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COMMENTARY

Optimizing Test Utilization in the Clinical Microbiology Laboratory: Tools and Opportunities

Bobbi S. Pritt

Clinical Parasitology Laboratory, Mayo Clinic, Rochester, Minnesota, USA

ABSTRACT Optimal laboratory test utilization is important for providing high-quality clinical care and efficiently using limited health care resources. While microbiologists have long been advocates for appropriate laboratory test utilization, the widespread availability of electronic medical records capable of supporting clinician order entry and of clinical decision support tools (CDSTs) has provided expanded opportunities for implementing effective, automated test stewardship protocols. D. Nikolic et al. (J. Clin. Microbiol. 55:3350–3354, 2017, https://doi.org/10.1128/JCM.01052-17) describe the results of implementing a CDST at their institution to curtail stool microbiology testing for patients hospitalized for more than 3 days. Their intervention significantly decreased unnecessary test orders and saved their laboratory over $8,000 in reagent and labor costs during an 11-month postintervention period. That report provides an excellent example of how clinical microbiologists can use electronic tools to optimize laboratory test utilization in their health care system.

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Editor Betty A. Forbes, Virginia Commonwealth University Medical Center

Address correspondence to pritt.bobbi@mayo.edu.

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In this month's issue of the *Journal of Clinical Microbiology*, Nikolic and colleagues describe their successful implementation of a clinical decision support tool (CDST) using the Epic (Verona, WI) hospital information system (HIS) (1). The described CDST was custom programmed at the authors' institution and provides automated blockage of select stool microbiology tests (bacterial cultures, ova and parasite [O&P] examinations, and *Giardia*/*Cryptosporidium* enzyme immunoassays) when ordered through the HIS for patients who have been hospitalized for more than 3 days. The intervention is paired with a notification to the ordering clinician that provides the rationale for test cancellation and instructions for contacting the laboratory if testing if still desired. Unlike a "soft stop," which allows providers to continue with the electronic order (e.g., by clicking through a series of HIS screens), this intervention utilizes a "hard stop" that requires laboratory approval/action to proceed with the test. Following implementation of the CDST, the authors observed significant decreases in O&P examination and stool bacterial culture volumes for patients hospitalized for more than 3 days (compared to the corresponding average volumes in the prior 11 months) and saved an estimated $8,108.84 in laboratory reagent costs and labor over the 11-month postimplementation period.

The report is timely given the increasing pressures on the laboratory to reduce waste and optimize test utilization throughout the health care system. Laboratory testing is a high-volume activity that drives patient care throughout health care institutions, and test overutilization is a known contributor to unnecessary interventions and patient harm (1–3). Shrinking payer reimbursements and changing reimbursement models (i.e., shifting from volume-based to value-based reimbursement) have placed additional, often substantial pressures on health care systems to reduce costs and unnecessary expenditures. Thus, there is an urgent need for laboratory leaders to partner with clinical colleagues to implement effective laboratory testing stewardship protocols. While microbiologists have long been advocates for appropriate

use of laboratory tests (1), the recent widespread adoption of electronic medical records (EMRs) with an ability to support computerized provider order entry (CPOE) and CDSTs has provided effective new avenues for implementation of sustainable automated test utilization programs.

Laboratorians can look to other areas of medicine for guidance on using CDSTs to optimize health care utilization. Hospital pharmacy systems have long used CDSTs for directing antimicrobial use, and these tools are considered important components of Hospital Antibiotic Stewardship Programs (4). Some areas of radiology have also been using CDSTs for guiding orders, particularly for advanced testing. This use is expected to expand significantly in the United States in 2018 with the implementation of the Protecting Access to Medicare Act (PAMA). This act requires providers to consult electronic clinical decision support systems containing appropriate-use criteria (AUC) prior to ordering advanced diagnostic imaging services for Medicare patients (5). Failure to consult (and document use of) AUC will result in a loss of reimbursement of the health care institution for such patients (5). It is not hard to fathom the possibility that advanced diagnostic pathology and laboratory medicine services might receive similar scrutiny from the Centers for Medicare and Medicaid Services (CMS) in the future.

Given the pressing clinical, economic, and regulatory drivers for optimizing laboratory test utilization, the issue faced by many clinical microbiologists is not "why" but "how" to start. Fortunately, there are numerous evidence-based guidelines that can be used to direct initial test utilization efforts in clinical microbiology. A general source for laboratory medicine is the Choosing Wisely campaign promoted by the American Board of Internal Medicine (ABIM) foundation, which has compiled lists of utilization opportunities from multiple national medical specialty societies. Among these is a list of "Fifteen things physicians and patients should question" provided by the American Society for Clinical Pathology, which includes evidence-based guidelines for testing for *Helicobacter pylori* and human papillomavirus species (6). The related "Choosing Wisely initiative in infectious diseases" campaign provides further evidence-based microbiology testing guidelines (7). Another substantial source of test utilization guidelines has been produced by the Infectious Diseases Society of America and the American Society for Microbiology (8). An updated version of these guidelines is anticipated later this year. Many microbiology subspecialty guidelines are also available; for example, there are more than 3 decades of publications to support restrictions for bacterial and parasite testing in patients hospitalized for more than 3 and 4 days, respectively (1, 9). These guidelines were the basis for the CDST described in the publication by Nikolic et al. (1).

Despite the drivers for laboratory test utilization programs, several significant hurdles exist impeding their implementation, including a lack of the information technology (IT) resources necessary to create and support CDSTs. Specifically, the use of CDSTs requires IT staff time and expertise and an HIS/EMR or middleware system that supports the use of CPOE and CDSTs. The CDST described by Nikolic et al. was developed in-house for a commercial HIS, and it is unlikely that smaller institutions will have the resources to implement similar CDSTs. Therefore, there is a need for affordable and widely available commercial software solutions that are capable of integrating with the wide array of commonly used EMR systems. Finally, it is important to emphasize that, generally, most successful and sustainable test utilization programs do not rely on single interventions but instead utilize a combination of practices such as automated test ordering rules, provider education, periodic audits of ordering practices, participant feedback, and ongoing improvement efforts. Not all tools are applicable to all utilization challenges; therefore, the tools should be carefully selected for each scenario (10). Regardless of the tools employed, it is essential to have strong leadership support from both the laboratory and the relevant clinical practice specialties when designing and implementing test utilization interventions.

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