do you see each year?

At your hospital, how are you most commonly consulted for patients with SBO?

Can you walk me through your general approach to working up and treating patients with SBO?

PROBE: Oral contrast, NG, CT scan

For the next part of the interview, I want to focus our discussion by reviewing a case.

This is a 45 year old female who presents to the ED with 24 hours of abdominal distension, nausea and vomiting. She has a past history of laparoscopic hysterectomy for fibroids but no history of cancer, radiation, or inflammatory bowel disease. Her clinical exam is consistent with a small bowel obstruction without peritonitis. Her vital signs are normal. A CT scan reveals a complete SBO with a transition point in the right lower quadrant. There is no evidence of hernia, mass, free fluid, or any signs of ischemia or perforation. Labs show a normal WBC, lactate, and a mild metabolic alkalosis.

In your practice, what proportion of patients with SBO have a similar presentation to this?

What are your initial thoughts on management of this patient?

In your practice, how long after admission would you wait for the patient's obstruction to resolve before operating?

Tell me what you would think if a surgeon, such as one of your partners, decided to wait:

OPTION: 5 days for the obstruction to resolve before operating?

OPTION: <24 hours for the obstruction to resolve before operating?

Do you think there is a standard of care for management of these types of patients?

Is your surgical approach for these cases typically open or laparoscopic?

Let's shift gears a little bit:

In your opinion, is there an area in which clinical evidence is lacking for guiding management of SBO? And if so what areas?

PROBE: for example, surgical approach, timing of surgery, patient characteristics that are appropriate for surgery.

PROBE: What type of new data would best inform your practice?

At SORCE, we are considering conducting a trial which would randomize patients [like the one above] with complete adhesive small bowel obstruction to either early surgery or expectant management [with rescue surgery].

What do you think about this kind of study?

Would you agree to randomizing patients in your practice?

IF YES: If you were to enroll patients in this trial, how soon after admission would be an appropriate time for randomization [12, 24, 48 hours, no preference?]

If you were to enroll patients in this trial, how long would you be willing to manage a patient in a non-surgical arm (with surveillance for ischemia) before proceeding to surgery?

PROBE: 2 days, 5 days, 7 days, 10 days?

Are there certain patients you would consider specifically including or excluding from such a trial?

PROBE: E.g. pts with history of SBO, IBD

Are there any other things you think should be considered about development of such a study?

IF NO: Why not?

PROBE: Are there any other things you think we should consider for determining inclusion or exclusion criteria?

**Table 1**

Topics discussed with surgeons during interviews about management of small bowel obstruction (SBO)

<b>Topic</b>	<b>Description</b>
Prior training	Surgeons described how they were originally taught to manage SBO
Routine workup of SBO	Surgeons described their typical approach in reaching a diagnosis of SBO
Use of imaging	Surgeons described what type of imaging they order (plain film or axial imaging) when working up patients with suspected SBO and whether they use enteral contrast studies (e.g. Gastrografin®)
Preoperative management	Surgeons described their approach to initial management of SBO including use of IV fluids, choice of inpatient service, and use of serial abdominal exams
Use of nasogastric decompression	Surgeons were asked about their preference routine use of nasogastric decompression
Duration of non-operative management	Surgeons were asked, based upon a standardized case (Table 2), how long they would manage a patient non-operatively prior to proceeding to the operating room for exploration
Preferred surgical approach	Surgeons described their preferred surgical approach to SBO (i.e. laparoscopic vs. open)
Standards of care	Surgeons were asked their opinion about whether there is a standard of care for management of SBO
Evidence gaps	Surgeons were asked to identify areas where evidence is lacking to support evidence-based practice in SBO
Research priorities	Surgeons highlighted priorities for future research in the management of SBO

**Table 2**

## Standardized clinical vignette used in surgeon interviews

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This is a 45 year old female who presents to the Emergency Department with 24 hours of abdominal distension, nausea and vomiting. She has a past history of laparoscopic hysterectomy for fibroids but no history of cancer, radiation, or inflammatory bowel disease. Her clinical exam is consistent with a small bowel obstruction without peritonitis. Her vital signs are normal. A CT scan reveals a complete Small Bowel Obstruction with a transition point in the right lower quadrant. There is no evidence of hernia, mass, free fluid, or any signs of ischemia or perforation. Labs show a normal WBC, lactate, and a mild metabolic alkalosis.

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**Table 3**

Characteristics of surgeons interviewed about management of small bowel obstruction (n=15).

Mean years in practice:	10.6 ± 8.7 47%
Women:	47%
Subspecialty training:	
Colorectal	53%
Minimally Invasive Surgery	7%
Trauma & Critical Care	13%
Hospital Type:	
Academic Medical Center	13%
Community Medical Center	80%
Military Hospital	7%
Population:	
Urban	40%
Suburban	60%

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