



# Why Do Physicians Order Unnecessary Preoperative Tests? A Qualitative Study

Steven R. Brown, MD; Jaclyn Brown, MD

**BACKGROUND:** Routine preoperative testing is ineffective and costly. We explored reasons for the continued use of unnecessary preoperative tests and approaches to limit such testing.

**METHODS:** We interviewed 23 physicians and nurse administrators involved in preoperative decision-making in our local health care environment. We conducted interviews using a semi-structured format and analyzed the data using a template organizing style.

**RESULTS:** Some interviewees feel routine preoperative tests are beneficial, others are ambivalent about preoperative tests in their practice, and many believe there is considerable unnecessary testing. As interviewees discussed factors that lead to the ordering of unnecessary preoperative tests, five major themes emerged: practice tradition, belief that other physicians want the tests done, medicolegal worries, concerns about surgical delays or cancellation, and lack of awareness of evidence and guidelines. Interviewees suggested that a consensus guideline, improved education, and increased collaboration between specialties could decrease unnecessary testing.

**CONCLUSIONS:** Our qualitative findings demonstrate barriers to limiting unnecessary preoperative testing but also suggest interventions that could improve the preoperative testing process. Minimizing unnecessary preoperative tests could decrease cost, maximize quality, and improve the patient experience.

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**D**uring pre-surgical evaluations, physicians frequently order a battery of tests. Preoperative laboratory testing in the United States costs at least \$18 billion annually.<sup>1,2</sup>

The value of routine preoperative testing has been challenged. In fact, preoperative tests rarely change management<sup>3-6</sup> and may cause harm to patients.<sup>6-9</sup> Up to 93% of preoperative tests are not indicated.<sup>7,10</sup> Two recent randomized controlled trials show there is no benefit to preoperative testing in cataract surgery

patients<sup>2</sup> and ambulatory surgical patients.<sup>11</sup> Many physicians feel these tests are unnecessary.<sup>12</sup>

Numerous experts have called for an end to routine preoperative testing, including the American Society of Anesthesiologists and the Institute for Clinical Systems Improvement.<sup>1,3,4,13,14</sup> The American Society of Anesthesiologists has published a practice advisory<sup>3</sup> noting that “preoperative tests should not be ordered routinely,” and it outlines indications for commonly used tests (Table 1).

In addition to savings of at least \$10 billion annually in the United States,<sup>7</sup> the elimination of unindicated preoperative testing could improve patient safety,<sup>1</sup> eliminate delays,<sup>15</sup> limit harm from unnecessary follow-up of abnormal tests,<sup>7,14</sup> improve system efficiency,<sup>14,15</sup> decrease postponement of surgery,<sup>7,14,15</sup> and improve the patient experience.<sup>14,15</sup>

It is unclear why routine preoperative testing is still widespread. Reasons for continued use of routine preoperative tests are poorly understood. Authors have hypothesized that factors include the following: institutional policies and procedures,<sup>4,6,12,16</sup> medicolegal worries,<sup>4,6,9,12</sup> concern about surgical delays,<sup>4,15</sup> complex health care environments,<sup>14</sup> the difficulty of changing ingrained behavior,<sup>6,7</sup> and a belief among physicians that other physicians want the tests performed.<sup>2,12</sup> While these factors are discussed in the literature at length, only one study, a 1995 written survey of doctors involved in cataract surgery,<sup>12</sup> has directly studied physician opinion and practice. Physician opinion has not been examined in an ambulatory surgical setting, other than decision-making around cataract surgery. Additionally, it is not known if physicians still cite the above factors as the most important reasons for routine preoperative testing after the publication of two recent guidelines.<sup>3,13</sup>

From the Banner Good Samaritan Family Medicine Residency, University of Arizona.

**Table 1: 2002 Practice Advisory for Preanesthesia Evaluation**  
**A report by the American Society of Anesthesiologists Task Force on Preanesthesia Evaluation**  
**Tests to consider on patients with no active issues identified on history and physical**

Test	Indication
Electrocardiogram	If not EKG in the last year: "older" patients. Cardiac risk factors like hypertension, smoking, peripheral vascular disease, congestive heart failure, morbid obesity.
Chest X ray	May consider for advanced age, smokers, stable chronic obstructive pulmonary disease, stable cardiac disease, recent resolved upper respiratory infection.
Hemoglobin and hematocrit	Possibly if extensive procedure planned. Known history of anemia, liver disease, bleeding disorders, other hematologic disorders.
Prothrombin time or partial thromboplastin time	Known liver dysfunction, renal dysfunction, bleeding disorders, on warfarin, or if extensive procedure planned.
Chemistries	Known endocrine disorders, diuretic use, risk of renal or liver dysfunction.
Urinalysis	Possibly for urologic procedures.
Pregnancy test	Consider for all female patients of childbearing age.

Recent editorials have emphasized the need for leadership to reduce unnecessary preoperative testing.<sup>1,14</sup> Physicians in several specialties and numerous other health care professionals are involved in preoperative decision making. Therefore, any attempt to eliminate routine testing will require a solution that is acceptable across disciplines. Efforts to limit tests have focused on anesthesiologist-directed preoperative clinics<sup>9,15,17,18</sup> or changes in institutional policy.<sup>16</sup> Qualitative methods have not been used to understand beliefs that may be barriers to care improvement. As described by Grimshaw, assessing barriers is critical to implementing change.<sup>19</sup>

We conducted a qualitative study by interviewing preoperative decision-makers in our local health care environment. The purpose of our study was to describe the factors that lead to the ordering of preoperative tests and to generate hypotheses about interventions that might decrease unnecessary preoperative testing.

## Methods

### *Participants*

We interviewed 19 physicians (five anesthesiologists, five general surgeons, two orthopedic surgeons, seven primary care physicians) and four nurse administrators. We selected anesthesiologists and surgeons involved in low-risk surgeries in the main operating room and the surgery center at our local hospital, including department heads and those in committee leadership positions. We interviewed a convenience sample of local primary care doctors, which included five family physicians and two general internists. Eleven of the physicians are men, eight are women, and the interviewed physicians had been in practice between 5 and 34 years (median=16). All nurse administrators are women. Three of the four nurse administrators were surgery center nurse administrators, the fourth was recommended for interview by a surgeon and was a nurse administrator with a wider scope of duties.

As part of the process of "chain sampling,"<sup>20</sup> we asked all interviewees to recommend key local decision-makers for additional interviews. We

sought divergent opinions by asking interviewees for recommendations of people to interview that had differing views from their own. We did not interview physicians with whom we work closely.

The medical center is an urban, medical school-affiliated, tertiary care hospital with 650 beds and numerous residency programs, including family medicine, internal medicine, obstetrics-gynecology, and general surgery. To appropriately represent our practice environment, we selected some interviewees who are educators at the medical center. Most interviewees are physicians in private practice.

The Institutional Review Board approved this study, and we obtained written consent from all participants.

### **Interviews**

We conducted semi-structured interviews.<sup>21</sup> We generated a topic guide (Table 2) by studying the existing literature. Our topic guide was peer reviewed and was adapted slightly based on interim analysis of the transcripts. Having reviewed the literature to design this study, both authors had preconceptions about the value of routine preoperative tests.

In an effort to minimize the effect of these preconceptions, we asked open-ended questions. We recorded and transcribed the interviews, which varied in length from 8 to 45 minutes. All interviews were complete. We stopped scheduling new interviews when our interim analysis of transcripts revealed that no new themes were emerging (termed “saturation”),<sup>20</sup> and recommendations from interviewees of new people to interview mentioned names of people we had already interviewed.

One author is a family physician and educator with 9 years’ practice experience, and one author is a family medicine resident.

### Analysis

We analyzed the data using a template organizing style.<sup>20,21</sup> Based on our review of the literature, we developed a preliminary template into which we could organize interview themes. We both coded transcripts as they were completed, and based on consensus adjusted our analysis framework as our understanding of the key concepts expanded. Several themes were added based on this interim analysis, some modifications to themes were made, and some of our preliminary understanding of this topic was confirmed. At the conclusion of the interviews, we both coded all transcripts for themes we identified, and we reached consensus by comparing our two analyses.

### Results

Themes that emerged during our interviews can be grouped into several categories: the necessity of preoperative tests, factors that lead to the ordering of unnecessary tests, and suggested strategies for decreasing unnecessary testing.

#### *The Necessity of Preoperative Tests*

Our interviewees have mixed opinions about the necessity of preoperative tests. Some feel preoperative tests are beneficial, others are ambivalent about preoperative tests in their practice, and many believe

**Table 2: Interview Topic Guide**

Opening statement:

We are doing a study on the use of preoperative tests. (If clarification is necessary: We are focusing on tests considered “routine,” including blood tests, urinalysis, ECG, chest X ray. These routine tests are tests in which abnormal tests are unsuspected.)

- **How would you describe your practice?**
  - \* What surgeries are you involved in?
- **What is the role of preoperative testing in your practice?**
  - \* How are preoperative tests incorporated into the care of your patients?
  - \* How does preoperative testing help your patients?
  - \* What do you do if there is an abnormal preoperative test?
  - \* How do you decide which tests to order or require?
  - \* Do you have a routine for ordering preoperative tests?
  - \* Are there any preoperative tests every patient should have?
  - \* Who generally orders preoperative tests on your patients?
  - \* Why do you order or require preoperative tests?
- **How necessary is preoperative testing?**
  - \* Which tests are necessary? Which aren’t?
  - \* Are you familiar with the evidence about the benefits of preoperative testing?
  - \* Do you use any guidelines when deciding which tests to order preoperatively?
- **How do you feel about efforts to limit preoperative testing?**
  - \* What do you think could be done to limit unindicated preoperative testing?
  - \* How would this benefit patients?
- **Do most of your colleagues practice the same way as you?**
  - \* How similar or different are your opinions compared to most of your colleagues?
  - \* Who might have a different view than you?

there is considerable unnecessary testing. Surgeon 2 noted that preoperative tests could be beneficial because, “You hope to find patients that would not do well with general surgery...and protect them from having a bad complication from having general anesthesia.”

Primary care physician 1 said the following about routine preoperative testing:

“Oh, I think a lot of times, it’s a waste of time, and it just makes me angry that we have to go through all this stuff. I think it’s largely very unnecessary.” There was little difference between the physician groups in opinions about the necessity of preoperative testing.

#### *Factors That Lead to the Ordering of Unnecessary Tests*

In describing the factors that lead to the ordering of unnecessary preoperative tests, five themes emerged:

practice tradition, belief that other physicians want the test done, medicolegal worries, concerns about surgical delay or cancellation, and lack of awareness of evidence and guidelines.

#### *Practice Tradition*

Several interviewees said ingrained habits are an important reason for the continued use of routine preoperative testing. As primary care physician 4 noted: “A lot of people do stuff...just from the way they used to do it. They’re just sort of going by instinct or what people have done in the past.”

#### *Belief That Other Physicians Want the Tests Done*

All interviewees felt preoperative tests were important to physicians in another specialty. In particular, all seven primary care doctors interviewed said that they order tests

because surgeons request them. Primary care physician 4 said: “[The patients] have a sheet they come in with...I don’t agree with everything on their sheet, but I order it because the surgeon requires that...I usually order whatever they request...because it’s requested, not because I think it’s required.”

Many surgeons order tests because they think the tests are required by anesthesiologists. As noted by Surgeon 1: “Anesthesia probably drives what tests we need more than we drive what tests we need...they’ve kind of instructed us what they need. [Anesthesiologists] have a lot of things they think are guidelines that they need...and most of the surgeons don’t argue with them.”

Anesthesiologists acknowledged this belief among surgeons. Anesthesiologist 4 said: “It’s the surgeon that thinks we want to see certain things.”

#### *Medicolegal Worries*

Many medical professionals interviewed said medicolegal concerns are an important factor in preoperative test ordering. This concern was mentioned by surgeons, primary care physicians, anesthesiologists, and nurse administrators. In the words of primary care physician 5: “[Preoperative testing] is probably more of a make sure you don’t get sued kind of thing.”

Two physicians in our survey expressed concern that routine preoperative testing can actually increase risk of liability. Surgeon 5 said: “Some people are of the opinion that if you don’t check, you don’t know, so you’re not liable. So some people would say getting labs makes you more liable in a way, if you don’t treat what you’re looking at.”

#### *Concern About Surgical Delay or Cancellation*

Many physicians expressed concern that failure to complete preoperative testing will lead to delays or cancellation of surgery. Surgeon 2 reported: “The last thing we want is to get a patient to the preoperative area

and have the anesthesiologist cancel surgery because they don’t think they’ve been adequately worked up. Cause that kills our day, and then we’re just down here reading the paper and drinking coffee.”

#### *Lack of Awareness of Evidence and Guidelines*

Few interviewees referenced a specific guideline used in decision making about preoperative testing. Only one physician—an anesthesiologist—cited the 2002 American Society of Anesthesiologists practice advisory by name. Several interviewees cited the American College of Cardiology/American Heart Association guideline,<sup>22</sup> which does not discuss specific preoperative laboratory testing other than cardiac evaluation. Many interviewees made reference to “the guidelines” or “the evidence,” often saying they had not reviewed the data recently. Anesthesiologist 5 summed it up as follows: “I have not found any uniform guidelines being followed.”

A nurse administrator showed us the hospital’s preoperative testing policy. The policy requires the following tests: a potassium level in patients on a diuretic medication or with end stage renal disease, a urine pregnancy test on all premenopausal women, a glucose on “all diabetic and/or cardiac patients,” and an electrocardiogram on patients 55 years or older. All of these tests can be performed at the point of care in the operating room. No physician in any specialty group mentioned specifics of this institutional policy or even the existence of the policy in our interviews.

#### *Suggested Strategies for Decreasing Unnecessary Testing*

Many interviewees suggested approaches to decrease unnecessary testing. These approaches frequently included interventions to educate and improve communication and collaboration. Some interviewees also suggested that the lack of a unified guideline was an obstacle to optimal care. Primary care physician 4

said: “We need sort of a single standard that everybody has agreed on...if there is more than one guideline out there, people are going to get confused.”

#### *Other Themes*

Several less frequently discussed themes emerged: the availability of rapid point-of-care tests in the operating room (mentioned by two surgeons), the need for pregnancy testing in women of child-bearing age, preoperative testing as an opportunity to screen healthy patients or manage chronic disease (discussed by primary care doctors and surgeons), and an observed decrease in preoperative testing in recent years (highlighted by surgeons and anesthesiologists.)

Most interviewees said that patients could benefit from a reduction in unnecessary preoperative testing. According to our interviewees, less testing could benefit patients by saving time and money, improving convenience, minimizing discomfort, limiting the need for follow up on false-positive test results, decreasing surgical delays, and reducing waste.

#### **Discussion**

With a renewed focus on waste<sup>23</sup> and harms from overuse<sup>24</sup> in American health care, limiting preoperative testing is a high-yield strategy to achieve savings and improve quality.<sup>24</sup> Our qualitative findings show that substantial barriers remain to decreasing the inappropriate use of preoperative testing and suggest approaches to improving care.

#### *Barriers to Decreasing Unnecessary Preoperative Testing*

We found numerous barriers to limiting unnecessary preoperative testing. Our interviews show that the belief among physicians that other doctors want preoperative tests ordered is essentially universal. Indeed, a 1995 survey of physicians showed that up to 74% of physicians perform a routine test before cataract surgery because they think another specialty group requires the test<sup>12</sup> but this has



not been previously described in an ambulatory general and orthopedic surgical setting. We found that primary care doctors order preoperative tests because surgeons ask them to, and surgeons order tests because they think anesthesiologists require them.

Many of our interviewees cited medicolegal concerns as a reason to order preoperative tests. This confirms a 15-year-old finding that up to 54% of physicians order preoperative tests with medicolegal issues in mind.<sup>12</sup> We find that this belief continues to persist since last studied and is true not only for cataract surgery. However, some argue that routine preoperative testing actually increases medicolegal risk.<sup>4,6,9</sup> Test results are often unavailable in the operating room, so an abnormal test might not be noticed prior to surgery. Additionally, there is considerable legal risk for not appropriately managing an abnormal test result.

Accumulating evidence and expert opinion show that test-ordering behavior in preoperative care could be safely changed. However, a knowledge gap limits practice application of these improvements. Our study shows that this lack of awareness of evidence and guidelines may impede appropriate test use. No previous study has shown that physicians under-utilize preoperative testing guidelines although physician reluctance to adopt guidelines in general has been well documented.<sup>25</sup>

### *Implications for Improving Care*

Our findings suggest several promising approaches to limiting the use of preoperative testing.

Like many national experts,<sup>7,9</sup> our interviewees indicated that a national preoperative testing consensus guideline could improve care. Experts have attempted this at individual hospitals.<sup>15,16</sup> However, getting physicians to change test-ordering behavior<sup>26</sup> and follow clinical practice guidelines is challenging.<sup>25</sup> A multidisciplinary guideline could be more accepted by physicians. At least two groups have published advisories<sup>3,13</sup>

that we find are not in common use. Great Britain's National Institute for Health and Clinical Excellence has published a preoperative testing guideline; this guideline could serve as a model for a national consensus guideline in the United States or other countries.<sup>27</sup> Physicians following a national consensus guideline might be more confident in limiting the ordering of preoperative tests.

Medical professionals in our study also cited the need for more education to standardize test ordering in preoperative care. Many authors support this approach to improving preoperative test ordering practices.<sup>6,17</sup> Traditionally, education alone has been unsuccessful in changing physician test ordering behavior,<sup>14,19,26</sup> but one study showed that the simple announcement of a new hospital guideline decreased testing by 30%.<sup>16</sup> The physicians in our study are open to educational outreach, and our data show definite areas of educational need.

Many of our interviewees also called for improved collaboration and communication in the preoperative testing process. For example, many surgeons in our study order tests because they feel the anesthesiologists require the tests, when, in fact, they may not. The need for a multidisciplinary approach to improving preoperative test ordering has been noted.<sup>1,14</sup> Changing the practice of an individual physician or that of a single specialty group might not improve care but instead a collaborative approach is required.

So, how best to change physician preoperative testing behaviors? While many experts recommend anesthesiologist-directed preoperative testing clinics,<sup>9,15,17,18</sup> this intervention may not be practical in all settings and excludes the patient's primary care physician. The availability of point of care tests in the operating room should be incorporated into any improvement plan. Preoperative assessment forms could include a statement such as: "Any necessary testing will be done just prior to surgery at the point of

care." The work of Grimshaw and colleagues<sup>19</sup> shows how complex changing physician behavior can be. Their recent review concludes that active educational approaches, audit and feedback data, use of local opinion leaders, and multifaceted interventions based on assessment of potential barriers to change are likely to be effective.<sup>19</sup> We have identified barriers in this report and suggest further study of multifaceted, active methods to improve use of preoperative testing.

### **Limitations**

Our study has several limitations. First, our method of chain-sampling to identify key decision-makers may not have identified the most representative sample of interviewees in our local health care environment. To increase the "information richness"<sup>20</sup> of our sample, we sought divergent opinions and stopped interviewing only when we had reached saturation—that is, when no new ideas were presented in subsequent interviews.

Second, in-person semi-structured interviews are subject to bias. We limited our bias as much as possible during interviews by asking open-ended questions and not revealing the results of our literature search and our understanding of the topic. During data analysis we were aware of our preconceptions as we analyzed the interview transcripts. We pursued an accurate analysis despite these preconceptions and sought ideas different from our own in the transcripts.

Third, it is unclear how well our local findings can be generalized to other practice settings. While most physicians in our study are in private practice, some are teachers in our multi-residency teaching institution. Other preoperative testing environments may have unique challenges we did not appreciate in our study. However, our literature review confirms that many of these challenges have been described in diverse settings.

## Summary

Routine preoperative testing is ineffective and wasteful. While some physicians recognize these inefficiencies, many continue to believe in the importance of routine preoperative testing. Our qualitative study identifies at least five potential barriers to care improvement and suggests that a consensus guideline, improved education, and greater collaboration could lead to decreased cost, improved effectiveness, and an enhanced patient experience.

**CORRESPONDING AUTHOR:** Address correspondence to Dr Steven Brown, 1300 N. 12th Street, Suite 605, Phoenix, AZ 85006. 602-839-2668. Fax: 602-839-2067. [steven.brown@bannerhealth.com](mailto:steven.brown@bannerhealth.com).

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