


Identifying Strategies to Reduce Low-Value Preoperative Testing for Low-Risk Procedures: a Qualitative Study of Facilities with High or Recently Improved Levels of Testing



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ABSTRACT

BACKGROUND: Healthcare agencies and perioperative professional organizations recommend avoiding preoperative screening tests for low-risk surgical procedures. However, low-value preoperative tests are still commonly ordered even for generally healthy patients and active strategies to reduce this testing have not been adequately described.

OBJECTIVE: We sought to learn from hospitals with either high levels of testing or that had recently reduced use of low-value screening tests (aka “delta sites”) about reasons for testing and active deimplementation strategies they used to effectively improve practice.

DESIGN: Qualitative study of semi-structured telephone interviews.

PARTICIPANTS: We identified facilities in the US Veterans Health Administration (VHA) with high or recently improved burden of potentially low-value preoperative testing for carpal tunnel release and cataract surgery. We recruited perioperative clinicians to participate.

APPROACH: Questions focused on reasons to order preoperative screening tests for patients undergoing low-risk surgery and, more importantly, what strategies had been successfully used to reduce testing. A framework method was used to identify common improvement strategies and specific care delivery innovations.

KEY RESULTS: Thirty-five perioperative clinicians (e.g., hand surgeons, ophthalmologists, anesthesiologists, primary care providers, directors of preoperative clinics, nurses) from 29 VHA facilities participated. Facilities that successfully reduced the burden of low-value testing shared many improvement strategies (e.g., building consensus among stakeholders; using evidence/norm-based education and persuasion; clarifying responsibility for ordering tests) to implement different care delivery innovations (e.g., pre-screening to decide if a preop

clinic evaluation is necessary; establishing a dedicated preop clinic for low-risk procedures).

CONCLUSIONS: We identified a menu of common improvement strategies and specific care delivery innovations that might be helpful for institutions trying to design their own quality improvement programs to reduce low-value preoperative testing given their unique structure, resources, and constraints.

KEY WORDS: preoperative testing; quality improvement; healthcare efficiency; diffusion of innovation; implementation science.

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BACKGROUND

For years, healthcare agencies and professional organizations have recommended the avoidance of preoperative screening tests for low-risk surgical procedures.^{1–4} The American Society of Anesthesiologists included in their Choosing Wisely Top-5 practices to avoid: “Don’t obtain baseline laboratory studies in patients without significant systemic disease (ASA I or II) undergoing low-risk surgery—specifically complete blood count, basic or comprehensive metabolic panel, coagulation studies when blood loss (or fluid shifts) is/are expected to be minimal.”⁵ These recommendations are based on clinical trials and cohort studies finding that screening tests prior to low-risk surgical procedures often do not reveal actionable data that improve patients’ outcomes, can yield ambiguous results that require further testing, can unnecessarily delay surgical procedures, and consume resources (attention and money) that could be more beneficially allocated.^{6–13} Even though guidance to avoid preoperative

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testing for low-risk procedures is now longstanding, these tests continue to be a common and major contributor to unnecessary health care spending in the USA and other countries.^{14–23}

Several qualitative studies have identified possible explanations why the ordering of low-value screening tests persists despite clear recommendations to the contrary including practice inertia, belief that colleagues want the tests ordered, concerns about malpractice claims, worries about surgical delays or cancelation, lack of knowledge regarding the relevant evidence and guidelines, and financial incentives for testing.^{24–26} Interviewees have also speculated on possible strategies that might be effective to reduce low-value preoperative testing, including education about the evidence and guidelines, better communication and coordination among specialties, and reducing financial incentives for low-value testing.^{24,25} However, none of these studies interviewed individuals who had used these strategies to successfully deimplement low-value testing. Recently, results from quality improvement (QI) efforts to reduce low-value preoperative testing have been reported.^{27,28} Because these QI interventions were skillfully designed for a specific local context, the generalizability of the specific strategies to contexts with different challenges and resources is unknown.

In this study, we sought to learn from US Veterans Health Administration (VHA) facilities with extensive low-value testing or that had recently reduced use of low-value screening tests (aka “delta sites”²⁹). The primary goals were to better understand why low-value testing persists in this public capitated system, and more importantly, to learn what active deimplementation strategies sites used to effectively improve practice. By interviewing key informants at these delta sites,²⁹ we hoped to develop a menu of effective common improvement strategies and specific care delivery innovations that might be adapted by others seeking to reduce the burden of low-value preoperative testing.

METHODS

Study Design We previously conducted quantitative analysis to identify VHA facilities with high or recently improved burden of potentially low-value preoperative testing in two common low-risk procedures—carpal tunnel release surgery and cataract surgery.^{30,31} In this qualitative study, to better understand variation and change in low-value preoperative testing, we recruited surgeons and other perioperative clinicians from those sites to participate in semi-structured telephone interviews. The institutional review board of Stanford University and research office of VA Palo Alto approved the study.

Setting and Participants The sampling frame included all clinicians who might have a role or interest in which

preoperative tests are ordered. From VHA facilities previously identified as having high or recently improved levels of low-value preoperative testing, we recruited clinicians (e.g., hand surgeons, ophthalmologists, anesthesiologists, primary care physicians, directors of preoperative clinics, physician assistants, nurses) with roles in preoperative clinics and evaluation. The primary metric for selecting sites was the proportion, or change in proportion over a 2-year period, of procedures proceeded by at least one low-value preoperative screening test.

As described elsewhere^{30,31}, a test was considered preoperative if it occurred in the 30 days prior to cataract or carpal tunnel release surgery AND within 30 days after an encounter where preoperative screening tests are typically ordered. We excluded tests that occurred within 30 days of a more physiologically stressful procedure (e.g., CABG) that might have justified it. As determined by Current Procedure Terminology codes, tests included basic metabolic panel, complete blood count, cardiac stress tests, urinalysis, chest x-ray, pulmonary function testing, electrocardiography, and trans-thoracic echocardiograms.

Facilities with high levels of testing had, on average, 78% of patients receiving low-value tests. Facilities with improved levels of testing reduced the frequency of low-value testing by 33% on average (e.g., reduced low-value testing from 80 to 47%) over a 2-year period. We used VHA clinician directories and VHA facility websites to identify perioperative clinicians at the target facilities, and further asked these contacts who else at their facilities might have relevant information and perspectives (i.e., snowball sampling). The initial recruitment email stated the purpose of the study, plus highlighted facility-specific data. For example, “Your VA facility has recently improved dramatically in reducing low-value preoperative tests for low-risk procedures. We are conducting a research study to learn how other facilities might learn from your experience.” The informed consent procedure made clear that participation was voluntary and that the data provided would not be linked to them by name. All participants were interviewed by phone and no participation payment was offered.

Interview Guide

We used the interview guide developed by Paty et al.²⁵ and informed by the Theoretical Domains Framework (TDF)³² as a starting point, and adapted it to our particular sample and focus. TDF has been successfully used in a growing body of research to investigate determinants of behavior within health care systems, including preoperative testing.²⁵ The interview guide was designed with branching logic depending on whether the interviewee was directly responsible for ordering tests, and whether the facility had high burden of low-value tests or was a delta site (i.e., recently improved). Clinicians who were directly responsible for ordering tests

were asked more detailed questions about their decision process. Clinicians at facilities with high levels of low-value tests were shown their data in relation to national norms and asked to speculate on possible explanations. Clinicians at delta site facilities that had recently reduced their burden of low-value tests were shown their data and asked to speculate on possible explanations, especially if they were aware of specific strategies that had been effectively deployed to reduce low-value testing (interview guide is presented in the supplemental material).

Data Collection and Analysis One investigator (LM) conducted the interviews by phone between April 2019 and February 2020. Interviews were recorded and transcribed verbatim, then stripped of identifying information. We developed a codebook using deductive codes from the TDF framework and inductively added new codes as they emerged. Transcripts were imported into the ATLAS.ti software package³³ to help organize and index qualitative data. Two investigators (LM and GJ) independently coded transcripts and met with the lead investigator (AH) on a weekly basis to discuss coding discrepancies until reaching agreement. After the initial round of thematic coding, the Framework Method of qualitative analysis was used to identify common and unique themes and improvement strategies.³⁴ The Framework Method is a form of thematic analysis that organizes the data by participant and by code, which facilitates comparing and contrasting themes within and between participants.³⁴

RESULTS

We interviewed 35 perioperative clinicians (e.g., hand surgeons, ophthalmologists, anesthesiologists, primary care physicians, directors of preoperative clinics, physician assistants, nurses) from 29 VA facilities, the characteristics of whom are summarized in Table 1. Ten of the interviewees were from sites with high levels of testing and 25 were from delta sites. Of the interviewees, 57% were female, the

average age was 52.5 years, and all but 3 were MDs. About one third (37%) were anesthesiologists, 34% were ophthalmologists, 17% were hand surgeons, and 11% were other clinicians working in preoperative clinics. The vast majority (82%) were directly involved in ordering preoperative tests and others directly supervised those that did.

Why Preoperative Tests Are Ordered We identified nine commonly cited reasons grouped into three themes regarding why preoperative tests are ordered in the context of low-risk procedures. There were no discernable differences in the themes that were commonly mentioned by interviewees from high and delta sites.

Theme 1: Concern for Patient Health

1A. Surgery is sometimes viewed as an opportunity and teachable moment for overdue screening. Participants commonly noted that for some patients, surgery is a long-overdue contact with the healthcare system and therefore represents an opportunity to provide recommended screening and other needed care. “We have a special patient population that doesn’t always get a lot of care. So for sure, over the years, our nurses have found things because the patient is motivated to get surgery and then they find their potassium is like seven, or they have this chest mass, or they have something just because they were motivated to seek care because they wanted to get the surgery.”

1B. Tests are sometimes ordered out of concern about conversion to general anesthesia or more complex procedures. “You never know when you’re doing the local anesthesia that it might have to be converted to a general. And if it does, we want these things done in advance.”

1C. Some believe that screening is worth it even if it rarely reveals problems. “It only takes a few lung nodules that turn out to be lung cancer to kind of change your perspective on that. I feel that we have saved some lives. Has it been a lot of lives? No. But I always struggle ethically with, well, do you do 100 chest x-rays to save one, or point five of a life? I don’t know. It’s tough to grapple with.”

Theme 2: Hospital Process, Practice, and Culture

2A. Tests are often ordered to avoid same-day cancellations. A common reason for ordering tests is the belief that anesthesiologists or others will cancel the surgery unless the tests results are available, or concern that something will be discovered on the day of surgery that will warrant cancelation. “Basically the mid-levels in the clinic were saying that if you didn’t have a one-of-everything study, then anesthesia would cancel the case.”

Table 1 Characteristics of 35 Respondents

Characteristic	Percent (N)
Female	57 (20)
Age, mean (range)	52.5 (34, 74)
Highest degree	
MD	86 (30)
MD, PhD	6 (2)
NP	8 (3)
Specialty	
Anesthesiology	37 (13)
Ophthalmology	34 (12)
Hand surgery (Ortho, Plastic)	17 (6)
Other preoperative nurse/MD	11 (4)
Directly or supervises ordering of tests	83 (29)
Site with high level of testing	28 (10)
Site with improved level of testing	71 (25)

2B. Preoperative clinics without tailored protocols for low-risk patients and procedures often order the same tests for everyone. “It was previously required to have a clinic appointment for every single patient, even if it was a patient who was 20 years old and super healthy and no medical problems. They’ll just send them to the same/through the same process.”

2C. Clinical culture and inertia was cited as a reason low-value tests are ordered. “It’s kind of one of those ‘This is how we always did it’ kind of a thing, ‘Where I worked, this is how we always did it.’”

2D. Low-value testing can be driven by legal concerns. “Then I will be culpable for being neglectful for not having ordered that. I mean, first off as MD, we have to do a quality improvement process and then we hope that the JDs don’t get involved.”

Theme 3: Lack of Consensus and Communication

3A. Poor communication or coordination can cause unnecessary testing. Often, tests get ordered because a one member of the team (e.g., the surgeon) erroneously thinks another member of the team (e.g., the anesthesiologist) wants it ordered. “They were being ordered by surgeons for anesthesia. Then people were asking, well why isn’t the anesthesiologist following up on this chest x-ray when the anesthesiology was like I didn’t order one nor would I ever have ordered on this for this patient.”

3B. When lack of consensus exists, decisions often default to the “most conservative” option. “It would be nice to have a national mandate that says, ‘Hey, cataract surgery is so uneventful. From a health standpoint, these are the only patients that require this testing to be done.’ Because if it comes from a national level, then you get buy-in from the nursing, anesthesia, everybody else.”

More exemplar quotes from each of these themes are presented in supplemental material Table S1.

Common Implementation Strategies to Reduce Low-Value Testing Focusing on delta sites only, we identified six common implementation strategies that delta facilities used within their unique system redesigns to successfully reduce the burden of low-value testing.

1. *Build consensus.* Every delta site mentioned the importance of building consensus among relevant clinical providers and services (e.g., anesthesia, surgery, preop clinics) regarding testing practices, often using evidence- or norm-based education and persuasion. “I think what turned the corner for us was—I battled this for so long—and it is to get anesthesia onboard. And we did it as a collaborative group. And we got all the literature,

we looked at the literature, and we came up with a plan. I mean, I still think we order more than we need to. But it’s way, way less than what we were ordering. So it really took anesthesia and us getting together to move forward to make the change.”

2. *Start with small-scale low-risk trials.* Many delta sites mentioned using small-scale low-risk trials and monitoring outcomes to help stakeholders feel more comfortable changing testing practice. “There was a lot of education and a lot of follow up when we switched to doing more e-consult and chart review type things for low-risk patients, low-risk procedures. Say hey, we got these. We’re not canceling on the day of surgery. We’re not changing our morbidity and mortality ratios. If anything they’ve got better. We’re doing a better job of pulling the low-risk people out and focusing our care on the high-risk people and their pre-operative work-up and evaluation.”
3. *Clarify roles.* Many delta site mentioned the importance of clarifying who is responsible for ordering and interpreting tests. “What we did several years back is we started having anesthesia order the labs for preop. Number one, they were the ones that were really calling most of the shots in terms of what labs they wanted to make sure this procedure would go off from their end without a hitch. It made sense that the people reading and responsible for the labs ordered the labs.”
4. *Clarify criteria.* Many sites reduced testing by clarifying criteria for testing. “I think standardization is the best for us because we have so many providers coming in and out and we want to just make it simple. They have patients like this and that, having this X surgery then they can look at the grid and decide what to order. So take a lot of the thought processes out of it.”
5. *Emphasize patient-centered care.* Many respondents mentioned the importance of emphasizing improving patient-centered care rather than saving money. “I think when the patients and the families realize you’re really putting their best interest first, it makes a huge difference.... That’s what’s great about it. It’s working. It’s working great. It’s good for everybody. It’s good for the healthcare system, it’s good for the patient, we don’t have to put them through quite so many tests. It’s getting them to the OR a little more efficiently and effectively.”

More exemplar quotes from each of these themes are presented in supplemental material Table S2.

Care Delivery Innovations to Reduce Low-Value Testing The common strategies just described were often used in the service of enacting specific changes to the care delivery model or clinical pathway. We identified five specific, but not mutually exclusive, strategies to reduce testing that involved changing the structure or process of how testing decisions were made.

1. *Move all responsibility for testing to existing preop clinics where specific protocols to avoid low-value testing can be place when procedures are low risk.* “Our surgeons have been very happy to simply move a lot of those requirements over to our anesthesia preoperative clinic...So that has been much more of a soft sell than a hard sell to our surgeons. And we specifically encourage the surgeons, and the surgery residents who we do have, not to order tests. As well as primary care, not to order tests or consultations”
2. *Implement nurse pre-screening to decide if a preop clinic evaluation is necessary.* “I have propagated a nurse screening initiative so that patients before cataract surgery and ...other low risk procedures ...go through a nurse screen process and it’s a questionnaire... And if they pass the questionnaire, then they undergo no testing preoperatively. And if they don’t pass the full nursing questionnaire...then they get sent to an in-person evaluation at clinic which does offer a general, more rigorous testing for higher acuity patients.”
3. *Establish a dedicated preop clinic for low-risk procedures, such as for cataract and other eye procedures.* “We have a unique model here of ophthalmology having its own preop clinic. A key decision point is the use of general anesthesia and then this triages patients to either the ophthalmology preop clinic or the more general anesthesia preop clinic.”
4. *Conduct the preop evaluation and review of history by telehealth and/or chart review.* “I started going away from having all the patients come into the clinic. Again, we started doing phone interviews. Obviously at the phone interviews they’re not getting labs drawn.”
5. *Make no testing and no preop clinic the default for some procedures, with eConsults for higher risk patients.* “Because in the thick of it, sometimes you get confused and so it’s just easier to order than it is to not. And so it’s trying to educate all the providers that it’s not necessary and also just having the buy-in from all the people at the table. But we don’t order labs for cataract surgeries, regardless of the patient’s ASA status.”

More exemplar quotes from each of these themes are presented in supplemental material Table S3.

DISCUSSION

The Centers for Medicare Services projects that total healthcare spending will rise from \$3.358 trillion in 2016 to \$5.548 trillion (20% of the US gross domestic product) in 2025, 10% to 20% of which consisting of low-value care.¹⁶ In the VHA, the largest integrated healthcare system in the USA, we previously found 86,327 (49.3%) of 178,775 low-risk procedures were preceded by 321,917

potentially low-value screening tests representing over 11 million dollars using Medicare average costs.³⁵ Similar patterns of the burden of low-value preoperative testing have been documented outside the VHA system.^{16,19–22} In this study, we learned from perioperative clinicians why preoperative tests continue to be ordered contrary to guidance from healthcare agencies and professional organizations. Overall, the factors that explain the ordering of low-value preoperative tests in the VA mirrored previous studies of low-value preoperative testing in other contexts.^{24,25} Preoperative screening tests were sometimes seen as a way to deliver overdue health checks or as a precaution in case there was a conversion to general anesthesia. These are understandable concerns and might be justified in some cases. However, they should not apply to the vast majority of patients. This highlights an important detail. Clinical practice guidelines recommend that these tests be *avoided*, especially in the context of low-risk procedures. They do not say that they are “never events.” Others mentioned that preoperative screening might be justified if it *ever* revealed a serious underlying problem. However, strong evidence exists, at least in the context of cataract surgery^{8,36}, that there is no population-level clinical benefit to these screening tests.

To aid in reducing low-value preoperative testing in other healthcare systems, we identified a menu of both common improvement strategies and specific care delivery innovations that were used in facilities across the VA system to reduce the burden of low-value preoperative testing. While the majority of preoperative evaluation clinics are overseen by anesthesiologists, a substantial fraction are also directed by internists. A unique aspect of our results are a set of improvement strategies that may be in common regardless of the specialty responsible for evaluations. Several examples exist in the literature of using PDSA and other QI frameworks to design and improve interventions tailored to local conditions to reduce low-value preoperative testing.^{27,28} The menu of both common implementation strategies and specific care delivery innovations identified in this study may assist institutions to design QI strategies optimized to their specific barriers, context, and resources.

Powell et al.³⁷ have enumerated a large taxonomy of general implementation strategies but there is little guidance to assist implementers in matching specific strategies to the quality issue they are seeking to address. This study provides unique and specific guidance in strategy selection for reducing low-value tests that have been shown to be effective in real world settings. Although other implementation strategies in the taxonomy may be useful to consider, we identified those that have been found to be effective in driving change in low-value preoperative testing in real world settings. The specific care delivery innovations we identified represent creative solutions to low-value testing in diverse environments.

Studies of strategies to reduce low-value screening and testing outside the preoperative setting suggest other possible ideas worth considering. Electronic health record–imbedded expert systems and alerts have been found to modestly reduce low-value testing in some contexts.^{38,39} Others have found that changes in payment policies can have even greater effects on screening and testing practice.^{40,41} Indeed, the overall lesson from this area of inquiry is that multimodal within-institution interventions to bring local practice in line with consensus professional standards are more likely to be effective when paired with targeted changes to payment policies.^{42,43}

This study has several limitations. First, the study was done within one large capitated public healthcare system that may differ in relevant ways from other institutions, especially those that might financially benefit from more testing. Second, our method of classifying tests as low-value may have captured tests unrelated to the target procedure, although we have no reason to believe this potential measurement error would vary between sites. Third, we intentionally recruited sites that had experienced recent improvements, usually driven by one or more local champions. The common implementation strategies and specific care delivery innovations revealed by these interviews are highly reliant on the existence and skill of a champion. Fourth, we did not collect contextual information about the locations where the successful redesigns were enacted. Nonetheless, this menu of innovations provides several options for others to consider in their own QI efforts.

CONCLUSIONS

By interviewing perioperative clinicians at facilities that had recently reduced the burden of low-value testing, we identified a menu of common implementation strategies and specific care delivery innovations that might be helpful for institutions trying to design their own quality improvement programs to reduce low-value preoperative testing.

Supplementary Information: The online version contains supplementary material available at <https://doi.org/10.1007/s11606-023-08287-0>.

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