



# Preoperative Testing Workgroup

August 1, 2023

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# Today's Presenter

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University of Michigan

# Housekeeping

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## **Recording**

- This session is being recorded; slides and the recording will be shared with attendees following the workgroup.

## **Questions**

- We will be monitoring the chat throughout the presentation so feel free to add questions.

## **Post-Workgroup Survey**

- Your feedback is important! Please complete the post-workgroup survey (link to be provided).

# Improving the Quality of the Preoperative Process for Patients Undergoing Low Risk Surgery in Michigan

Initial Lessons from De-Implementation of Low-Value Preoperative Testing

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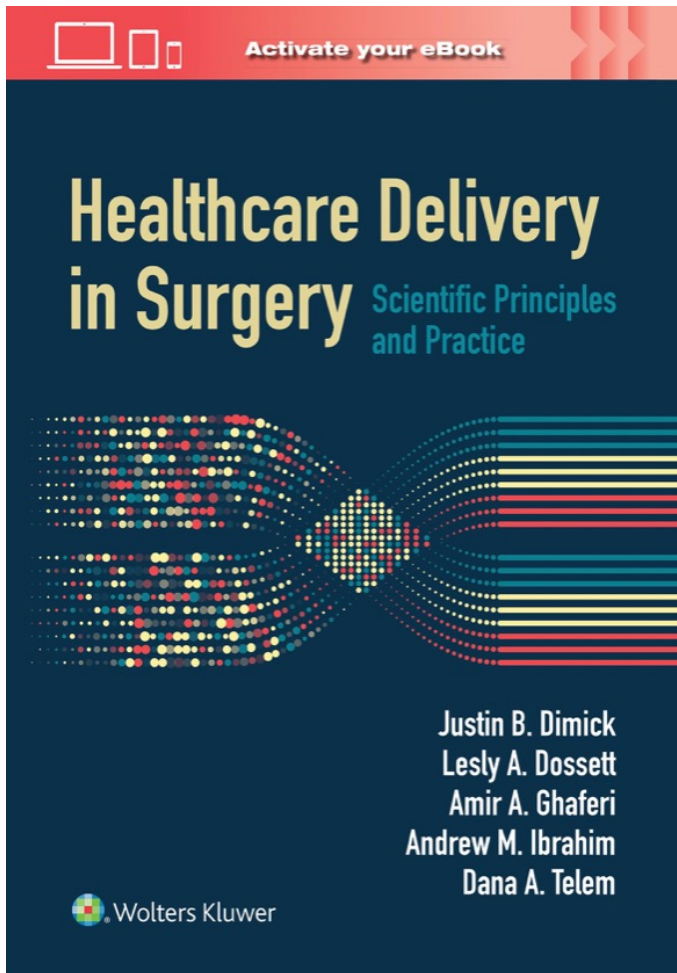


# Disclosures

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- I have no financial disclosures

# Additional Recommended Resource



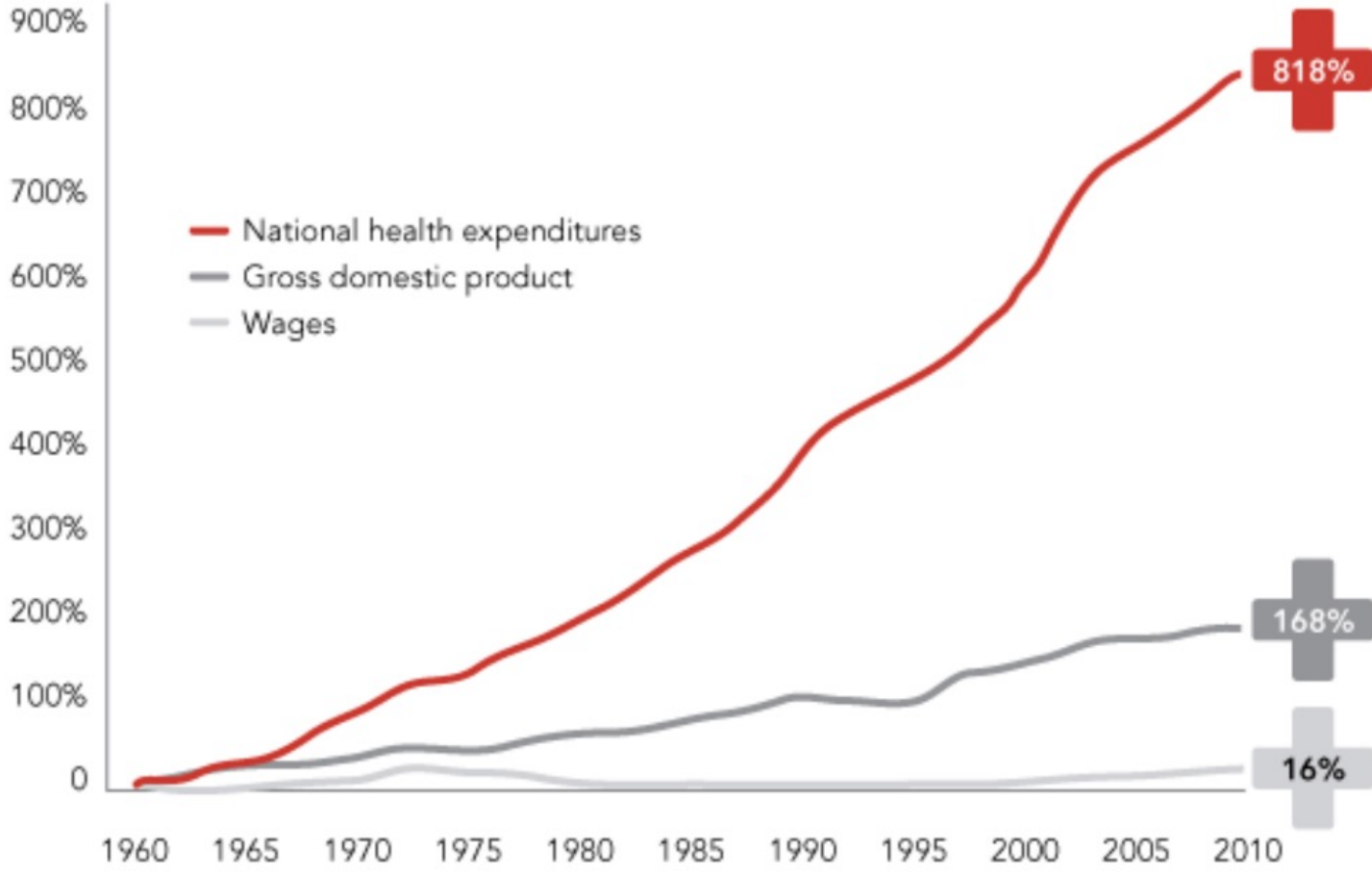
- Forthcoming in October 2023
- Case-based approaches to address common challenges in improving the delivery of surgical care. For each case, we consider the underlying scientific principles and existing evidence followed by real-world, practical solutions.
- Overuse of Preoperative Testing Low-Risk Patients
  - co-authored w/ Erika Sears, MD MS

# Objectives

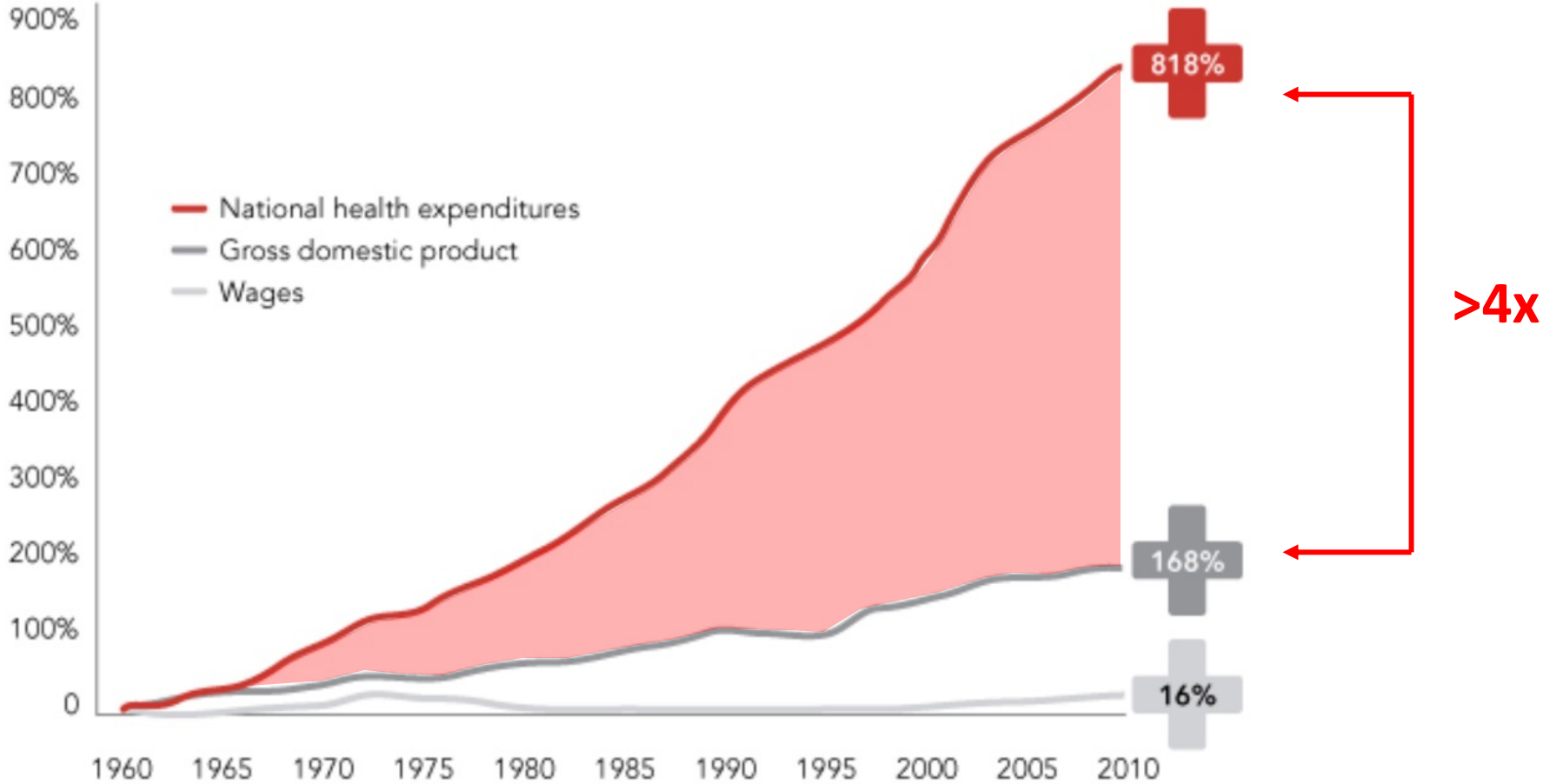
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- Introduce concept of “low-value care”
- Review evidence against routine preoperative testing for low-risk surgery
- Discuss recent studies of low-value preoperative testing in Michigan
  - Prevalence
  - Variability across and within hospitals
  - Association with preoperative consultation before surgery
- Review qualitative work at U Michigan on barriers to de-implementation
- Introduce conceptual models to affect change

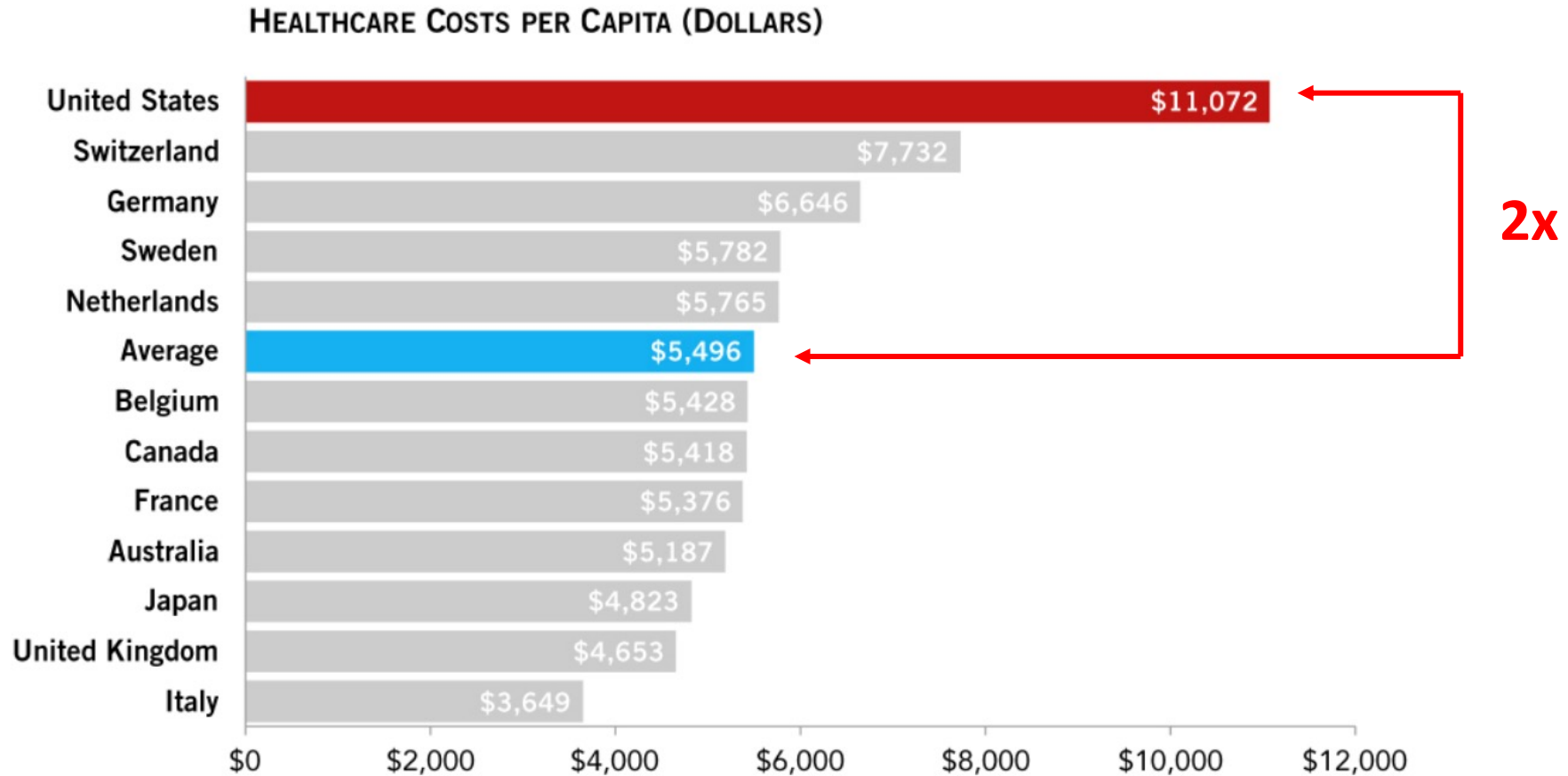
# Health care spending has grown faster than rest of the economy



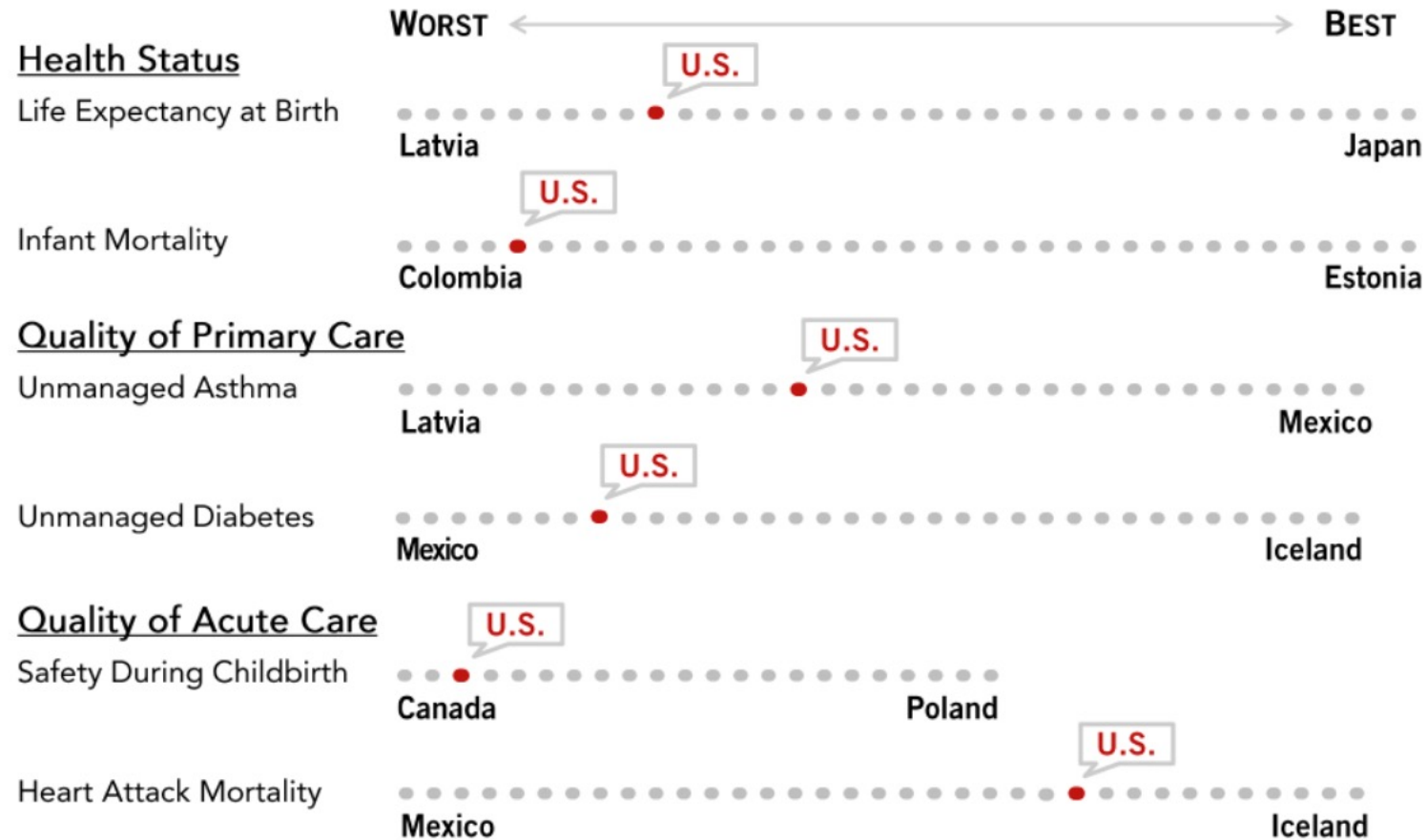
# Health care spending has grown faster than rest of the economy



# US per capita healthcare spending is almost twice the average



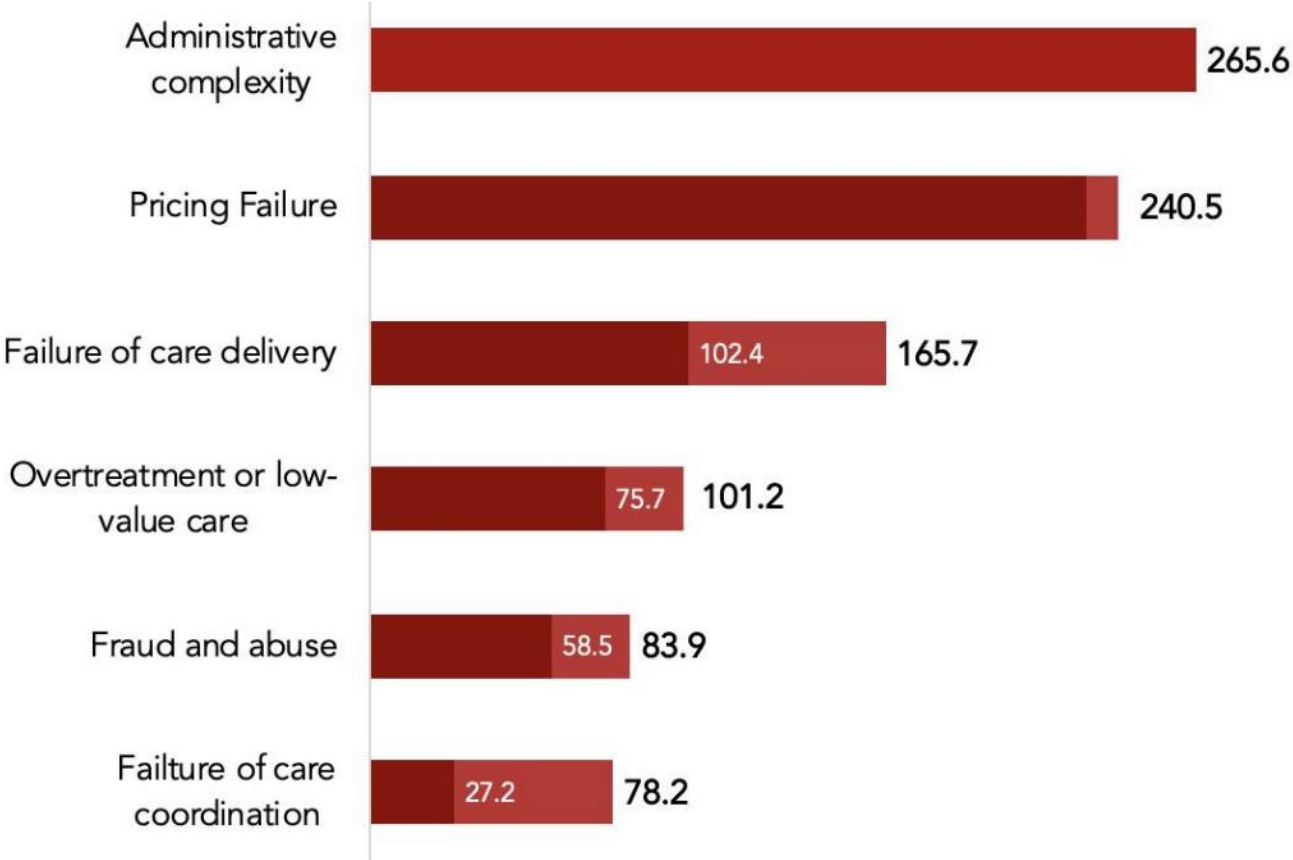
# Additional spending does not translate to better health outcomes



# Approximately \$750 billion of waste in US Healthcare annually

## Total Annual Costs of **Waste** in Healthcare (in Billion)

(JAMA October 2019) - Total estimate ranges from \$760B - \$935B

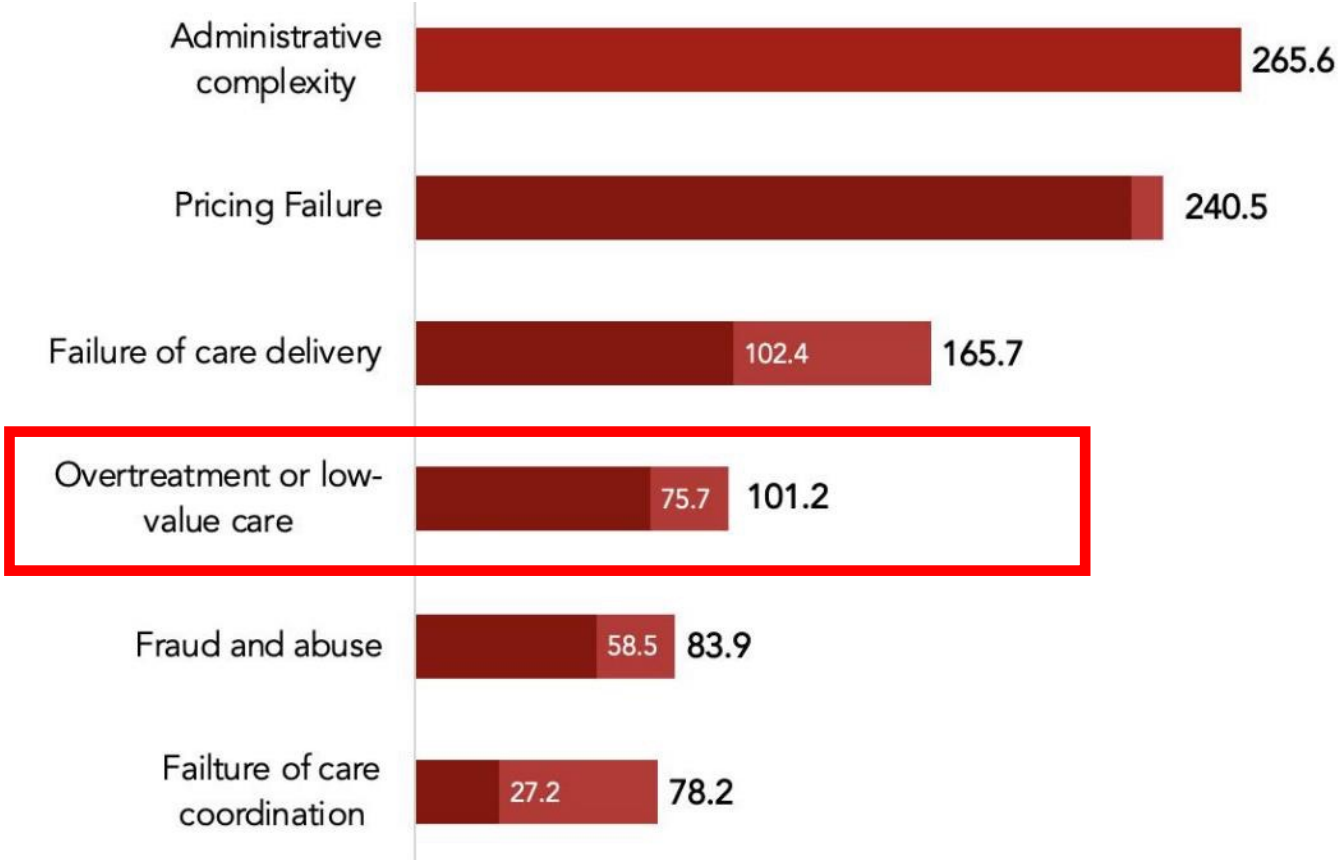




# Approximately \$750 billion of waste in US Healthcare annually

## Total Annual Costs of **Waste** in Healthcare (in Billion)

(JAMA October 2019) - Total estimate ranges from \$760B - \$935B



## Definition of Low-Value Care



Services providing  
**little or no benefit**  
to patients, have potential to  
**cause harm**, incur  
**unnecessary cost** to  
patients, or **waste resources**.

# Multiple recommendations for de-implementation of low value preoperative testing



*An initiative of the ABIM Foundation*

1. Don't obtain baseline laboratory studies in patients without significant systemic disease undergoing low-risk surgery (ASA).
2. Don't obtain baseline cardiac testing (e.g., echocardiography) in asymptomatic patients with cardiac disease undergoing low or moderate risk surgery (ASA).
3. Don't perform routine pre-operative testing before low-risk surgical procedures (ACIM).
4. Avoid preoperative chest x-rays for ambulatory patients with unremarkable history and physical exam (ACS).
5. Avoid routine preoperative testing for low-risk surgeries without a clinical indication (ASCP).

# Routine preoperative testing before low-risk surgery does not prevent adverse events...

## **Routine preoperative testing: a systematic review of the evidence**

The tests produce a wide range of abnormal results even in healthy individuals.

The clinical importance of these results is uncertain.

The tests rarely lead to changes in management.

The clinical value of changes in management are uncertain.

Preoperative tests do not predict adverse events.

No good evidence exists to suggest that routine testing in asymptomatic patients provides any benefit.

THE VALUE OF ROUTINE PREOPERATIVE MEDICAL TESTING  
BEFORE CATARACT SURGERY

OLIVER D. SCHEIN, M.D., M.P.H., JOANNE KATZ, Sc.D., ERIC B. BASS, M.D., M.P.H., JAMES M. TIELSCH, Ph.D.,  
LISA H. LUBOMSKI, Ph.D., MARC A. FELDMAN, M.D., M.P.H., BRENT G. PETTY, M.D.,  
AND EARL P. STEINBERG, M.D., M.P.P., FOR THE STUDY OF MEDICAL TESTING FOR CATARACT SURGERY\*

ABSTRACT

**Background** Routine preoperative medical testing is commonly performed in patients scheduled to undergo cataract surgery, although the value of such testing is uncertain. We performed a study to determine whether routine testing helps reduce the incidence of intraoperative and postoperative medical complications.

**Methods** We randomly assigned 19,557 elective cataract operations in 18,189 patients at nine centers to be preceded or not preceded by a standard battery of medical tests (electrocardiography, complete blood count, and measurement of serum levels of electrolytes, urea nitrogen, creatinine, and glucose), in addition to a history taking and physical examination. Adverse medical events and interventions on the day of surgery and during the seven days after surgery were recorded.

**Results** Medical outcomes were assessed in 9408 patients who underwent 9626 cataract operations that were not preceded by routine testing and in 9411 patients who underwent 9624 operations that were preceded by routine testing. The most frequent medical events in both groups were treatment for hypertension and arrhythmia (principally bradycardia). The overall rate of complications (intraoperative and postoperative events combined) was the same in the two groups (31.3 events per 1000 operations). There were also no significant differences between the no-testing group and the testing group in the rates of intraoperative events (19.2 and 19.7, respectively, per 1000 operations) and postoperative events (12.6 and 12.1 per 1000 operations). Analyses stratified according to age, sex, race, physical status (according to the American Society of Anesthesiologists classification), and medical history revealed no benefit of routine testing.

**Conclusions** Routine medical testing before cataract surgery does not measurably increase the safety of the surgery. (N Engl J Med 2000;342:168-75.)

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CATARACT surgery is the most commonly performed operation in elderly people in developed countries. In the United States, Medicare beneficiaries underwent approximately 1.5 million cataract operations in 1996. Since 1984, in the United States, this surgery has been performed almost exclusively as an outpatient procedure, with the use of local anesthesia, usually in conjunction with intravenous sedation. The rates of periop-

erative morbidity and mortality associated with cataract surgery are low.<sup>1,2</sup> Nevertheless, because patients with cataracts tend to be elderly and to have serious coexisting illnesses,<sup>3,7</sup> many physicians believe that a systematic medical examination with laboratory testing must be performed before a patient can be considered eligible for surgery.<sup>4,8</sup>

In 1993, the Agency for Health Care Policy and Research published guidelines for the management of cataracts.<sup>9</sup> The agency endorsed "appropriate" testing but did not provide specific recommendations based on reported data. We subsequently performed a national survey of ophthalmologists, anesthesiologists, and internists and found that the majority of the respondents routinely ordered complete blood counts, measurements of serum electrolytes, and electrocardiograms preoperatively.<sup>4</sup> Other tests, such as chest radiography, blood-clotting studies, and urinalysis, were also ordered often, although less frequently. Many physicians did not think that the tests were necessary but ordered them anyway because of institutional requirements, medicolegal concerns, or a belief that another physician wanted them performed. We have estimated that the direct cost to Medicare of routine medical testing before cataract surgery is \$150 million annually.<sup>10</sup> Because of variation in the tests ordered and uncertainty about the effectiveness of such testing, we performed a prospective, randomized clinical trial to assess whether routine medical testing before cataract surgery reduces the rate of complications during the perioperative period.

METHODS

Patients and Medical Procedures

The study was designed to be a large trial with few exclusion criteria and easily assessable principal outcomes. Nine clinical centers participated. These nine centers represented a mix of private practices operating at free-standing ambulatory-surgery centers, academic medical centers, and community hospitals. The study

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\*Other participating members of the Study of Medical Testing for Cataract Surgery are listed in the Appendix.

- New England Journal of Medicine 2000
- RCT of ~18,000 patients at 9 centers
- Routine testing before cataract surgery
- No difference in intraop or postop complications



## Preoperative Laboratory Testing in Patients Undergoing Elective, Low-Risk Ambulatory Surgery

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Kimberly M. Brown, MD, Yimei Han, MS, Courtney M. Townsend, Jr, MD, and Taylor S. Riall, MD, PhD

**Background:** Routine preoperative laboratory testing for ambulatory surgery is not recommended.

**Methods:** Patients who underwent elective hernia repair (N = 73,596) were identified from the National Surgical Quality Improvement Program (NSQIP) database (2005-2010). Patterns of preoperative testing were examined. Multivariate analyses were used to identify factors associated with testing and postoperative complications.

**Results:** A total of 46,977 (63.8%) patients underwent testing, with at least one abnormal test recorded in 61.6% of patients. In patients with no NSQIP comorbidities (N = 25,149) and no clear indication for testing, 54% received at least one test. In addition, 15.3% of tested patients underwent laboratory testing the day of the operation. In this group, surgery was done despite abnormal results in 61.6% of same day tests. In multivariate analyses, testing was associated with older age, ASA (American Society of Anesthesiologists) class >1, hypertension, ascites, bleeding disorders, systemic steroids, and laparoscopic procedures. Major complications (reintubation, pulmonary embolus, stroke, renal failure, coma, cardiac arrest, myocardial infarction, septic shock, bleeding, or death) occurred in 0.3% of patients. After adjusting for patient and procedure characteristics, neither testing nor abnormal results were associated with postoperative complications.

**Conclusions:** Preoperative testing is overused in patients undergoing low-risk, ambulatory surgery. Neither testing nor abnormal results were associated with postoperative outcomes. On the basis of high rates of testing in healthy patients, physician and/or facility preference and not only patient condition currently dictate use. Involvement from surgical societies is necessary to establish guidelines for preoperative testing.

**Keywords:** ambulatory surgery, low-risk surgery, overuse, preoperative evaluation, preoperative laboratory testing

(*Ann Surg* 2012;256: 518–528)

Over the last 2 decades, the indications for ambulatory surgery have expanded, with an increasing number of surgical procedures performed in the ambulatory setting. Currently 60% to 70% of the surgical procedures performed in the United States each year are performed in the ambulatory setting.<sup>1,2</sup> Ambulatory surgical procedures are generally less than 1 to 2 hours in duration, have low expected blood loss and complication rates, minimal expected postoperative care, and are usually performed in patients with no medical problems or with stable chronic medical conditions.

As surgical and anesthetic techniques have evolved, evidence-based guidelines regarding preoperative testing have lagged. In the United States, current recommendations for preoperative testing are based on the 2002 Practice Advisory from the American Society of Anesthesiologists (ASA) Task Force on Preanesthesia Evaluation.<sup>3</sup> These recommendations represent a synthesis of expert opinion and are not based on a sufficient number of adequately powered and controlled trials. Moreover, there are inconsistencies between authorities, and the language of current recommendations is imprecise. For example, “advanced age” is often used as an indication for testing without a clear minimum age. Table 1 summarizes the recommendations of the ASA,<sup>3</sup> the Canadian Anesthesiologists’ Society (CAS),<sup>4</sup> and the Ontario Preoperative Testing Group (OPTG).<sup>5,6</sup> In addition, recommendations for preoperative testing vary widely on the basis of single-institution studies and systematic reviews.<sup>7–10</sup>

While the cost of individual tests may be low, the aggregate costs can be substantial.<sup>11,12</sup> In the United States, the current estimated cost of preoperative testing is \$3 billion to 18 billion annually.<sup>7,13,14</sup> On the basis of single-institution studies and literature reviews, many advocate against routine preoperative laboratory testing in asymptomatic and clinically normal patients who are undergoing elective, low-risk surgery.<sup>5,7–12,14–17</sup> It also has been shown that abnormal results in testing done before elective low-risk surgery change management in less than 3% of cases.<sup>5,11,18</sup> Although these groups advocate against “routine” testing, they fail to outline clear and consistent guidelines or indications for specific tests. Several studies, including 2 randomized controlled trials, have evaluated the elimination of preoperative testing in patients undergoing low-risk surgery and have demonstrated no difference in adverse events.<sup>1,17,18</sup>

Despite these data, several single-institution studies document overuse of preoperative testing in the low-risk, ambulatory setting.<sup>5,11,19</sup> However, the use of preoperative testing has not been studied at the population level. Our study uses the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) database to examine current patterns of preoperative laboratory testing in patients undergoing elective hernia repair, a representative low-risk ambulatory operation. Specifically, we examine preoperative testing in all patients and a subgroup with no NSQIP-measured comorbidities and, therefore, no clear indication for preoperative testing. Finally, this study identifies factors associated with preoperative laboratory testing and examines 30-day outcomes in tested and untested patients and patients with normal and abnormal test results.

### METHODS

#### Data Source

The NSQIP is a nationally validated, risk-adjusted, outcomes-based program designed to measure and improve the quality of surgical care. Sponsored by the American College of Surgeons, NSQIP

- Annals of Surgery 2012
- Retrospective cohort study
- 74,000 elective hernia repair patients
- 64% with preoperative lab testing
- Neither testing by itself or abnormal test results were associated with postoperative outcomes

From the Department of Surgery, University of Texas Medical Branch, Galveston, Texas.

Disclosure: This study was supported by grants from the National Cancer Institute (1K07CA130983-01A1), National Institutes of Health (UL1RR029876 and T32 DK007639), and the Center for Comparative Effectiveness Research in Texas. Apart from this, the authors have nothing to disclose.

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SPECIAL ARTICLE

## Preoperative Medical Testing in Medicare Patients Undergoing Cataract Surgery

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Mervyn Maze, M.B., Ch.B., Michael A. Gropper, M.D., Ph.D.,  
and R. Adams Dudley, M.D., M.B.A.

ABSTRACT

**BACKGROUND**

From the Departments of Anesthesia and Perioperative Care (C.L.C., A.W.G., M.M., M.A.G.), Pediatrics (N.S.B.), and Medicine and Epidemiology and Biostatistics (W.J.B., R.A.D.), Center for Healthcare Value (C.L.C., G.A.L., N.S.B., R.A.D.), Division of General Internal Medicine (G.A.L.), and Philip R. Lee Institute for Health Policy Studies (G.A.L., R.A.D.), University of California, San Francisco, San Francisco; and Clay Software and Statistics, Ashland, OR (T.H.C.). Address reprint requests to Dr. Chen at the Department of Anesthesia and Perioperative Care, Center for Healthcare Value, University of California, San Francisco, 513 Parnassus Ave., Rm. 5436, San Francisco, CA 94143, or at [chencl@anesthesia.ucsf.edu](mailto:chencl@anesthesia.ucsf.edu).

*N Engl J Med* 2015;372:1530-8.  
DOI: 10.1056/NEJMoa1410846

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Routine preoperative testing is not recommended for patients undergoing cataract surgery, because testing neither decreases adverse events nor improves outcomes. We sought to assess adherence to this guideline, estimate expenditures from potentially unnecessary testing, and identify patient and health care system characteristics associated with potentially unnecessary testing.

**METHODS**

Using an observational cohort of Medicare beneficiaries undergoing cataract surgery in 2011, we determined the prevalence and cost of preoperative testing in the month before surgery. We compared the prevalence of preoperative testing and office visits with the mean percentage of beneficiaries who underwent tests and had office visits during the preceding 11 months. Using multivariate hierarchical analyses, we examined the relationship between preoperative testing and characteristics of patients, health system characteristics, surgical setting, care team, and occurrence of a preoperative office visit.

**RESULTS**

Of 440,857 patients, 53% had at least one preoperative test in the month before surgery. Expenditures on testing during that month were \$4.8 million higher and expenditures on office visits \$12.4 million higher (42% and 78% higher, respectively) than the mean monthly expenditures during the preceding 11 months. Testing varied widely among ophthalmologists; 36% of ophthalmologists ordered preoperative tests for more than 75% of their patients. A patient's probability of undergoing testing was associated mainly with the ophthalmologist who managed the preoperative evaluation.

**CONCLUSIONS**

Preoperative testing before cataract surgery occurred frequently and was more strongly associated with provider practice patterns than with patient characteristics. (Funded by the Foundation for Anesthesia Education and Research and the Grove Foundation.)

- New England Journal of Medicine 2015
- Retrospective cohort study
- 440,000 medicare cataract surgery patients
- 53% with  $\geq 1$  preoperative test within 30 days of surgery
- \$4.8 million increased expenditures
- Testing determined by provider practice patterns

## Variability and Costs of Low-Value Preoperative Testing for Carpal Tunnel Release Surgery

Alex H. S. Harris, PhD, MS,\*† Esther L. Meerwijk, PhD, MSN,\* Robin N. Kamal, MD,‡ Erika D. Sears, MD, MS,§|| Mary Hawn, MD,\*† Dan Eisenberg, MD,\*† Andrea K. Finlay, PhD,\* Hildi Hagedorn, PhD,¶ and Seshadri Mudumbai, MD, MS\*#

**BACKGROUND:** The American Society of Anesthesiologists (ASA) Choosing Wisely Top-5 list of activities to avoid includes “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.” Accordingly, we define low-value preoperative tests (LVTs) as those performed before minor surgery in patients without significant systemic disease. The objective of the current study was to examine the extent, variability, drivers, and costs of LVTs before carpal tunnel release (CTR) surgeries in the US Veterans Health Administration (VHA).

**METHODS:** Using fiscal year (FY) 2015–2017 data derived from the VHA Corporate Data Warehouse (CDW), we determined the overall national and facility-level rates and associated costs of receiving any of 8 common LVTs in the 30 days before CTR in ASA physical status (PS) II patients. We also examined the patient, procedure, and facility factors associated with receiving  $\geq 1$  LVT with mixed-effects logistic regression and the number of tests received with mixed-effects negative binomial regression.

**RESULTS:** From FY15–17, 10,000 ASA class II patients received a CTR by 699 surgeons in 125 VHA facilities. Overall, 47.0% of patients had a CTR that was preceded by  $\geq 1$  LVT, with substantial variability between facilities (range = 0%–100%; interquartile range = 36.3%), representing \$339,717 in costs. Older age and female sex were associated with higher odds of receiving  $\geq 1$  LVT. Local versus other modes of anesthesia were associated with lower odds of receiving  $\geq 1$  LVT. Several facilities experienced large (>25%) increases or decreases from FY15 to FY17 in the proportion of patients receiving  $\geq 1$  LVT.

**CONCLUSIONS:** Counter to guidance from the ASA, we found that almost half of CTRs performed on ASA class II VHA patients were preceded by  $\geq 1$  LVT. Although the total cost of these tests is relatively modest, CTR is just one of many low-risk procedures (eg, trigger finger release, cataract surgery) that may involve similar preoperative testing practices. These results will inform site selection for qualitative investigation of the drivers of low-value testing and the development of interventions to improve preoperative testing practice, especially in locations where rates of LVT are high. (Anesth Analg 2019;129:804–11)

### KEY POINTS

- **Question:** What are the extent, variability, and costs of low-value preoperative tests (LVTs) for carpal tunnel release (CTR) in the US Veterans Health Administration (VHA)?
- **Findings:** Almost half of CTRs performed on American Society of Anesthesiologists (ASA) physical status (PS) I or II VHA patients were preceded by  $\geq 1$  LVT.
- **Meaning:** These results will inform site selection for qualitative investigation of the drivers of low-value testing and development of interventions to improve preoperative testing practice, especially in locations where rates of low-value preoperative testing are high.

### GLOSSARY

**AHRQ** = Agency for Healthcare Research and Quality; **ASA** = American Society of Anesthesiologists; **BMI** = body mass index; **BMP** = basic metabolic panel; **CBC** = complete blood count; **CDW** = Corporate Data Warehouse; **CMS** = Centers for Medicare Services; **CPT** = common procedural terminology; **CTR** = carpal tunnel release; **EKG** = electrocardiography; **FY** = fiscal year; **ICC** = intraclass correlation coefficients; **IQR** = interquartile range; **LVT** = low-value preoperative test; **MD** = medical doctor; **MOR** = median odds ratios; **NICE** = UK National Institute for Health and Care Excellence; **PFT** = pulmonary function testing; **Preop** = preoperative; **PS** = physical status; **TTE** = transthoracic echocardiogram; **VA** = Veterans Affairs; **VHA** = Veterans Health Administration

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- Healthcare Economics, Policy, and Organization 2019
- Retrospective cohort study of VA patients
- 10,000 low-risk carpal tunnel surgery patients
- 47% with  $\geq 1$  low-value preoperative test within 30 days of surgery
- Substantial variability between hospitals 0%–100%
- Older age and female sex associated with testing



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## Prevalence and Cost of Care Cascades After Low-Value Preoperative Electrocardiogram for Cataract Surgery in Fee-for-Service Medicare Beneficiaries

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**IMPORTANCE** Low-value care is prevalent in the United States, yet little is known about the downstream health care use triggered by low-value services. Measurement of such care cascades is essential to understanding the full consequences of low-value care.

**OBJECTIVE** To describe cascades (tests, treatments, visits, hospitalizations, and new diagnoses) after a common low-value service, preoperative electrocardiogram (EKG) for patients undergoing cataract surgery.

**DESIGN, SETTING, AND PARTICIPANTS** Observational cohort study using fee-for-service Medicare claims data from beneficiaries aged 66 years or older without known heart disease who were continuously enrolled between April 1, 2013, and September 30, 2015, and underwent cataract surgery between July 1, 2014 and June 30, 2015. Data were analyzed from March 12, 2018, to April 9, 2019.

**EXPOSURES** Receipt of a preoperative EKG. The comparison group included patients who underwent cataract surgery but did not receive a preoperative EKG.

**MAIN OUTCOMES AND MEASURES** Cascade event rates and associated spending in the 90 days after preoperative EKG, or in a matched timeframe for the comparison group. Secondary outcomes were patient, physician, and area-level characteristics associated with experiencing a potential cascade.

**RESULTS** Among 110 183 cataract surgery recipients, 12 408 (11.3%) received a preoperative EKG (65.6% of them were female); of those, 1978 (15.9%) had at least 1 potential cascade event. The comparison group included 97 775 participants (63.1% female). Those who received a preoperative EKG experienced between 5.11 (95% CI, 3.96-6.25) and 10.92 (95% CI, 9.76-12.08) additional events per 100 beneficiaries relative to the comparison group. This included between 2.18 (95% CI, 1.34-3.02) and 7.98 (95% CI, 7.12-8.84) tests, 0.33 (95% CI, 0.19-0.46) treatments, 1.40 (95% CI, 1.18-1.62) new patient cardiology visits, and 1.21 (95% CI, 0.62-1.79) new cardiac diagnoses. Spending for the additional services was up to \$565 per Medicare beneficiary (95% CI, \$342-\$775), or an estimated \$35 025 923 annually across all Medicare beneficiaries in addition to the \$3 275 712 paid for the preoperative EKGs. Among preoperative EKG recipients, those who were older (adjusted odds ratio [aOR] for patients aged 75 to 84 years vs 66 to 74 years old, 1.42; 95% CI, 1.28-1.57), had more chronic conditions (aOR for each additional Elixhauser condition, 1.18; 95% CI, 1.14-1.22), lived in more cardiologist-dense areas (aOR, 1.05; 95% CI, 1.02-1.09), or had their preoperative EKG performed by a cardiac specialist rather than a primary care physician (aOR, 1.26; 95% CI, 1.10-1.43) were more likely to experience a potential cascade.

**CONCLUSIONS AND RELEVANCE** Care cascades after preoperative EKG for cataract surgery are infrequent but costly. Policy and practice interventions to reduce low-value services and the cascades that follow could yield substantial savings.

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- JAMA Internal Medicine 2019
- Retrospective cohort study of Medicare patients
- Cataract surgery without pre-existing heart disease
- “Cascade Events” = tests, treatments, visits, and hospitalizations related to testing
- 110,000 patients
- 11% had preoperative EKG
- 16% with cascade event
- \$565 per beneficiary
- \$35 million across medicare beneficiaries

## Preoperative testing before low-risk surgical procedures

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CMAJ Podcasts: author interview at [soundcloud.com/cmajpodcasts/150174-res](https://soundcloud.com/cmajpodcasts/150174-res)

### ABSTRACT

**Background:** There is concern about increasing utilization of low-value health care services, including preoperative testing for low-risk surgical procedures. We investigated temporal trends, explanatory factors, and institutional and regional variation in the utilization of testing before low-risk procedures.

**Methods:** For this retrospective cohort study, we accessed linked population-based administrative databases from Ontario, Canada. A cohort of 1 546 223 patients 18 years or older underwent a total of 2 224 070 low-risk procedures, including endoscopy and ophthalmologic surgery, from Apr. 1, 2008, to Mar. 31, 2013, at 137 institutions in 14 health regions. We used hierarchical logistic regression models to assess patient- and institution-level factors associated with electrocardiography (ECG), transthoracic echocardiography, cardiac stress test or chest radiography within 60 days before the procedure.

**Results:** Endoscopy, ophthalmologic surgery and other low-risk procedures accounted for 40.1%, 34.2% and 25.7% of procedures, respectively. ECG and chest radiography were conducted before 31.0% (95% confidence interval

[CI] 30.9%–31.1%) and 10.8% (95% CI 10.8%–10.8%) of procedures, respectively, whereas the rates of preoperative echocardiography and stress testing were 2.9% (95% CI 2.9%–2.9%) and 2.1% (95% CI 2.1%–2.1%), respectively. Significant variation was present across institutions, with the frequency of preoperative ECG ranging from 3.4% to 88.8%. Receipt of preoperative ECG and radiography were associated with older age (among patients 66–75 years of age, for ECG, adjusted odds ratio [OR] 18.3, 95% CI 17.6–19.0; for radiography, adjusted OR 2.9, 95% CI 2.8–3.0), preoperative anesthesia consultation (for ECG, adjusted OR 8.7, 95% CI 8.5–8.8; for radiography, adjusted OR 2.2, 95% CI 2.1–2.2) and preoperative medical consultation (for ECG, adjusted OR 6.8, 95% CI 6.7–6.9; for radiography, adjusted OR 3.6, 95% CI 3.5–3.6). The median ORs for receipt of preoperative ECG and radiography were 2.3 and 1.6, respectively.

**Interpretation:** Despite guideline recommendations to limit testing before low-risk surgical procedures, preoperative ECG and chest radiography were performed frequently. Significant variation across institutions remained after adjustment for patient- and institution-level factors.

**Competing interests:** None declared.

This article has been peer reviewed.

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In response to concerns about increasing utilization of low-value health care services, the American Board of Internal Medicine Foundation launched the Choosing Wisely campaign in the United States in 2012.<sup>1</sup> The goal of the campaign is to encourage conversations between physicians and patients about low-value care by defining “top 5” lists of tests, treatments and procedures that may be unnecessary or unsupported by evidence.<sup>1</sup> Subsequent Choosing Wisely campaigns have followed in other countries, including Canada starting in April 2014.<sup>2,3</sup> Of interest for health policymakers, payers and clinicians are current utilization

permits an understanding of the extent of the problem of low-value care, which in turn allows monitoring of the effect of initiatives such as Choosing Wisely on utilization rates over time.

One Choosing Wisely item included by many specialty societies is the recommendation to avoid routinely performing preoperative testing (including chest radiography, echocardiography and cardiac stress tests) for patients undergoing low-risk surgery.<sup>4–6</sup> This recommendation was previously included in the 2007 American College of Cardiology/American Heart Association guidelines on perioperative cardiovascular evaluation for noncardiac surgery<sup>7</sup> and was recom-

- Canadian Medical Association Journal 2015
- Retrospective cohort study from Canada
- 1.5 million patients
- Low-risk surgical procedures at 137 hospitals
- 31% of patients with EKG or CXR
- Variability across hospitals 3% to 90%
- Older patients and those referred for preoperative consultations associated with testing

# Routine preoperative testing before low-risk surgery does not prevent adverse events...

## **Routine preoperative testing: a systematic review of the evidence**

The tests produce a wide range of abnormal results even in healthy individuals.

The clinical importance of these results is uncertain.

The tests rarely lead to changes in management.

The clinical value of changes in management are uncertain.

Preoperative tests do not predict adverse events.

No good evidence exists to suggest that routine testing in asymptomatic patients provides any benefit.

# Strategic Partnerships to Reduce Low-Value Preoperative Testing

## Organization #1



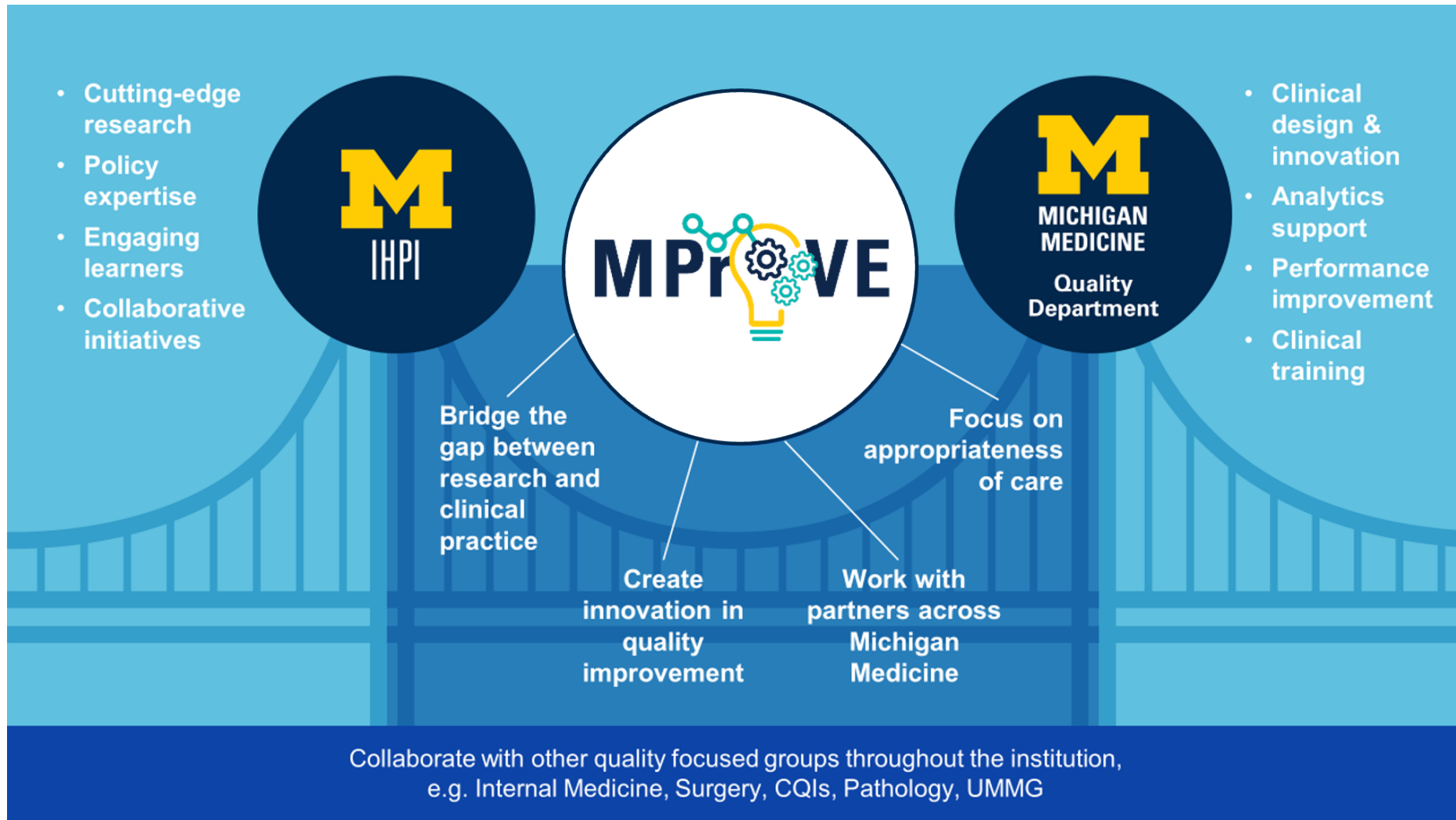
## Organization #2



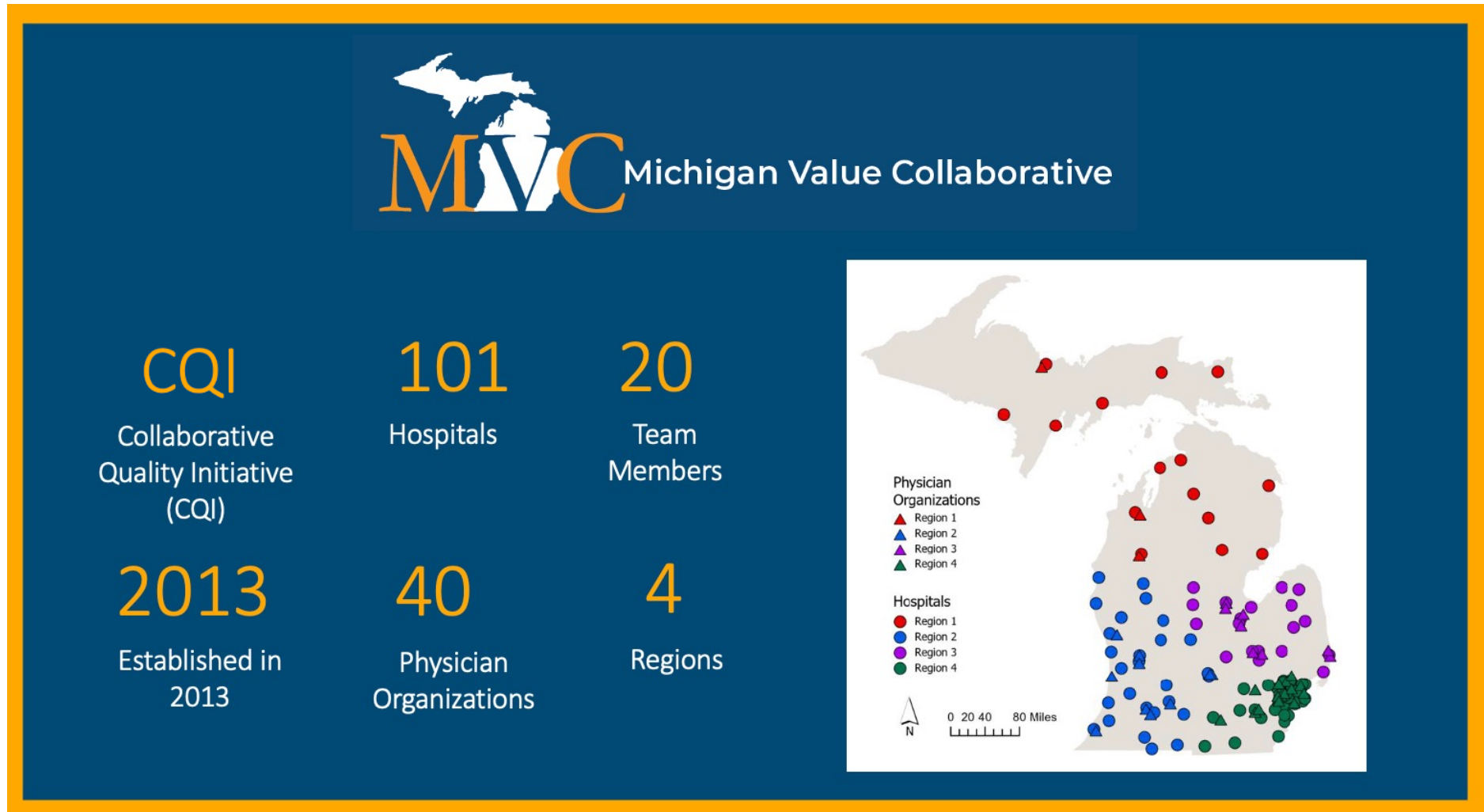
# MPrOVE – Partnering Organization #1



# MPrOVE – Partnering Organization #1



# Michigan Value Collaborative – Partnering Organization #2





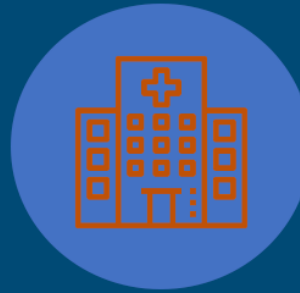
# Michigan Value Collaborative – Partnering Organization #2

## Levers for Improvement



### Data Analytics

Online registry to provide ready web-access data  
Episode-based intelligence



### Hospital & PO Engagement

Collaborative meetings  
Regional networking events  
Virtual workgroups  
Webinar trainings



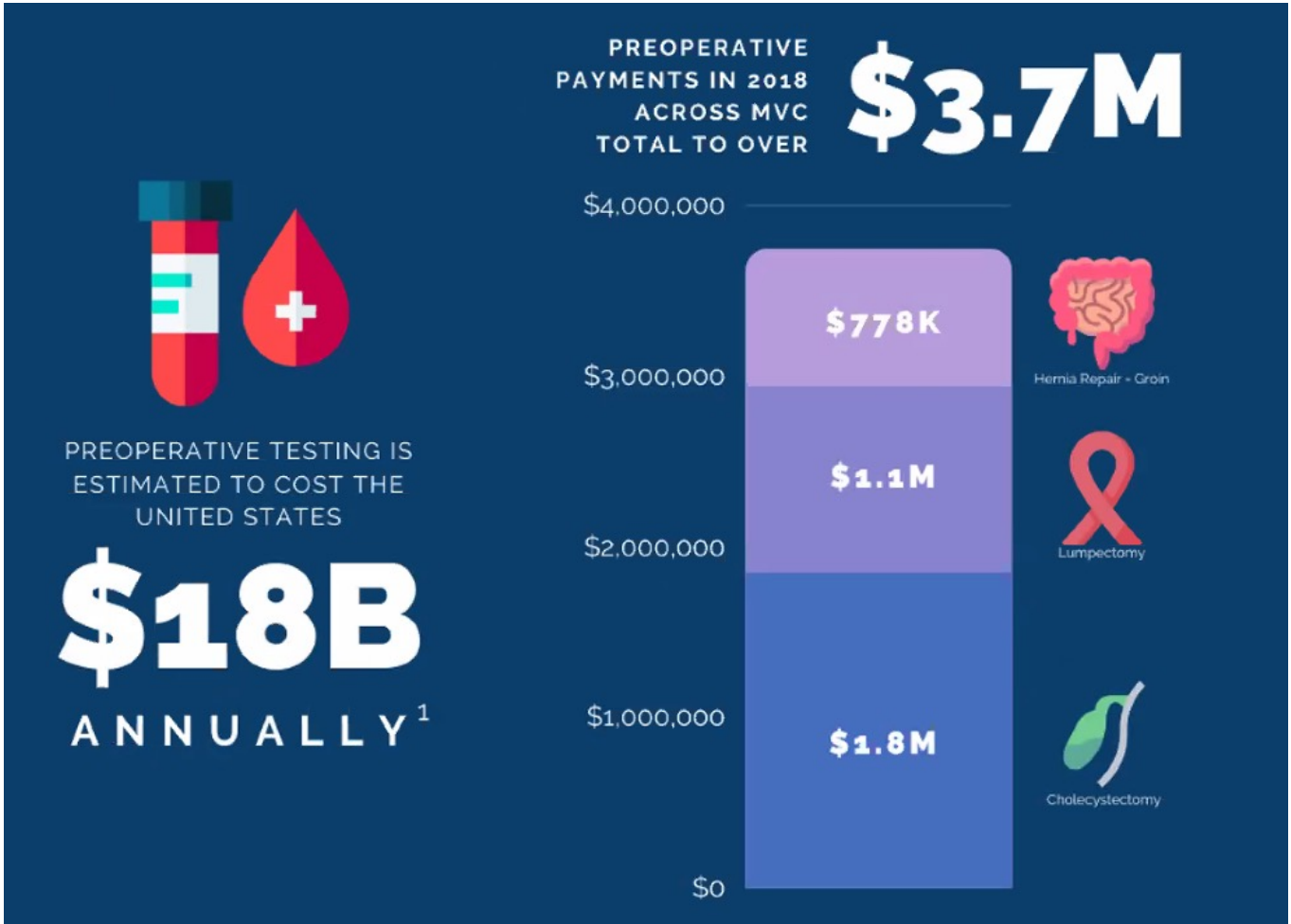
### CQI Synergy

Quality and value integration  
Comprehensive claims





# Spending on low-value testing nationally and across Michigan



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## Letters

### RESEARCH LETTER

#### LESS IS MORE

##### Patterns and Determinants of Low-Value Preoperative Testing in Michigan

Routine preoperative testing before low-risk surgery has no known benefit and is an important target for deimplementation because it is overused and costly and can lead to downstream care cascades involving invasive diagnostic testing.<sup>1-4</sup> Selecting appropriate strategies for deimplementation is limited by an insufficient understanding of patterns and determinants of routine preoperative testing before low-risk surgery. Our objectives were to (1) examine use of preoperative testing before 3 common low-risk, ambulatory surgical procedures across diverse practice settings in Michigan, (2) to assess interhospital and intrahospital variations in testing, and (3) to identify determinants of testing to inform targets for future deimplementation strategies.

**Methods** | We performed a retrospective cohort analysis of administrative claims data from a Blue Cross Blue Shield of Michigan-funded statewide collaborative quality initiative to identify adults who underwent preoperative testing before 1 of 3 common low-risk ambulatory surgeries (lumpectomy, laparoscopic cholecystectomy, or laparoscopic inguinal hernia repair) from January 1, 2015, through June 30, 2019. This study was deemed exempt from human subjects protection review by the University of Michigan Institutional Review Board owing to the use of deidentified data. Patient informed consent was not required owing to the use of deidentified data. This study followed the Strengthening

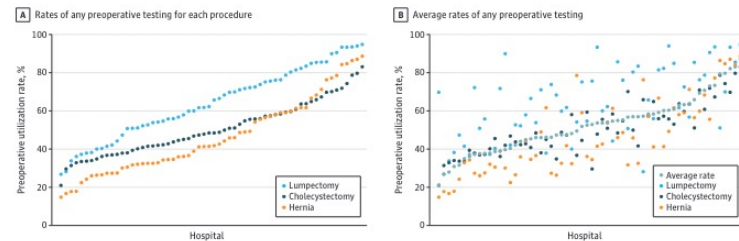
the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline.

The primary dependent variable was receipt of at least 1 preoperative test in the 30 days prior to the index procedure (excluding testing on the day of the procedure, during an inpatient stay, or in an emergency setting). Preoperative tests included cardiac testing (ie, electrocardiogram, echocardiogram, cardiac stress tests), laboratory studies (ie, complete blood cell count, basic metabolic panel, coagulation studies, urinalysis), chest radiography, and pulmonary function testing.

Multilevel mixed-effects regression modeling was performed to evaluate associations between patient, practice-level, and hospital characteristics with testing. Statistical analyses were performed using SAS, version 9.4 (SAS Institute) and Stata, version 16 (StataCorp LLC).

**Results** | The analytic cohort included 9619 patients who underwent lumpectomy, 20 249 patients who underwent laparoscopic cholecystectomy, and 10 172 patients who underwent laparoscopic inguinal hernia repair; mean (SD) age for the cohort was 59.3 (16.1) years, and 24 783 (61.9%) were female. Approximately 51.6% of patients (n = 20 656) received 1 or more preoperative test, 29.4% of patients (n = 11 759) underwent 2 or more tests, and 13.5% (n = 5 395) underwent 3 or more tests. The 3 most common tests were complete blood cell count (n = 13 243 [33.1%]), electrocardiograms (n = 10 078 [25.2%]), and basic metabolic panel (n = 4533 [11.3%]). After adjusting for patient case-mix, there were wide interhospital and intrahospital variations in testing before the surgical procedures (Figure).

Figure. Risk-Adjusted Caterpillar Plots Showing Interhospital and Intrahospital Variations of Any Testing for 3 Low-risk Surgical Procedures Across Michigan



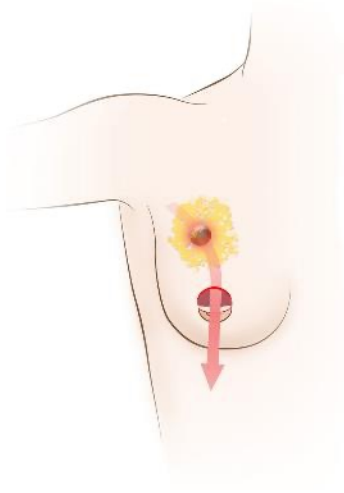
A, Hospitals are sorted by rates of any preoperative testing for each procedure separately. B, Hospitals are sorted by average rates of any preoperative testing. Rates of preoperative testing for the 3 surgical procedures within each facility were then plotted separately. Median rate of preoperative testing was 50.9% at participating hospitals (n = 63 hospitals). Models were adjusted for patient age and number of comorbidities with hospital identifiers included as random intercepts.

## Study #1 -- JAMA Internal Medicine 2021

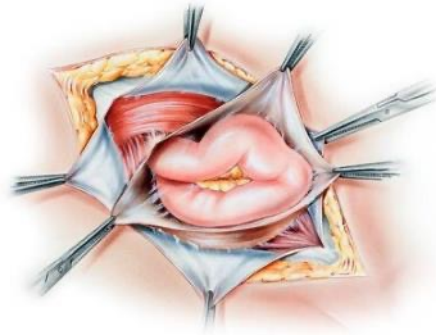
### Patterns and Determinants of Low-Value Preoperative Testing in Michigan

# What is extent of low-value preoperative testing across Michigan?

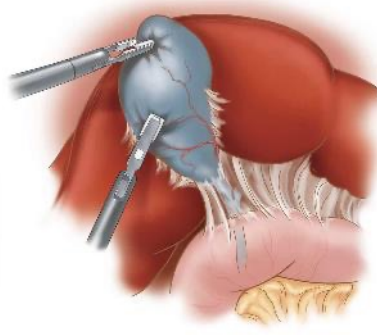
## Common Ambulatory Procedures



Lumpectomy

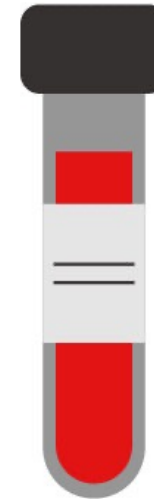
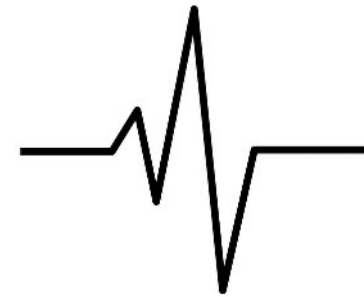


Lap Inguinal Hernia



Lap Cholecystectomy

## Testing with 30 Days Before Surgery



- Lab studies
- EKG
- Cardiac testing
- PFTs
- Urinalysis
- CXR

Excluded testing in ED or inpatient setting

# Low-value preoperative testing is common across Michigan

At least one test

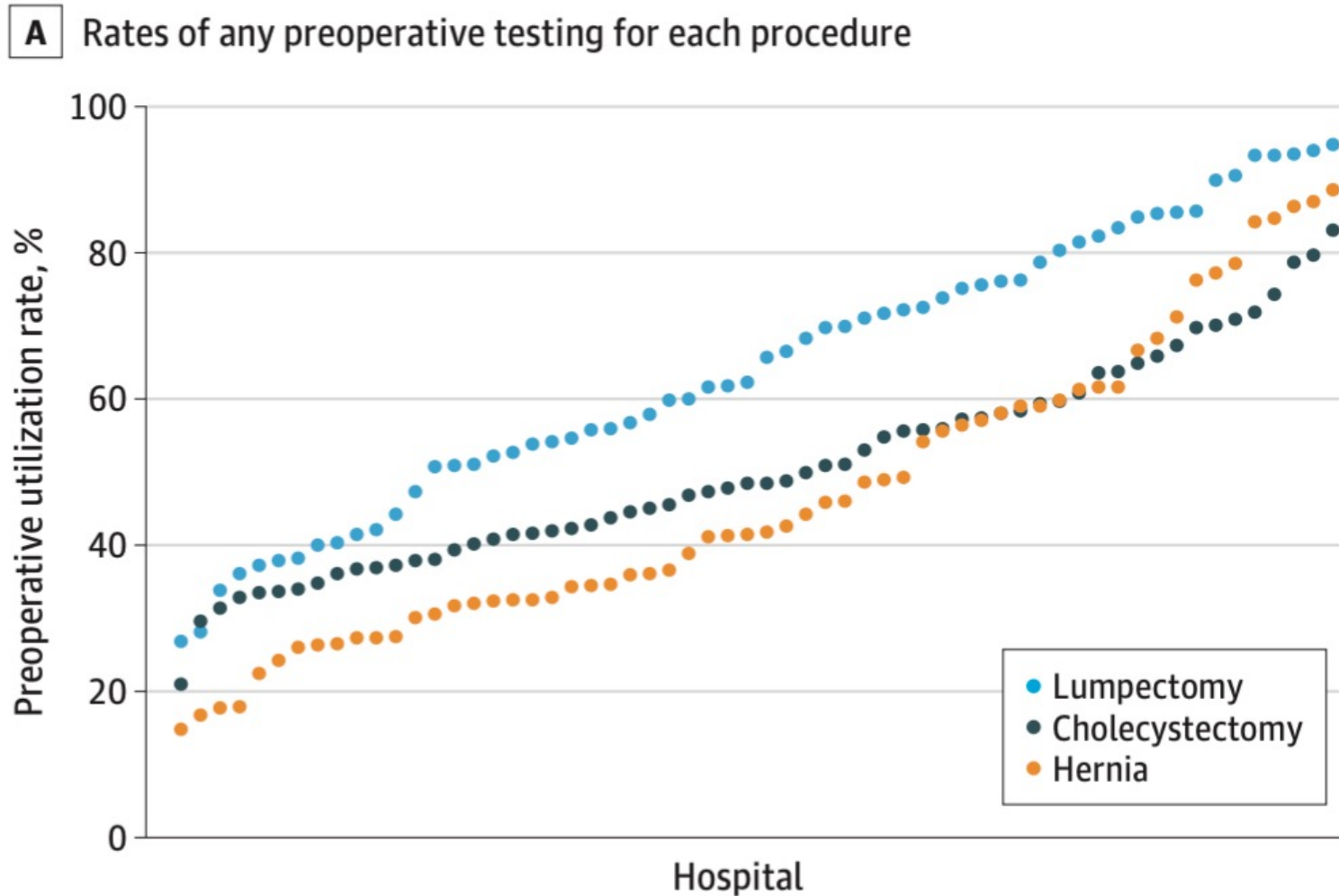
**52%**

2 or more tests

**29%**

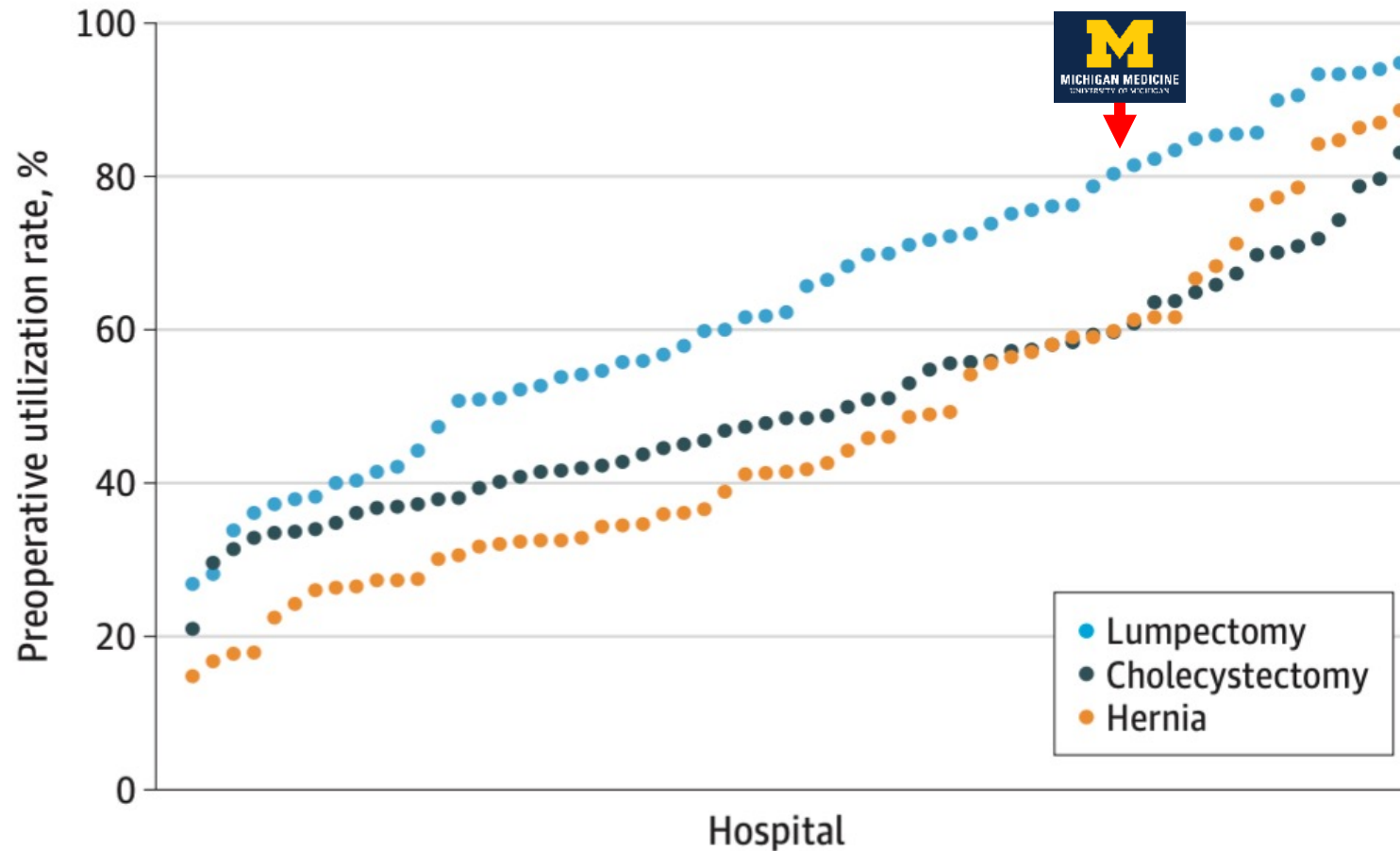
**Among 40,040 patients who underwent ambulatory low-risk surgery 60 hospitals in Michigan**

# Low-value testing rates vary widely *between* hospitals



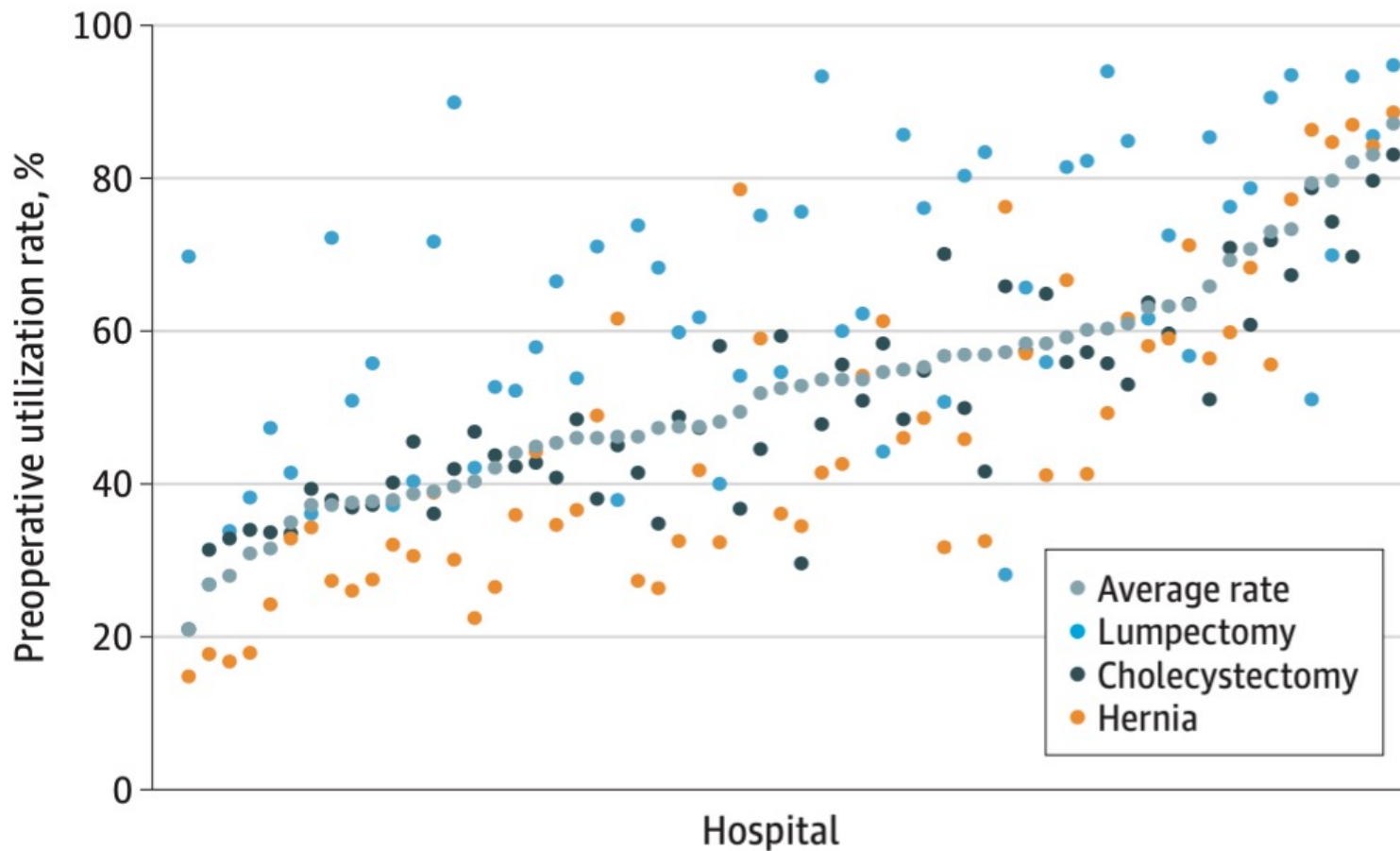
# What about our own institution?

**A** Rates of any preoperative testing for each procedure



# Low-value testing rates vary *within* hospitals

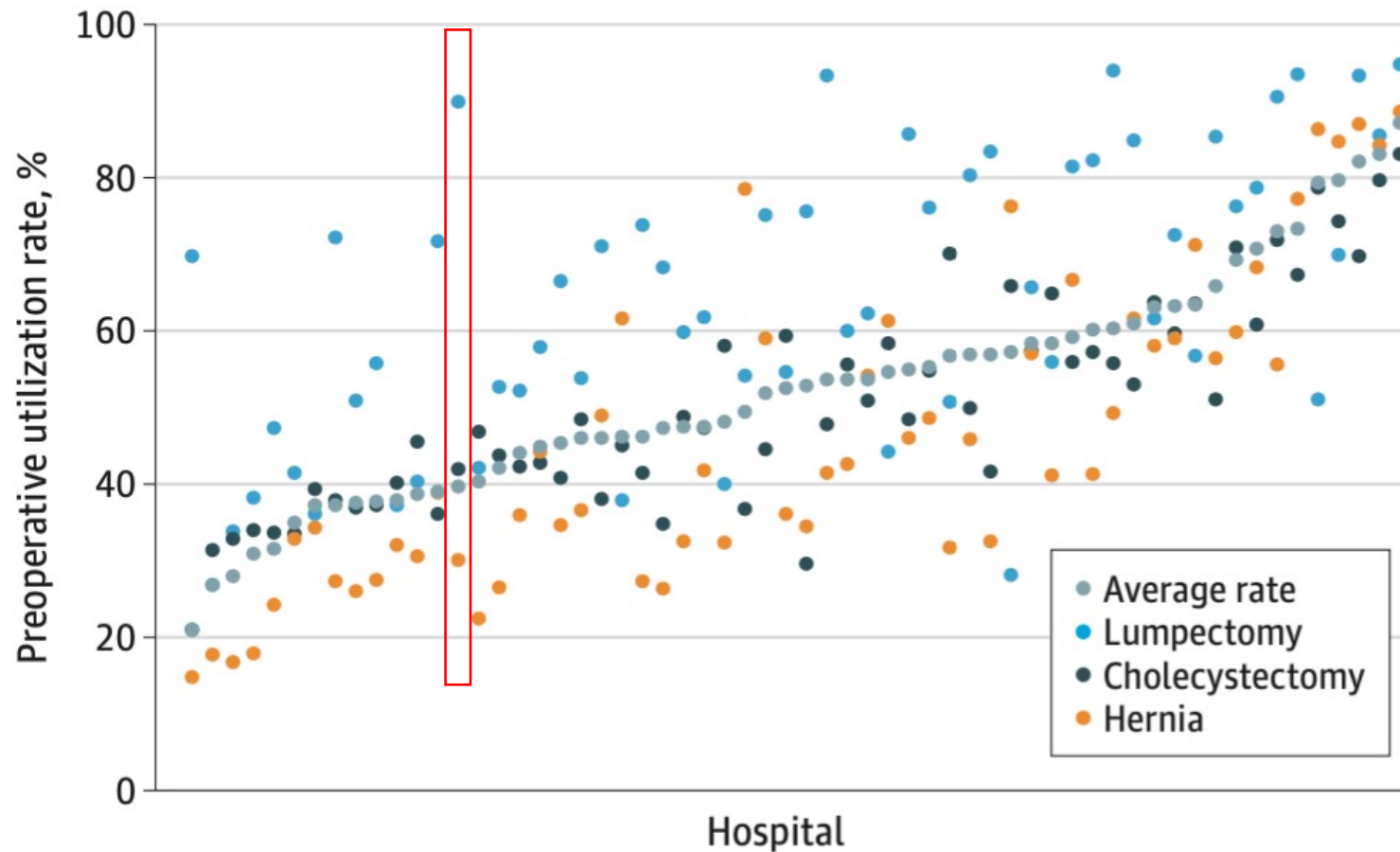
**B** Average rates of any preoperative testing





# Low-value testing rates vary *within* hospitals

**B** Average rates of any preoperative testing





# Study #1 - Conclusions

---

- Low-value preoperative testing is common across Michigan
- Wide inter- and intra-hospital variations
- De-implementation strategies may target specific hospitals, in addition to individual practitioners
- Preoperative H&P visits may be a driver of testing



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 journal homepage: [www.JournalofSurgicalResearch.com](http://www.JournalofSurgicalResearch.com)



## Comprehensive History and Physicals are Common Before Low-Risk Surgery and Associated With Preoperative Test Overuse

Check for updates

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 Monica L. Yost, MPH,<sup>d</sup> Bonnie Cheng, MPH,<sup>d</sup> Eve Kerr, MD,<sup>e,f,g</sup>  
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### ABSTRACT

**Introduction:** The Centers for Medicare and Medicaid Services (CMS) recently eliminated the requirement for preoperative history and physicals (H&Ps) prior to ambulatory surgery. We sought to assess variations in separately billed preoperative H&P utilization prior to low-risk ambulatory surgery, describe any relationship with preoperative testing, and identify independent predictors of these consultations prior to this policy change to help characterize the potential unnecessary utilization of these consultations and potential unnecessary preoperative testing prior to low-risk surgery.

**Materials and methods:** A retrospective cohort study was performed using claims data from a hospital value collaborative in Michigan from January 2015 to June 2019 and included patients undergoing one of three ambulatory procedures: breast lumpectomy, laparoscopic cholecystectomy, and laparoscopic inguinal hernia repair. Rates of preoperative H&P visits within 30 d of surgical procedure were determined. H&P and preoperative testing associations were explored, and patient-level, practice-level, and hospital-level determinants of utilization were assessed with regression models. Risk and reliability-adjusted caterpillar plots were generated to demonstrate hospital-level variations in utilization.

**Results:** 50,775 patients were included with 50.5% having a preoperative H&P visit, with these visits being more common for patients with increased comorbidities ( $1.9 \pm 2.2$  vs  $1.4 \pm 1.9$ ;  $P < 0.0001$ ). Preoperative testing was associated with H&P visits (57.2% vs 41.4%;  $P < 0.0001$ ). After adjusting for patient case-mix and interhospital and intrahospital

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## Study #2 -- Journal of Surgical Research 2023

- Comprehensive History and Physicals Are Common Before Low-Risk Surgery and Associated with Preoperative Test Overuse

# All testing more common with preoperative history & physical exams

**Table 2 – Comparison of preoperative testing types by occurrence of preoperative history and physical examination.**

| Variables               | Total cohort N = 50,775 | Preoperative H&P N = 42,973 | No preoperative H&P N = 7802 | P-value |
|-------------------------|-------------------------|-----------------------------|------------------------------|---------|
| Any testing             | 25,062 (49.4%)          | 14,656 (57.2%)              | 10,406 (41.4%)               | <0.0001 |
| Cardiac testing         |                         |                             |                              |         |
| Electrocardiogram       | 11,452 (22.6%)          | 6752 (26.4%)                | 4700 (18.7%)                 | <0.0001 |
| Echocardiogram          | 1273 (2.5%)             | 867 (3.4%)                  | 406 (1.6%)                   | <0.0001 |
| Cardiac stress test     | 1143 (2.3%)             | 784 (3.1%)                  | 359 (1.4%)                   | <0.0001 |
| Laboratory studies      |                         |                             |                              |         |
| Complete blood count    | 16,609 (32.7%)          | 9886 (38.6%)                | 6723 (26.7%)                 | <0.0001 |
| Basic metabolic panel   | 5439 (10.7%)            | 2962 (11.6%)                | 2477 (9.9%)                  | <0.0001 |
| Coagulation studies     | 3361 (6.6%)             | 2083 (8.1%)                 | 1278 (5.1%)                  | <0.0001 |
| Urinalysis              | 4977 (9.8%)             | 3139 (12.3%)                | 1838 (7.3%)                  | <0.0001 |
| Chest radiography       | 3636 (7.2%)             | 2132 (8.3%)                 | 1504 (6.0%)                  | <0.0001 |
| Pulmonary function test | 711 (1.4%)              | 480 (1.9%)                  | 231 (0.9%)                   | <0.0001 |

Values presented as n (column %).

H&P = history and physical examination.

## Study #2 -- Conclusions

---

- Preoperative H&Ps were common prior to three low-risk surgical procedures, even among younger patients with no comorbidities
- These consultations are associated with low-value preoperative testing
- Preoperative H&P visits may be a potential target for de-implementation

# Qualitative Work within Michigan Medicine



# Initial Qualitative Investigation within University of Michigan

**7+ surgical specialties represented**



**Routine preoperative testing frequently viewed as “low value”**

**Routine preoperative testing was often described as:** “unnecessary”, “redundant”, or “just checking a box”

**Low likelihood of influencing care:** “with lower risk patients, the times that those thorough testing would actually change anything or result in a change in, or postponement of surgery or needing to further optimize the patient would be relatively rare.”

# Initial Qualitative Investigation within University of Michigan



## Incentives to de-escalate preoperative testing:

**To create a more efficient preoperative process:** “I don’t think it should be one size fits all. We shouldn’t have to jump so many hoops in order to make it to the OR.”



## Barriers to de-implementing preoperative testing:

**Concern for safety:** “We all know complications can occur regardless of the preop evaluation, it’s better to be safe and just have everyone go through it [preoperative testing].”

**Current culture:** “I think one of the big barriers [to de-implementation] would just be making sure that everybody knows that that's the policy.”



# Study #3 – Under Review

---

- Focused ethnography study
- Goal: identify determinants of unnecessary preoperative testing across a diverse group of individuals to inform future de-implementation strategies targeting participant-identified barriers
- Semi-structured interviews and direct observations
- 2 preoperative H&P clinics and 1 outpatient surgery center
- Thematic analysis
- 30 individuals (surgeons, anesthesiologists, primary care physicians, physician assistants, nurses, and medical assistants).

# Study #3 – Under Review






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- **Three themes**

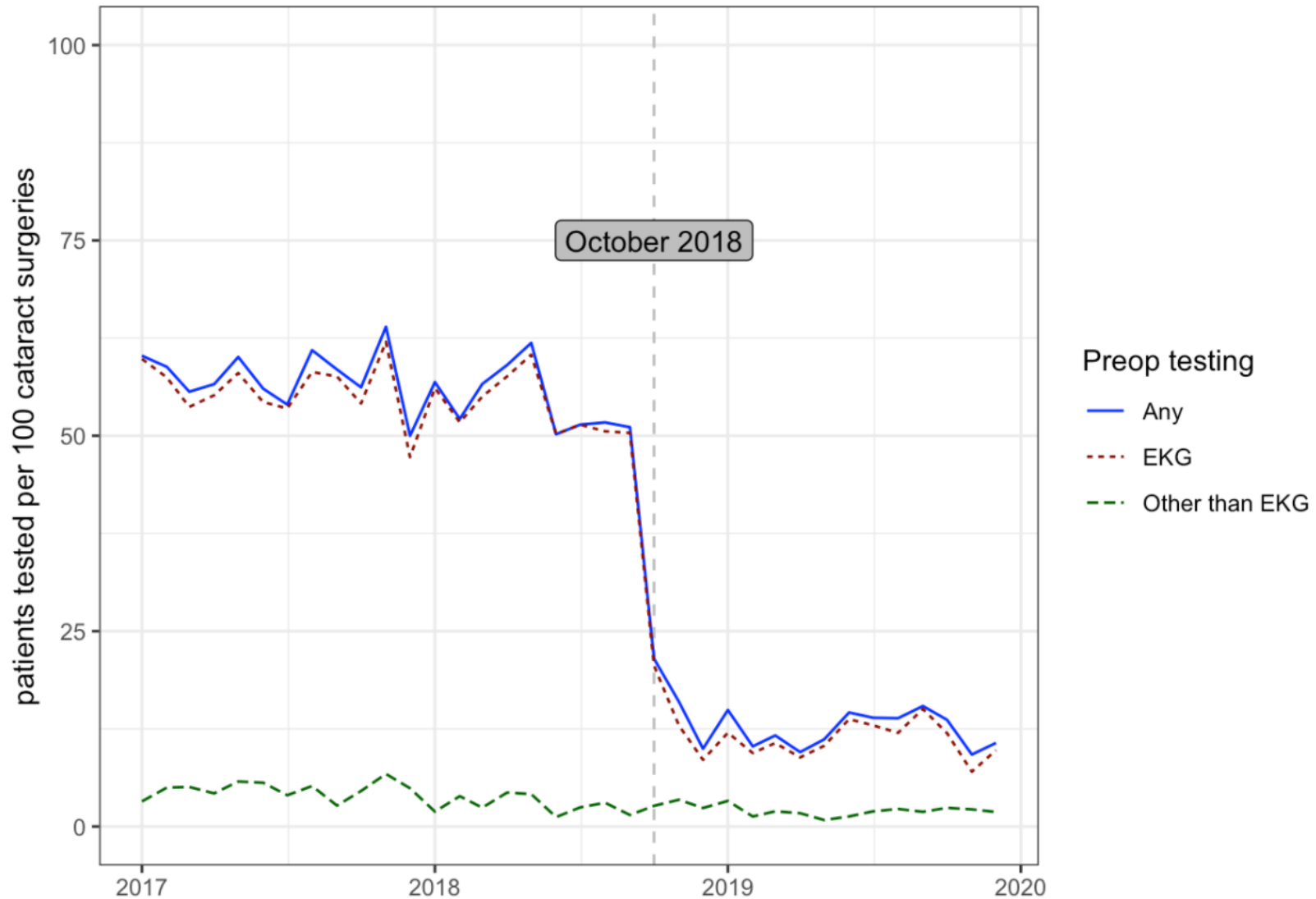
1. Shared Values: Prioritize patient safety and evidence based medicine
2. Gaps in Knowledge: Discrepancies related to existing guidelines
3. Communication Breakdown: Testing ordered to meet perceived expectations of other providers

# MPROVE Strategy: Multi-level Approach within UM

## Mapping Intervention Strategies to Barriers of De-Implementing Pre-Op Testing

| BARRIERS  | INTERVENTION STRATEGIES   |   |   |  |   |
|---|---|---|---|--|---|
|   | Consensus guidelines<br> | Provider education<br> | Audit & Feedback<br> | Clinical decision support<br> | Financial incentives<br> |
| Different beliefs & attitudes about pre-op testing  |   | X   | X   |  |   |
| Different surgeon, anesthesia, & other staff perspectives about pre-op testing                          | X   |   |   | X  |   |
| Unequal awareness of evidence-based guidelines/standardization  | X   | X   |   |  |   |
| Cultural norms  | X   | X   |   | X  |   |
| Fear of adverse events, Concern for medico-legal risk   |   | X   | X   |  |   |
| Facilities are not motivated to reduce over testing overtreatment since it leads to lower reimbursement |   |   |   |  | X   |

# Example of success within UM





## CHANGE

## Reducing unnecessary preoperative testing

Lesly A Dossett,<sup>1</sup> Anthony L Edelman,<sup>2</sup> Gloria Wilkinson,<sup>2</sup> Shannon M Ruzycki<sup>3</sup>

## What you need to know

- Routine preoperative tests (such as electrocardiograms and blood tests) before low risk surgery do not prevent adverse events during or after surgery
- Unnecessary testing is costly and can lead to other potentially unnecessary specialty consultations and invasive tests
- Choosing Wisely and NICE guidelines provide multi-specialty recommendations to support the avoidance of unnecessary preoperative testing
- Over-testing is rooted in the general misconception that medical screening cannot be harmful
- Interventions shown to reduce unnecessary preoperative testing include local practice guidelines, clinician education, and audit and feedback

Preoperative evaluation is a component of risk stratification and mitigation for patients undergoing surgery. These evaluations include comprehensive histories, directed physical exams, and selected preoperative diagnostic testing. However, most people who undergo low risk surgeries do not need any preoperative tests. Routine and unnecessary use of preoperative tests is harmful to patients and can lead to unnecessary specialty consultations, invasive diagnostic and therapeutic interventions, delays in surgery, costs to patients (such as missed days of work, travel burden, out-of-pocket costs), wasted time for clinicians, and environmental harm.<sup>1-5</sup>

The choice to conduct preoperative testing is guided by characteristics of the patient (which can be classified according to the American Society of Anesthesiologists (ASA)) and the planned procedure (emergent or minor, intermediate, or major elective surgery). While patients with significant systemic disease (ASA 3 or 4) and those undergoing major surgery typically require testing, asymptomatic patients undergoing low risk surgery do not require routine preoperative tests.

The UK National Institute for Health and Care Excellence (NICE) and the international Choosing Wisely campaign recommend against the use of routine laboratory studies, electrocardiograms, echocardiograms, cardiac stress tests, and chest radiographs in most patients undergoing low risk (such as eye and dental surgery, removal of skin lesions) and intermediate risk surgery (such as repair of inguinal hernia, knee arthroscopy) (see box 1). This

\*Change\* aim to alert clinicians to the immediate need for a change in practice to make it consistent with current evidence. We welcome any suggestions for future articles (email us at [practice@bmj.com](mailto:practice@bmj.com)).

article summarises the rationale for these recommendations, barriers to change, and strategies for reducing unnecessary preoperative testing.

## Box 1: Selected Choosing Wisely and National Institute for Health and Care Excellence (NICE) recommendations for preoperative testing\*

- Don't obtain baseline laboratory studies in patients without significant systemic disease† undergoing low risk surgery†—specifically, completed blood count, basic or comprehensive metabolic panels, or coagulation studies
- Don't obtain baseline diagnostic cardiac testing (such as echocardiography) in asymptomatic stable patients with known cardiac disease undergoing low or moderate risk surgery
- Don't perform preoperative medical tests for eye surgery unless there are specific medical indications
- Avoid preoperative chest x rays for ambulatory patients with unremarkable history and physical exam
- Avoid routine preoperative testing for low risk surgery without a clinical indication

\*Recommendations available at [www.choosingwisely.com](http://www.choosingwisely.com), [choosingwiselycanada.com](http://www.choosingwiselycanada.com), and [www.nice.org.uk/guidance/ng45](http://www.nice.org.uk/guidance/ng45).

†Patients with an American Society of Anesthesiologists (ASA) class of 1 (a normal healthy patient) or 2 (mild systemic disease).

‡Patients undergoing minor or intermediate surgery as defined by NICE guidelines and with a <1% risk of 30-day serious adverse events.

## The evidence for change

## How common is unnecessary preoperative testing?

Given the high prevalence of surgical procedures, eliminating unnecessary preoperative testing before low risk surgery represents a key opportunity to improve value in surgery. Despite the recommendations from international campaigns and specialty organisations, unnecessary preoperative testing remains common, with multiple studies demonstrating persistently high rates of testing across several patient populations.

- In a study of patients over the age of 65 years undergoing non-cardiac procedures (such as breast surgery, inguinal hernia repair, laparoscopic cholecystectomy) in the United States, 45% of patients underwent unnecessary preoperative cardiac testing in the form of stress

# Review Article on Low-Value Preoperative Testing and QI Strategies for De-implementation

Dossett et al, BMJ 2022

# Preoperative evaluation and testing recommendations based on patient and procedural risk

|                 |   | Patient risk   |   |
|-----------------|---|--|---|
|                 |   | Low risk<br>(ASA class 1 or 2)   | High risk<br>(ASA class 3 or 4)   |
| Procedural risk | Minor or intermediate risk elective surgery | Routine testing not recommended  | Comorbidity specific testing (such as hemoglobin A1C for diabetic patients) |
|                 | Major elective surgery                      | Procedure specific testing (such as complete blood count if blood loss expected) | Comprehensive evaluation by perioperative medicine or anaesthesia provider  |

ASA = American Society of Anesthesiologists

Minor surgery examples: skin or soft tissue excision, breast biopsy, ophthalmologic surgery

Intermediate surgery examples: inguinal hernia repair, knee arthroscopy, laparoscopic cholecystectomy

Major surgery examples: total joint replacement, colon resection, lung resection

Fig 1 | Preoperative evaluation and testing recommendation based on patient and procedural risk

Dossett et al, BMJ 2022

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Dossett et al, BMJ 2022



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Dossett et al, BMJ 2022

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Fig 1 | Preoperative evaluation and testing recommendation based on patient and procedural risk

Dossett et al, BMJ 2022

# PDSA Quality Improvement Process to Reduce Unnecessary Preoperative Testing

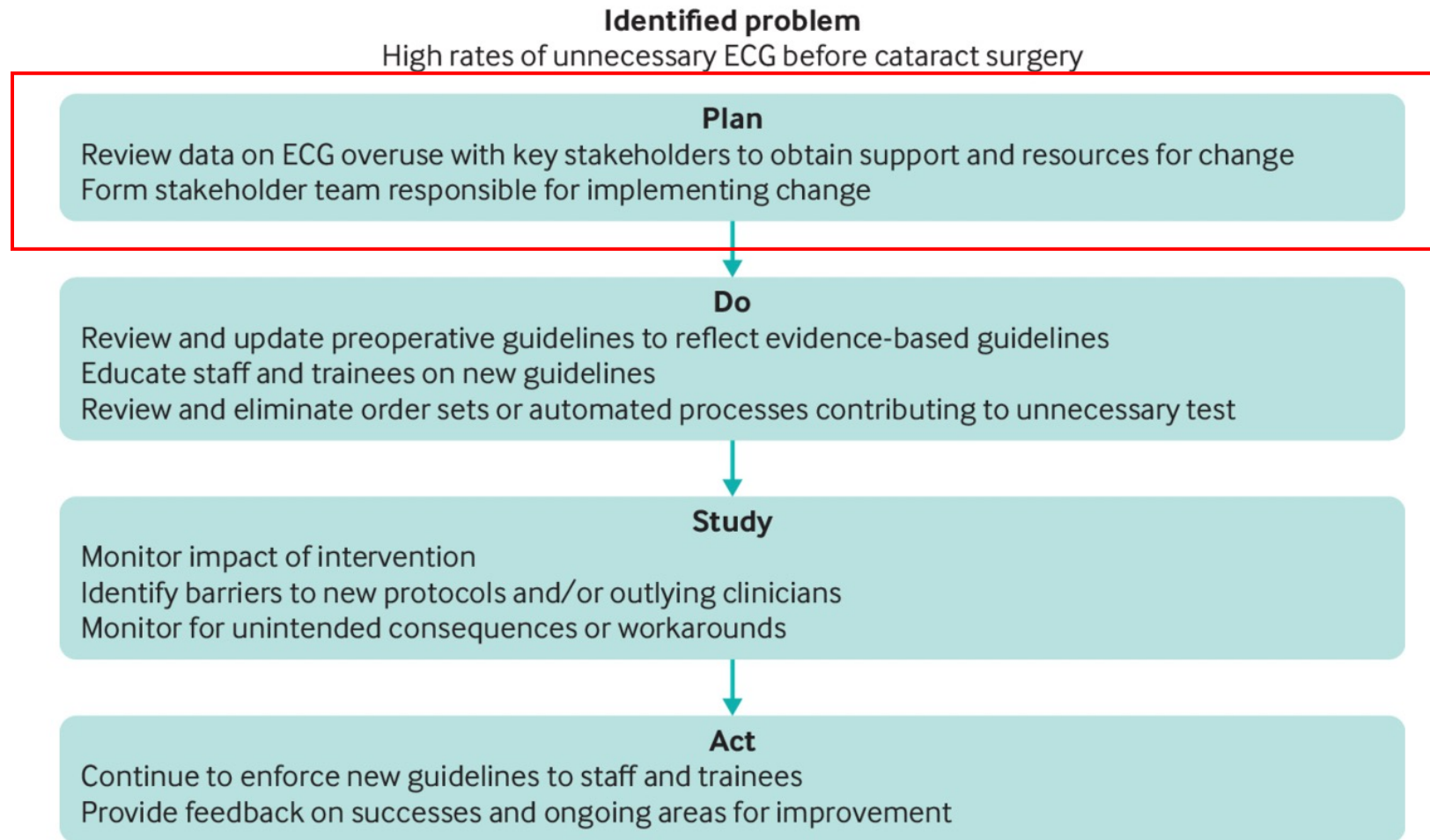


Fig 2 | Example of a plan-do-study-act quality improvement process to reduce unnecessary preoperative testing

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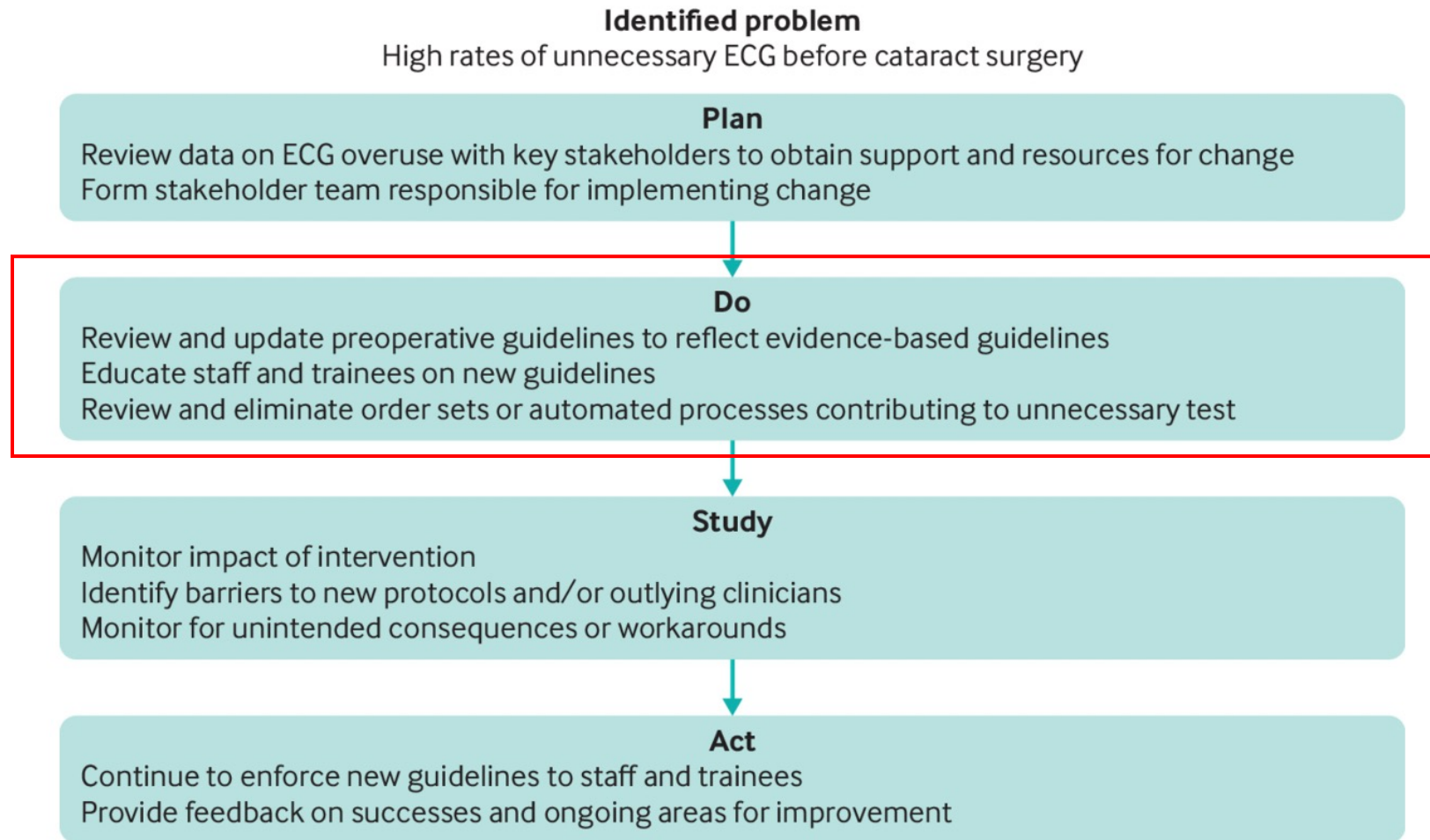


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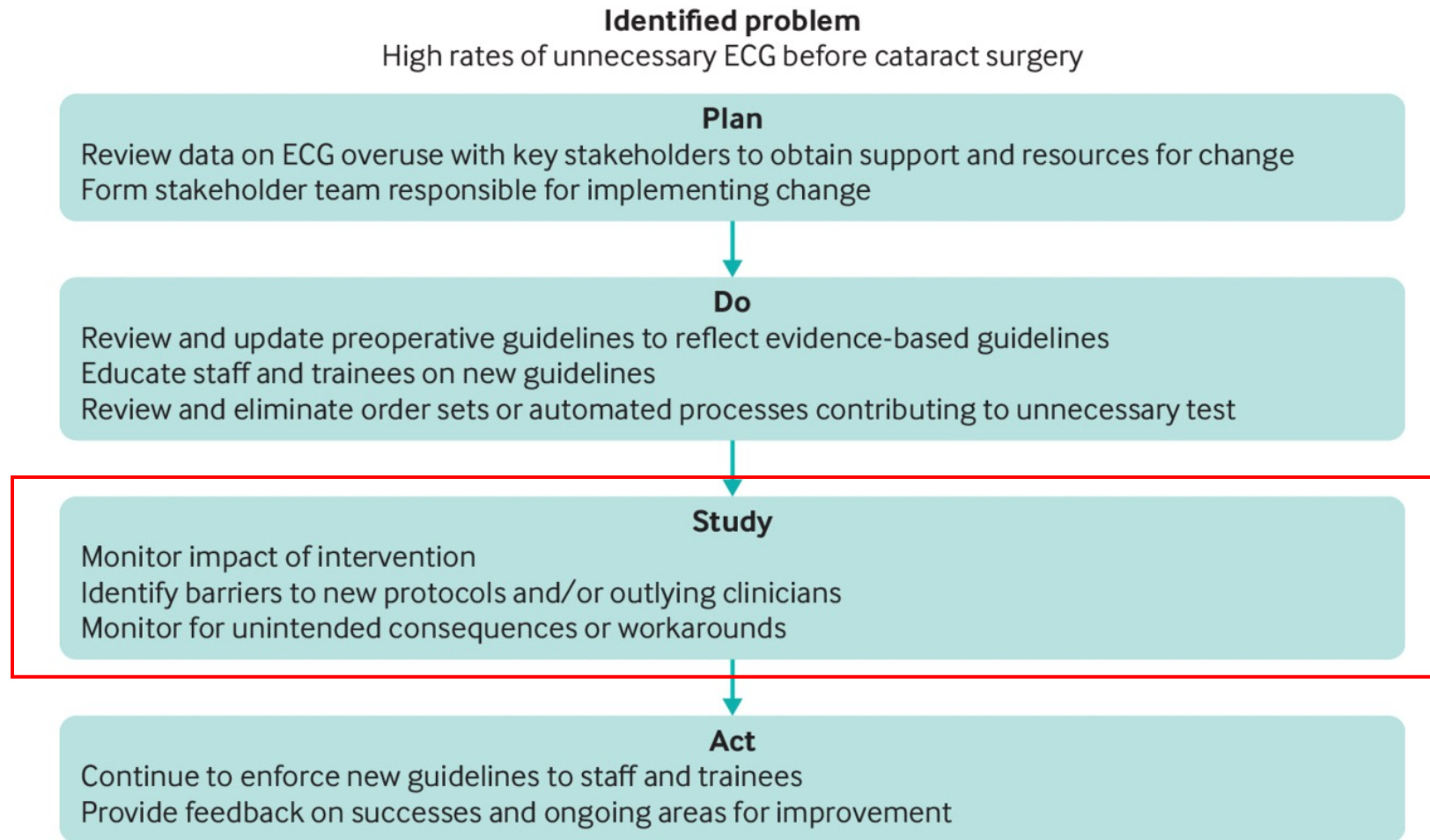
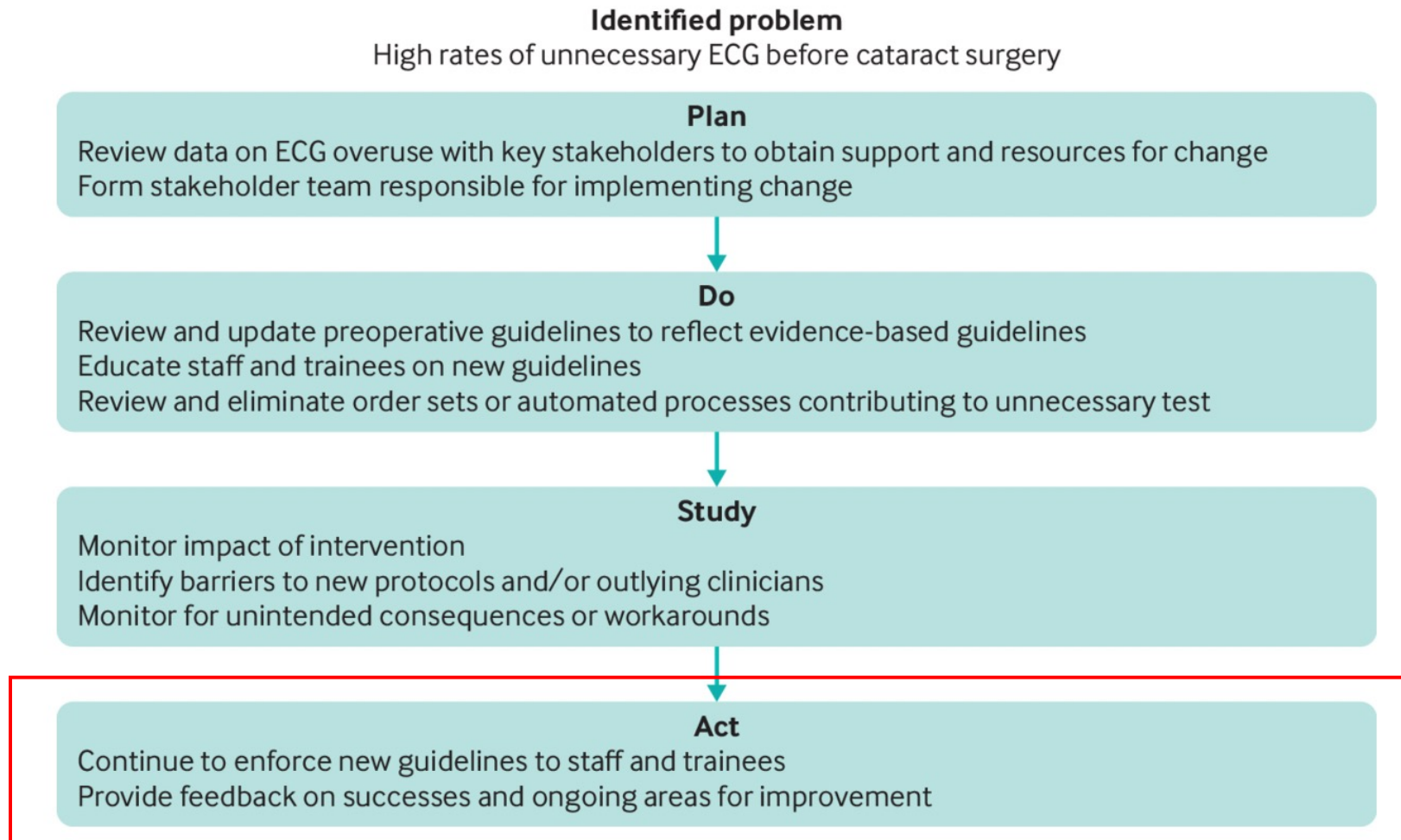


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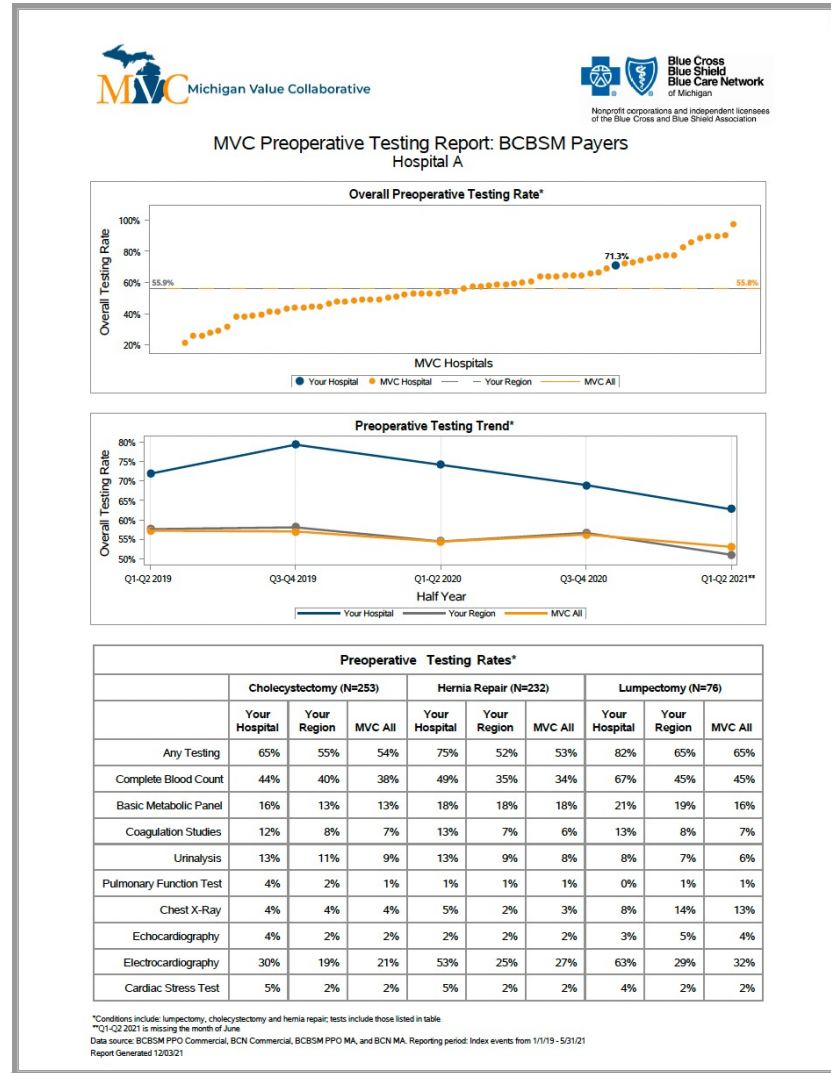
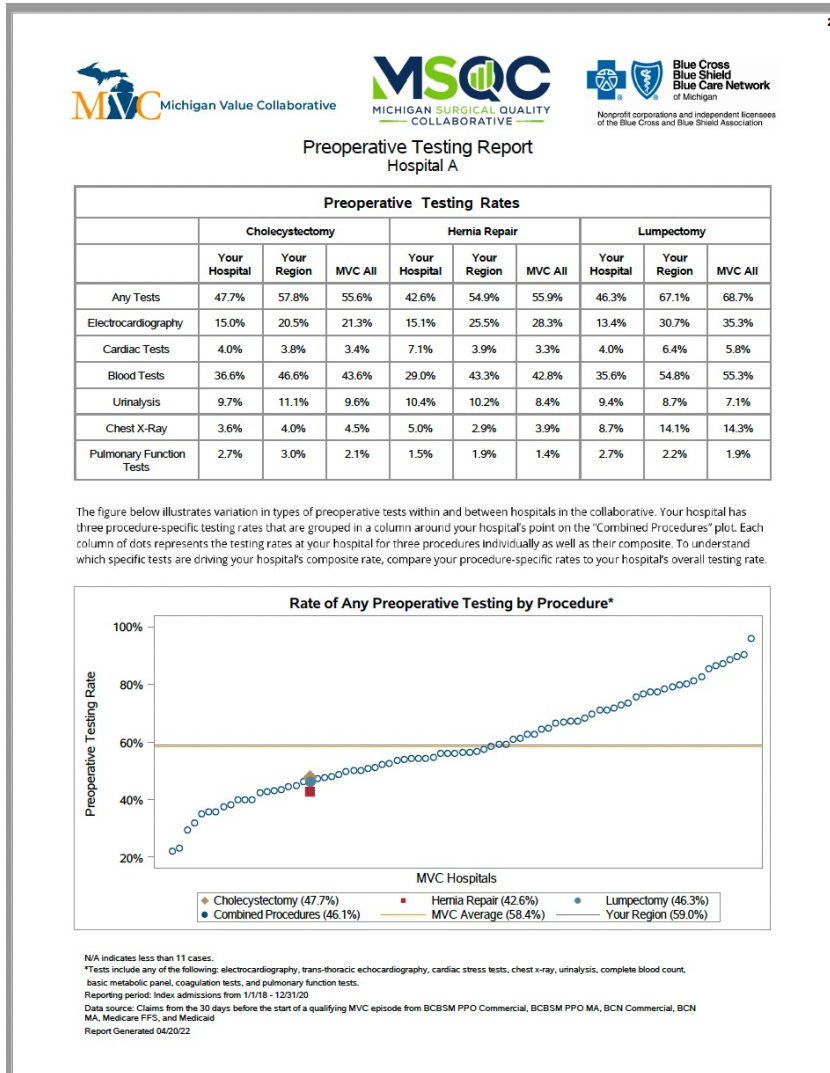
# PDSA Quality Improvement Process to Reduce Unnecessary Preoperative Testing



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Fig 2 | Example of a plan-do-study-act quality improvement process to reduce unnecessary preoperative testing

# MVC Strategy: Audit & Feedback / Benchmarking





# MVC Strategy: Statewide “Value Coalition Campaign”

2021 Progress Report

## Preoperative Testing

Value Coalition Campaign

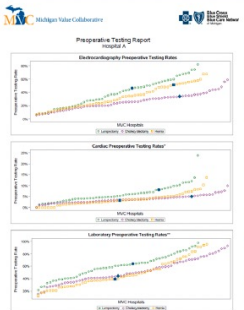


### About the Campaign

Preoperative testing, especially in low-risk surgical procedures, often provides no clinical benefits to patients. Despite this, these services continue to be ordered regularly at hospitals across Michigan. Eliminating this unnecessary and, in some cases, potentially harmful preoperative testing represents a clear opportunity to improve value in surgery. The Michigan Value Collaborative (MVC) Coordinating Center uses administrative claims data and engagement with MVC members to try and reduce the use of unnecessary preoperative testing for surgical procedures to improve quality, reduce cost, and improve the equity of care delivery in Michigan. The MVC Coordinating Center is supported by a stakeholder working group to advise ongoing activity. The expertise of this workgroup is used to provide insight on the best approaches to improve member awareness of preoperative testing practices and increase access to existing guidelines and best practices.



Routine preoperative testing before low-risk surgical procedures is a practice that often does not reclassify estimated risk from patient history or physical exams, may delay surgeries unnecessarily, can lead to additional testing downstream and a resulting treatment cascade, and can impose avoidable costs on the patient and provider.



### Preoperative Push Reports

The MVC Coordinating Center first distributed preoperative testing push reports to members and other partner Collaborative Quality Initiatives (CQIs) in February of 2021 to 65 MVC members in the hopes of helping them identify areas of opportunity. A refreshed version of the report was developed using only BCBSM data to provide more up-to-date and granular preop testing information. These reports were distributed in December of 2021.

In general, the reports demonstrated a wide range of testing rates between facilities, with preoperative testing rates ranging from 20% to over 90%. The average overall testing rate was around 62% when looking at all payers and 55% when looking at only the BCBSM payers. Due to the amount of variation, MVC suspects preoperative testing is overused at the state level such that even hospitals that are average or below average may still have significant opportunities to safely reduce preoperative testing.

### Preop Testing VCC: 2021 Progress & 2022 Goals

Preoperative Testing Value Coalition Campaign

Stand with the majority of clinicians and #LoveThePreopLabs. For more information, visit [www.michiganvalue.org](http://www.michiganvalue.org)

### Developed Webpage & Flyer

The MVC Coordinating Center developed an informational flyer to explain the case for reducing unnecessary preoperative testing and make clinicians aware of its prevalence. It is accompanied by a QR code that leads to an MVC webpage populated with a variety of preoperative testing resources.

### Stakeholder Meetings Held

The MVC Coordinating Center held two preoperative testing stakeholder meetings with representatives from member hospitals and physician organizations. These meetings helped MVC to facilitate collaboration and best practice sharing. Stakeholder meetings will continue to occur on a biannual basis in 2022.

### Custom Analytics for Members

The MVC Coordinating Center assisted a number of its members with requests for custom analytics using MVC claims data. These custom reports provided members with information tailored to their specific questions and needs. MVC analysts are eager to prepare similar reports for other members interested in improving their preoperative testing rates.

### Published Manuscript

The MVC Coordinating Center contributed to the development of a manuscript that was published in *JAMA Internal Medicine*, a monthly peer-reviewed medical journal. The manuscript's objectives were to (1) examine use of preoperative testing before 3 common low-risk, ambulatory surgical procedures across diverse practice settings in Michigan, (2) to assess interhospital and intrahospital variations in testing, and (3) to identify determinants of testing to inform targets for future de-implementation strategies. Read the full published manuscript [here](#).

### Collaboration with Fellow CQIs

The MVC Coordinating Center is intentional about reaching out to fellow CQIs for partnership opportunities related to its Value Coalition Campaigns. In the case of its preoperative testing campaign, MVC initiated collaborations with the Michigan Program on Value Enhancement (MPVE) and the Michigan Surgical Quality Collaborative (MSQC). The Coordinating Center plans to further develop and build on these partnerships in the year ahead with new projects.



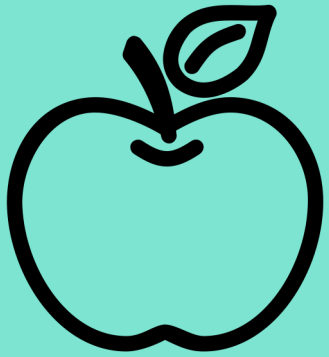
### 2022 VCC Campaign Goals

- Develop provider-level reporting
- Conduct an analysis on the cascade effect from unnecessary preoperative testing
  - Draft a manuscript with MVC's findings
- Host bi-annual stakeholder meetings
- Relationship building with key stakeholders:
  - MSQC site champions
  - Hospital sites for intervention pilot test
  - Physician organizations
- Host a symposium, workgroup, or breakout group focused on preoperative testing
- Use MVC communications to implement a Preoperative Testing Awareness Week
- Refine MVC's preoperative testing sample methodology



# De-implementation of Low-Value Preoperative Testing

Lessons from within and across hospitals in Michigan



**Address  
Low-Hanging Fruit**



**Leverage  
Mixed Methods**



**Robust Data  
Management Plan**



**Consider Multi-Level  
Interventions**

# Acknowledgements



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## Other Collaborators

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# BMJ Open Protocol for assessing the determinants of preoperative test-ordering behaviour for low-risk surgical procedures using a theoretically driven, qualitative design

Andrea Pike <sup>1</sup>, Krista Mahoney,<sup>2</sup> Andrea M Patey,<sup>3</sup> Samantha Inwood <sup>1</sup>, Sameh Mortazheji,<sup>3</sup> Rebecca Lawrence,<sup>1</sup> Amanda Hall,<sup>1</sup> De-implementing Wisely Research Group

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► Prepublication history and additional material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2019-036511>).

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## ABSTRACT

**Introduction** Current evidence suggests that preoperative tests such as chest X-rays, electrocardiograms and baseline laboratory studies may not be useful for healthy patients undergoing low-risk surgical procedures. Routine preoperative testing for healthy patients having low-risk surgery is not a scientifically sound practice. In this study, we will interview healthcare providers working at medical facilities where low-risk surgical procedures are carried out. This will allow us to gain insight into the determinants of preoperative testing behaviours for healthy patients undergoing low-risk surgeries and their barriers and enablers to guideline adherence.

**Methods and analysis** We will use semistructured interviews with anesthesiologists, surgeons and preadmission clinic nurses to assess the determinants of preoperative testing behaviours. The interview guide was designed around the Theoretical Domains Framework (TDF), developed specifically to determine the barriers and enablers to implementing evidence-based guidelines. Interviews will be audio-recorded, transcribed verbatim and coded according to the TDF. Key themes will be generated for each of the identified domains.

**Ethics and dissemination** We have received ethics approval from the Health Research Ethics Board in Newfoundland and Labrador (HREB #2018.190) for this study. The results of this work will be disseminated through a peer-reviewed publication, presentation at a healthcare forum and plain-language infographic summaries. Additionally, deidentified data collected and analysed for this study will be available for review from the corresponding author on reasonable request.

## INTRODUCTION

Preoperative testing (eg, chest X-rays, electrocardiograms (ECG), and baseline laboratory studies, such as bloodwork and urine analysis) is used to supplement the clinical history and physical examination findings of patients scheduled to receive anaesthesia.<sup>1,2</sup> These tests are completed to provide additional information about high-risk patients (ie, those with known risk factors identified by their clinical history and physical examination) that will help

## Strengths and limitations of this study

- This study is using the Theoretical Domains Framework synthesised from 33 behaviour change theories to guide the conduct and analysis of these interviews and ultimately form a theory-based intervention.
- The research team will use rigorous methods to collect and analyse the data.
- The team is using the Consolidated Criteria for Reporting Qualitative Research (COREQ) 32-item checklist to guide our methods and reporting.
- The findings of this study cannot be generalised or directly extrapolated to other settings.

anaesthesiologists prepare them for surgery and improve perioperative outcomes.<sup>2,3</sup> In practice, however, preoperative testing has been implemented using a variety of strategies. Although there does not seem to be a common terminology, three different strategies are commonly referred to in the literature. The Agency for Healthcare Research and Quality refers to these strategies as:

1. Routine testing: tests are conducted on all patients undergoing given procedures, regardless of patient history.
2. Per protocol testing: tests are conducted on a predefined subset of patients undergoing a given procedure.
3. Ad hoc testing: preoperative testing is done at the discretion of the clinician doing a preoperative evaluation based on patients' clinical history and physical examination findings.<sup>4</sup>

Without supporting evidence, many hospitals have chosen to implement routine testing as a sort of "fail-safe", seemingly under the assumption that more information (from more tests) will increase patient safety and decrease potential legal action resulting from adverse

## INNOVATION REPORT

# Addressing the Drivers of Medical Test Overuse and Cascades: User-Centered Design to Improve Patient–Doctor Communication

Robert S. Rudin, PhD, SM; Nitya Thakore; Kathleen L. Mulligan; Ishani Ganguli, MD, MPH

**Background:** Low-value medical testing is a major component of health care overuse, both directly and through the potential for borderline and/or incidental results to trigger cascades (downstream services of uncertain value). The costs and harms from marginal test results and their cascades can add up. It is thus important to both prevent low-value tests at the outset and mitigate cascades when they arise.

**Methods:** Informed by a framework for understanding and reducing overuse of care, this study employed user-centered design methods (focus groups and 1:1 design meetings) with patients and primary care physicians (PCPs) to understand the problem and iteratively develop an intervention.

**Results:** Design meetings with 15 PCPs, 12 patients, and 3 patient focus groups revealed myriad drivers for medical test overuse and cascades. Patients commonly believed that all medical tests yield definitive results and lack downsides. PCPs cited expert recommendations, limited time during visits, fear of lawsuits, and desire to be responsive to patients as reasons for ordering potentially low-value medical tests. To address these issues, an intervention was designed using patient pre-visit educational materials, clinician reference materials on test interpretation and incidental findings, and clinician peer comparison on test overuse.

**Conclusion:** Overuse of medical testing is driven by a range of factors related to PCPs, patients, and their interactions. Multipronged interventions may have the potential to address these drivers after they are rigorously tested.

Overuse of medical care is a long-standing problem in the United States and a key driver of health care spending.<sup>1,2</sup> Yet, interventions designed to reduce overuse have had limited impact to date,<sup>3–7</sup> prompting a call for renewed efforts to develop and test scalable interventions.<sup>8,9</sup>

Low-value medical testing is a major component of overuse, both directly and through the potential for borderline and/or incidental results to trigger downstream “cascades” of additional tests and treatments of uncertain value.<sup>10–12</sup> Unlike with surgeries and other invasive procedures, decisions to order laboratory and imaging tests are not viewed by patients and doctors as major decisions and may not be discussed, yet the costs and harms from marginal tests and their cascades can add up. It is therefore important to both prevent low-value tests at the outset and mitigate cascades when they arise.<sup>13</sup>

To begin to address this problem, we rigorously designed an intervention that requires pilot testing in future work. We examined patient and primary care physician (PCP)

perspectives on the drivers of medical test overuse and cascades and used user-centered design methods to iteratively develop a scalable intervention. We designed this intervention with the objective of promoting “productive” conversations about medical tests between patients and PCPs during primary care visits and mitigating cascades of care.<sup>14</sup> To do so, the intervention aims to improve what we call “medical test literacy” in patients and to prepare patients to ask questions about medical tests. For clinicians, we designed the intervention to encourage shared decision making, where appropriate, and effective communication about medical test-ordering decisions.

## METHODS

### Overview and Conceptual Framework

We conducted a user-centered design process<sup>15,16</sup> guided by Morgan et al.'s framework for understanding and reducing overuse of care, which conceptualizes the drivers of overuse through multiple domains.<sup>17</sup> The most proximate domain that influences overuse of medical test-

# Upcoming Events

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- [Rural Health Meeting, August 9, 10:00 am-12:00pm](#)  
**Presenters:** Ross Ramsey, MD, CPE, FAAFP, Scheurer Health & Mariah Hesse, BSN, RN, CENP, Michigan Critical Access Hospital Quality Network
- [Health Equity Workgroup, August 24, 11:00am-12:00pm](#)  
**Presenter:** Janée Tyus, MPH, Community Health Access Program, Greater Flint Health Coalition
- [Health in Action Workgroup- Sepsis, September 14, 2:00-3:00pm](#)  
**Presenter:** Tami Garcia, MSN, RN, Quality Department, Michigan Medicine

# Thank you!

MVC Coordinating Center:

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