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Why do clinicians continue to order 'routine preoperative tests' despite the evidence?

Guidelines and practice advisories issued by several medical societies, including the American Society of Anesthesiologists,[1] American Heart Association (AHA) and American College of Cardiology (ACC),[2] and Society of General Internal Medicine,[3] advise against routine preoperative testing for patients undergoing low-risk surgical procedures. Such testing often includes routine blood chemistry, complete blood cell counts, measures of the clotting system, and cardiac stress testing.

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In this issue of the *Cleveland Clinic Journal of Medicine*, Dr. Nathan Houchens reviews the evidence against these measures.[4]

Despite a substantial body of evidence going back more than 2 decades that includes prospective randomized controlled trials,[5–10] physicians continue to order unnecessary, ineffective, and costly tests in the perioperative period.[11] The process of abandoning current medical practice—a phenomenon known as *medical reversal*[12]—often takes years,[13] because it is more difficult to convince physicians to discontinue a current behavior than to implement a new one.[14] The study of what makes physicians accept new therapies and abandon old ones began more than half a century ago.[15]

More recently, Cabana et al[16] created a framework to understand why physicians do not follow clinical practice guidelines. Among the reasons are lack of familiarity or agreement with the contents of the guideline, lack of outcome expectancy, inertia of previous practice, and external barriers to implementation.

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The rapid proliferation of guidelines in the past 20 years has led to numerous conflicting recommendations, many of which are based primarily on expert opinion.[17] Guidelines based solely on randomized trials have also come under fire.[18,19]

In the case of preoperative testing, the recommendations are generally evidence-based and consistent. Why then do physicians appear to disregard the evidence? We propose several reasons why they might do so.

SOME PHYSICIANS ARE UNFAMILIAR WITH THE EVIDENCE

The complexity of the evidence summarized in guidelines has increased exponentially in the last decade, but physician time to assess the evidence has not increased. For example, the number of references in the executive summary of the ACC/AHA perioperative guidelines increased from 96 in 2002 to 252 in 2014. Most of the recommendations are backed by substantial amounts of high-quality evidence. For example, there are 17 prospective and 13 retrospective studies demonstrating that routine testing with the prothrombin time and the partial thromboplastin time is not helpful in asymptomatic patients.[20]

Although compliance with medical evidence varies among specialties,[21] most physicians do not have time to keep up with the ever-increasing amount of information. Specifically in the area of cardiac risk assessment, there has been a rapid proliferation of tests

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that can be used to assess cardiac risk.[22–28] In a Harris Interactive survey from 2008, physicians reported not applying medical evidence routinely. One-third believed they would do it more if they had the time.[29] Without information technology support to provide medical information at the point of care,[30] especially in small practices, using evidence may not be practical. Simply making the information available online and not promoting it actively does not improve utilization.[31]

As a consequence, physicians continue to order unnecessary tests, even though they may not feel confident interpreting the results.[32]

PHYSICIANS MAY NOT BELIEVE THE EVIDENCE

A lack of transparency in evidence-based guidelines and, sometimes, a lack of flexibility and relevance to clinical practice are important barriers to physicians' acceptance of and adherence to evidence-based clinical practice guidelines.[30]

Even experts who write guidelines may not be swayed by the evidence. For example, a randomized prospective trial of almost 6,000 patients reported that coronary artery revascularization before elective major vascular surgery does not affect long-term mortality rates.[33] Based on this study, the 2014 ACC/AHA guidelines[2] advised against revascularization before noncardiac surgery exclusively to reduce perioperative cardiac events. Yet the same guidelines do recommend assessing for myocardial ischemia in patients with elevated risk and poor or unknown functional capacity, using a pharmacologic stress test. Based on the extent of the stress test abnormalities, coronary angiography and revascularization are then suggested for patients willing to undergo coronary artery bypass grafting (CABG) or percutaneous coronary intervention.[2]

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The 2014 European Society of Cardiology and European Society of Anaesthesiology guidelines directly recommend revascularization before high-risk surgery, depending on the extent of a stress-induced perfusion defect.[34] This recommendation relies on data from the Coronary Artery Surgery Study registry, which included almost 25,000 patients who underwent coronary angiography from 1975 through 1979. At a mean follow-up of 4.1 years, 1,961 patients underwent high-risk surgery. In this observational cohort, patients who underwent CABG had a lower risk of death and myocardial infarction after surgery.[35] The reliance of medical societies[34] on data that are more than 30 years old—when operative mortality rates and the treatment of coronary artery disease have changed substantially in the interim and despite the fact that this study did not test whether preoperative revascularization can reduce postoperative mortality—reflects a certain resistance to accept the results of the more recent and relevant randomized trial.[33]

Other physicians may also prefer to rely on selective data or to simply defer to guidelines that support their beliefs. Some physicians find that evidence-based guidelines are impractical and rigid and reduce their autonomy.[36] For many physicians, trials that use surrogate end points and short-term outcomes are not sufficiently compelling to make them abandon current practice.[37] Finally, when members of the guideline committees have financial associations with the pharmaceutical industry, or when corporations interested in the outcomes provide financial support for a trial's development, the likelihood of a recommendation being trusted and used by physicians is drastically reduced.[38]

PRACTICING DEFENSIVELY

Even if physicians are familiar with the evidence and believe it, they may choose not to act on it. One reason is fear of litigation.

In court, attorneys can use guidelines as well as articles from medical journals as both exculpatory and inculpatory evidence. But they more frequently rely on the standard of care, or what most physicians would do under similar circumstances. If a patient has a bad outcome, such as a perioperative myocardial infarction or life-threatening bleeding, the defendant may assert that testing was unwarranted because guidelines do not recommend it or because the probability of such an outcome was low. However, because the outcome occurred, the jury may not believe that the probability was low enough not to consider, especially if expert witnesses testify that the

standard of care would be to order the test.

In areas of controversy, physicians generally believe that erring on the side of more testing is more defensible in court.[39] Indeed, following established practice traditions, learned during residency,[11,40] may absolve physicians in negligence claims if the way medical care was delivered is supported by recognized and respected physicians.[41]

As a consequence, physicians prefer to practice the same way their peers do rather than follow the evidence. Unfortunately, the more procedures physicians perform for low-risk patients, the more likely these tests will become accepted as the legal standard of care.[42] In this vicious circle, the new standard of care can increase the risk of litigation for others.[43] Although unnecessary testing that leads to harmful invasive tests or procedures can also result in malpractice litigation, physicians may not consider this possibility.

FINANCIAL INCENTIVES

The threat of malpractice litigation provides a negative financial incentive to keep performing unnecessary tests, but there are a number of positive incentives as well.

First, physicians often feel compelled to order tests when they believe that physicians referring the patients want the tests done, or when they fear that not completing the tests could delay or cancel the scheduled surgery.[40] Refusing to order the test could result in a loss of future referrals. In contrast, ordering tests allows them to meet expectations, preserve trust, and appear more valuable to referring physicians and their patients.

Insurance companies are complicit in these practices. Paying for unnecessary tests can create direct financial incentives for physicians or institutions that own on-site laboratories or diagnostic imaging equipment. Evidence shows that under those circumstances physicians do order more tests. Self-referral and referral to facilities where physicians have a financial interest is associated with increased healthcare costs.[44] In addition to direct revenues for the tests performed, physicians may also bill for test interpretation, follow-up visits, and additional procedures generated from test results.

This may be one explanation why the ordering of cardiac tests (stress testing, echocardiography, vascular ultrasonography) by US physicians varies widely from state to state.[45]

RECOMMENDATIONS TO REDUCE INAPPROPRIATE TESTING

To counter these influences, we propose a multifaceted intervention that includes the following:

- Establish preoperative clinics staffed by experts. Despite the large volume of potentially relevant evidence, the number of articles directly supporting or refuting preoperative laboratory testing is small enough that physicians who routinely engage in preoperative assessment should easily master the evidence.
- Identify local leaders who can convince colleagues of the evidence. Distribute evidence summaries or guidelines with references to major articles that support each recommendation.
- Work with clinical practice committees to establish new standards of care within the hospital. Establish hospital care paths to dictate and support local standards of care. Measure individual physician performance and offer feedback with the goal of reducing utilization.
- National societies should recommend that insurance companies remove inappropriate financial incentives. If companies deny payment for inappropriate testing, physicians will stop ordering it. Even requirements for preauthorization of tests should reduce utilization. The Choosing Wisely campaign (**www.choosingwisely.org**) would be a good place to start.

Even physicians who write the guidelines may be unswayed by the evidence

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