

Interventions that improve laboratory utilization

Michael Astion, M.D., Ph.D.
Professor and Director of Reference Laboratory Services
University of Washington Department of Laboratory Medicine

Overview. This is the second of two articles on overutilization of the clinical laboratory. It first appeared in *Laboratory Errors and Patient Safety* in 2006. The first article¹ discussed the causes of overutilization, and this article focused on interventions, which were also addressed in an interview with Dr. Kim Riddell².

Table 1 reviews some of the causes of overutilization.

Causes	Type of error
Patient pressure	Cognitive
Incomplete understanding of the effect of low pretest probability on the diagnostic value of a test.	Cognitive
Failure to understand the harmful consequences of overutilization	Cognitive
Defensive testing	Cognitive
Perverse financial incentives (more testing = more revenue)	Complex
Table 1. Causes of overutilization of laboratory services	

With the exception of perverse financial incentives, these causes are cognitive errors, defined as errors due to a lack of knowledge or purposeful disregard of well-known rules. Interventions for cognitive errors usually involve education and enhanced supervision. In addition, automation or other technology can potentially address cognitive errors by reducing the number of steps requiring advanced knowledge. This concept of using technology to reduce cognitive errors is well known to laboratory professionals. For example, errors interpreting microscope images can be reduced by either using an automated microscope - as can now be done for urinalysis- or by switching to nonmicroscopic methods that do not require subjective interpretation.

Improving laboratory utilization: What works?

In 1998, Solomon and colleagues³ performed a thought-provoking analysis of the scientific literature on laboratory utilization, and since then a number of excellent studies have been added to this literature. The practical findings of this published research, can be summarized as follows:

- Physician education by itself is a weak intervention⁴
- Patient education by itself is a weak intervention⁵
- Computerized physician order entry (CPOE) can improve laboratory utilization if thoughtfully implemented⁶.
- Education can be made more effective by combining it with other methods that make the desired behavior more likely^{2,7-10}. These methods include CPOE, changes to manual requisitions, use of sendout -and other- formularies, requiring higher level approval, and the use of physician utilization report cards with performance feedback.
- The best approaches to improving laboratory utilization combine multiple interventions³.
- Interventions must stay in place or behavior will drift back to the unwanted condition.

Conceptually, methods that make education more effective, are similar in that they guide or restrict physician choices. Methods for guiding or restricting physician choices can be viewed as lying on a continuum (Figure 1) between gentle methods like computerized physician reminders to highly restrictive methods like forbidding particular tests because a resource utilization committee has declared them ineffective. In general, the more restrictive methods are the strongest interventions and the most difficult to implement.

An example of a moderately restrictive approach is provided by the work of Wang and colleagues⁹. In this study, a multidisciplinary medical team developed educational guidelines regarding testing on patients in the intensive care unit. The guidelines were evidence-based when evidence was available and used expert consensus otherwise. Physicians were educated about the guidelines and the CPOE ordering template was modified. The new template encouraged proper utilization by providing easy ordering of recommended tests, but tests outside the usual recommendations -for example comprehensive metabolic panels- had to be ordered outside the template, which was more cumbersome. The intervention significantly reduced the number of chemistry tests ordered without a change in patient outcomes.

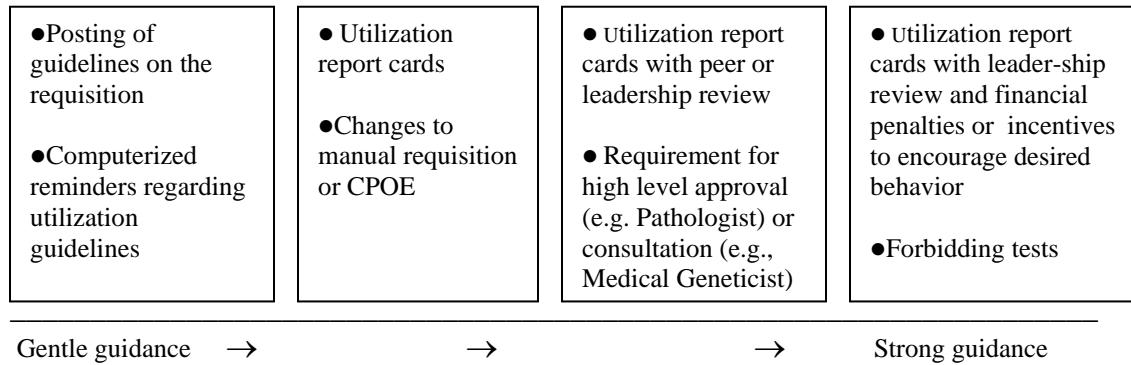


Figure 1. A comparison of methods for guiding physician choices regarding laboratory testing. Strong guidance involves restrictions on testing and peer pressure to influence behavior.

CPOE: blessing or curse? CPOE can be a blessing or a curse depending on how it is implemented. In the worst case, often described as "the candy store approach", the full menu of laboratory tests, from the most common to the most esoteric is made readily available to all practitioners, and repetitive interval-based testing is easily ordered but not automatically turned off. This is a prescription for laboratory misutilization.

When CPOE is implemented effectively, it can have a positive effects on utilization, even without an accompanying educational intervention. For example, in a study involving hospitalized patients by Neilson and colleagues⁶, a resource utilization committee consisting of medical leaders guided improvements in CPOE. The specific changes in CPOE chosen were a prompt making it easy to discontinue standing orders beyond 72 hours, the unbundling of metabolic panels (sodium, potassium, chloride, bicarbonate, glucose, blood urea nitrogen, and creatinine) into their individual components, and reducing the ease of repeating specific tests (e.g., electrolytes). The result was that testing on the individual components of the metabolic panel decreased 24% without a change in patient outcomes.

Conclusions: Interventions to improve laboratory utilization vary from easy and relatively weak to difficult and relatively strong. The stronger interventions, like physician report cards with peer pressure or implementation of utilization guidelines through changes to CPOE are long term projects requiring significant contributions from organizational leaders. Leaders must develop effective utilization guidelines, provide resources for their implementation, and provide accountability to the front line physicians whose behavior must change if laboratory utilization is going to be optimized. Laboratory leaders are usually not in a position to fight this battle alone, but they should be part of the management group that makes it happen.

References.

1. Astion M. Overutilization of the laboratory, part 1: Googling our way into overutilization and misinterpretation. *Laboratory Errors and Patient Safety*. 2005; 2(3): 5-6.

2. LEPS editorial staff. Improving laboratory test utilization through physician report cards: an interview with Dr. Kim Riddell. *Laboratory Errors and Patient Safety*. 2005; 2(4): 2-6.
3. Solomon DH et al. Techniques to improve physician's use of diagnostic tests. *JAMA*. 1998; 280:2020-2027.
4. Prochazka AV et al. Support of evidence-based guidelines for the annual physical examination: a survey of primary care providers. *Arch Intern Med*. 2005;165:1347-1352.
5. Oboler SK, Prochazka AV, Gonzales R, et al. Public expectations and attitudes for annual physical exams and testing. *Ann Intern Med*. 2002;136:652-659.
6. Neilson EG et al. The impact of peer management on test-ordering behavior. *Ann Intern Med*. 2004;141:196-204.
7. Bunting PS, van Walraven C. Effect of a controlled feedback intervention on laboratory test ordering by community physicians. *Clin Chem*. 2004; 50:321-326.
8. Verstappen WH et al. Effect of a practice-based strategy on test ordering performance of primary care physicians. *JAMA*. 2003;289:2407-2412.
9. Wang TJ et al. A utilization management intervention to reduce unnecessary testing in the coronary care unit. *Arch Intern Med*. 2002;162:1885-1890.
10. van Wijk MA et al. Assessment of decision support for blood test ordering in primary care. *Ann Intern Med*. 2001;134:274-281.