Issue Brief 21

Diagnostic Stewardship as a Model To Improve the Quality and Safety of Diagnosis

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PATIENT SAFETY

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Introduction

Diagnostic errors often involve problems in data gathering and synthesis, including in the use of diagnostic testing.[1,2] In several comprehensive analyses of diagnostic errors, problems with the testing process (including test selection and ordering, specimen collection, interpretation, and followup) are among the most prominent contributing factors.[1,3-5]

In contrast to clinical reasoning errors (e.g., failure to consider alternative hypotheses),[1-4,6,7] testing process issues are relatively more amenable to interventions. Such interventions can be supported by bringing the clinical laboratory into a broader strategy to advance accurate and timely diagnoses and reduce diagnostic errors.[8] A variety of actionable approaches are available to ensure that diagnostic tests are used appropriately, described collectively as diagnostic stewardship.[9,10]

Diagnostic stewardship refers to "ordering the right tests for the right patient at the right time to provide information necessary to optimize clinical care."[11] However, the concept of diagnostic stewardship extends beyond test selection and ordering and also includes, for instance, reporting results in ways that maximize the usefulness of tests and guide best clinical actions.[10,12,13]

Applying diagnostic stewardship beyond infectious disease testing is a recent advance that focuses on applying a multidisciplinary, data-driven approach to the broader scope of diagnostic testing to optimize clinical care for patients.[9,10,14] Partnerships between clinicians and clinical laboratory professionals are essential to the success of diagnostic stewardship initiatives.[8,15]

This issue brief is a call to action for healthcare organization leaders and policymakers to bridge clinical laboratory expertise and routine clinical decision making through diagnostic stewardship. We review existing models and strategies to implement diagnostic stewardship practices and identify how these practices can enhance diagnostic safety. We also discuss measuring implementation of diagnostic stewardship and policy implications.

Background

The increasing number and complexity of diagnostic tests available to clinicians, including molecular genetic testing and next generation sequencing, promises greater precision and personalization in medical decision making. However, this complexity comes at the cost of increasing types of pitfalls in test selection, performance, and interpretation.[11,16-19] In many healthcare organizations, a disconnect occurs between clinical decision making at the bedside and the expertise and knowledge resources available to guide appropriate use of diagnostic testing.[20]

A survey of 1,768 U.S. primary care physicians found that uncertainty about test ordering and interpretation is common. While 53 percent of respondents indicated that asking a lab professional would be "very" or "extremely" helpful to overcoming uncertainty, only 6 percent indicated that they did so at least once a week. Similarly, 75 percent of respondents rated a "curbside consult" as helpful, but only 11 percent used it frequently.[21]

Ensuring that clinicians are optimally equipped to use tests to inform diagnoses, prognoses, and therapy decisions is consistent with the definition of stewardship: "the careful and responsible management of something entrusted to one's care."[22] Diagnostic stewardship comprises a variety of interventions to optimize use of testing directly or indirectly through collaborations between clinicians and diagnostic testing experts.

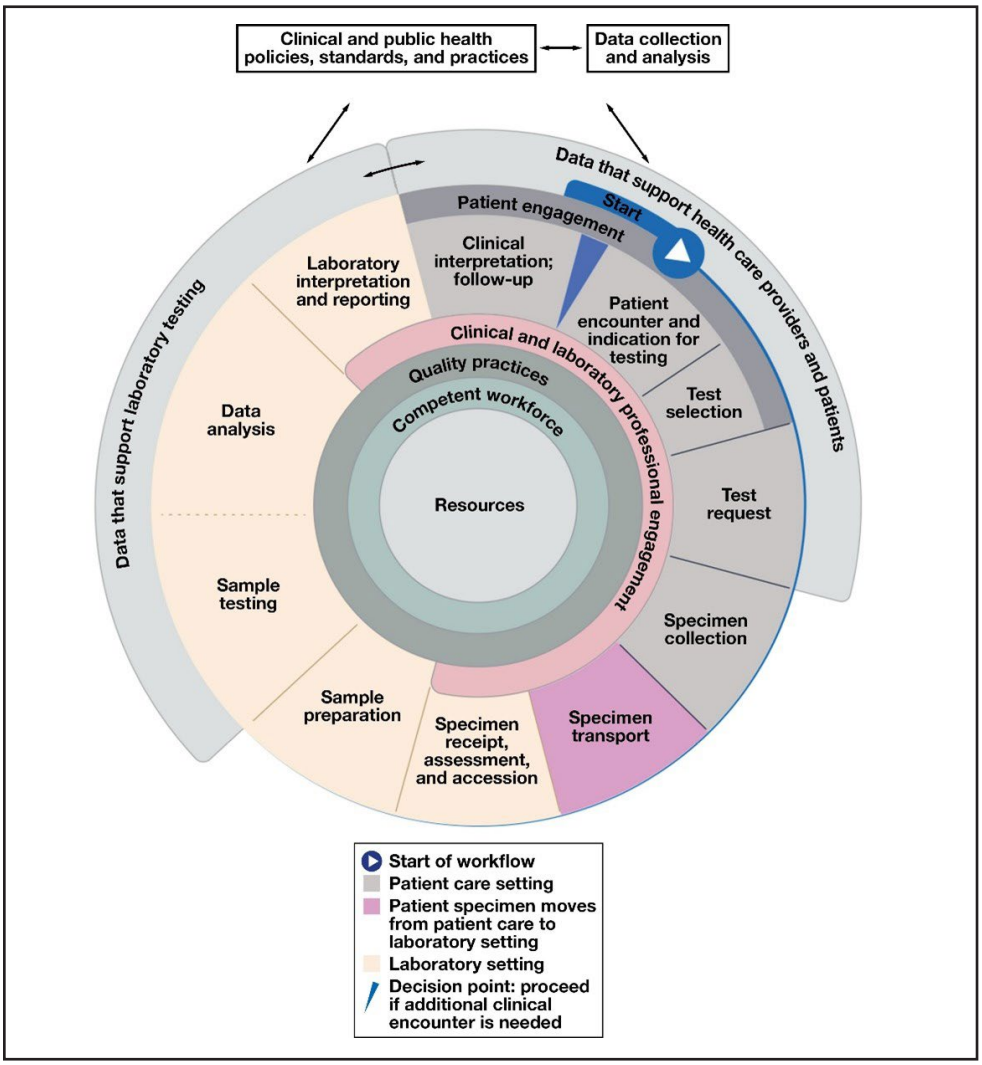
Although for the purpose of this brief we focus on improving diagnosis by optimizing clinical laboratory and anatomic pathology diagnostic services, stewardship can be applied to other types of diagnostic testing. Concurrent initiatives in imaging stewardship, for instance, aim to increase appropriate use of imaging and reduce low-value testing.[23-25]

Diagnostic Error in the Testing Process

Diagnostic errors include missed, delayed, and wrong diagnosis, as well as failure to communicate the diagnosis effectively to the patient and family members.[20] Interventions to improve diagnostic testing should target breakdowns in the testing process that lead to diagnostic error.

The total testing process (Figure 1) is a model that can help identify and classify failure points in the process of test ordering, collection, processing, and reporting.[15]

Figure 1. The total testing process



Source: Lubin IM, Astles JR, Bunn JD, et al. The clinical laboratory is an integral component to health care delivery: an expanded representation of the total testing process. Am J Clin Pathol. 2023 Aug 1;160(2):124-129. https://doi.org/10.1093/ajcp/aqad038.

While the model outlines a complex process with multiple structural and systemic components, a simpler way to conceptualize diagnostic errors in the testing process is to classify them as preanalytic, analytic, or postanalytic[10,11]:

- Preanalytic errors refer to problems with test selection, ordering, and specimen collection.[10] Often, such errors reflect ordering diagnostic tests in the setting of low pretest probability of a disease, increasing the likelihood of a false positive or overdiagnosis. A well-known example is ordering urine cultures in patients without urinary tract symptoms, which can increase the risk of wrong (false positive) diagnosis of urinary tract infections and lead to inappropriate use of antibiotics.[26]

  Underuse of diagnostic tests is also frequently implicated in diagnostic error[27,28] but is less often discussed in the context of diagnostic stewardship. Preanalytic errors may also result from specimen mishandling; for instance, contamination of specimens at the time of collection can result in wrong diagnosis and unnecessary treatment.[10,29,30] Blood cultures are an area of special concern given high rates of use and high rates of specimen collection errors, including inadequate specimens and contamination.[30]

- Analytic errors refer to problems performing a clinical laboratory test (usually in the laboratory setting but also applicable to point-of-care testing). These errors can occur through inappropriate or inadequate quality control procedures, atypical characteristics of the test specimen, and presence of substances that interfere with analysis.[31,32] Interpretive errors can lead to misdiagnosis; for example, in a study of second-opinion pathology reviews, 6 percent of cases had major discrepancies with potential to affect patient care.[33]

- Postanalytic errors include problems with interpretation, reporting (e.g., ambiguity about diagnosis or necessary next steps in the workup), and use of test results to inform diagnoses. While the failure to correctly interpret a diagnostic test result may reflect knowledge gaps or cognitive error, the problem of postanalytic errors could be structure or process related.

  For instance, the optimal use of next-generation sequencing in the neonatal critical care setting depends on the availability of a multidisciplinary team to assist with interpretation, relay critical information to clinicians to inform time-sensitive diagnosis, and communicate findings to the patient's family.[34] If access to the appropriate expertise to interpret these complex tests is limited, the correct diagnosis could be delayed or missed.

Diagnostic Stewardship Interventions To Reduce Diagnostic Error

Diagnostic stewardship refers to a range of actions to promote optimal use of diagnostic tests, improve the speed and accuracy of diagnosis, and reduce the occurrence of misdiagnosis due to false positive or false negative findings. The benefits of diagnostic stewardship include improved efficiency and more appropriate use of healthcare resources. Here, however, we focus on how diagnostic stewardship reduces the risk of diagnostic errors and patient harm.

Preanalytic interventions

Most diagnostic stewardship interventions have focused on the preanalytic phase of the testing process by supporting appropriate selection and ordering of diagnostic tests.[10,35] On one end of the spectrum are

interventions such as clinician education, algorithms that include indications for test use, and modifications to health information technology (IT) systems. These modifications may include reminders, alerts, hard-stops, and changes to default computerized order entry (CPOE) interfaces to encourage appropriate use of testing.

For instance, an initiative at Massachusetts General Hospital, co-led by representatives from pathology and internal medicine services, aimed to encourage more "hypothesis-driven" use of testing and reduce use of unnecessary daily laboratory tests for inpatients. After the hospital implemented a combination of interventions, including emails to clinicians and modifications to the CPOE system and order sets, daily inpatient laboratory order volume decreased 60 percent, even as overall routine laboratory order volume remained stable.[36] Although it is plausible that fewer unnecessary tests translated to reductions in false positive diagnoses, the authors of the study could not measure these outcomes.

On the more labor-intensive end of the spectrum are interventions to encourage appropriate use of testing, such as real-time laboratory consultation on test selection (see "Diagnostic management teams" below) and mandatory review of certain orders by laboratory personnel before a test is performed. For instance, one study indicated that review of genetic test orders by genetic counselors in a national reference laboratory resulted in cost savings of $48,000 per month from cancellation of inappropriate tests.[37]

Increasing the use of appropriate diagnostic testing practices requires coordinated interventions to change clinician culture and ordering behavior to combat both over- and underuse. Failure to assess for and monitor chronic kidney disease (CKD), particularly in people with diabetes, is an example of underuse of testing that can result in delayed diagnosis and preventable disease progression.[38] An Indian Health Service (IHS) initiative in 2003 to improve diabetes care included implementation of routine glomerular filtration rate reporting. An intervention in 2006 involved annual albumin-creatinine ratio reporting in patients with diabetes.

These changes, combined with education and other components of the IHS's population-based kidney care program, are believed to have contributed to the 54 percent reduction in the incidence of diabetes-related end-stage renal disease in the American Indian/Alaska Native population between 1996 and 2013.[39] Similar initiatives in the Veterans Health Administration[40] and managed care settings[41] have aimed to standardize the use of laboratory tests for CKD screening and monitoring in high-risk patients.

Finally, improving specimen collection practices can further reduce false positive diagnoses and is an essential component of stewardship efforts where specimen contamination is a known problem. For blood cultures, several strategies have been shown to reduce contamination rates: education of clinical staff, reinforcement of appropriate collection techniques, and use of diversion devices that eliminate the first 1-2 mL of a blood draw to remove skin fragments colonized by bacteria.[42,43]

Analytic interventions

Analytic interventions focus on laboratory actions and include internal quality control procedures (e.g., contamination prevention), as well as actions to promote diagnostic accuracy and efficiency. Reflex testing refers to further testing that is performed automatically (i.e., according to algorithm) when certain criteria are met. For example, reflex testing for biomarkers in some newly diagnosed cancers can further characterize a malignancy and expedite treatment selection compared with the traditional pathway of sequential testing mediated only through the treating oncologist.[44-47]

Distinct from reflex testing, reflective testing is more commonly described in the United Kingdom and Europe. It refers to an expanded decision-making role of the laboratory professional, such that the decision

to perform further testing may be mediated by professional judgment rather than by a prespecified protocol or algorithm.[48,49]

A randomized trial in the Netherlands compared reflective testing with a control condition. In reflective testing, laboratory professionals were allowed to add tests they believed were indicated to the tests general practitioners ordered. In the control condition, practitioners received only the test results they personally ordered. The subsequent management of patients was more likely to be rated by an independent record reviewer as "adequate" (versus neutral or not adequate) in the reflective testing condition.[50] However, it is unclear to what extent observed improvements in management were attributable to improvements in diagnosis.

Postanalytic interventions

Interventions to improve the postanalytic testing phase aim to facilitate interpretation of test results and encourage appropriate followup actions. Postanalytic interventions often focus on modifying the text of test result reports. These modifications, which in many scenarios can be delivered through clinical decision support systems or templated language in laboratory reports, have been shown to significantly influence prescribing decisions, including de-escalation of unnecessary treatments.

Examples from infectious disease testing include:

- Using language that definitively rules out specific infections,[51,52]
- Normalizing colonization of organisms in the absence of symptoms (e.g., candiduria[53]), and
- Selectively reporting preferred antibiotic susceptibilities to encourage guideline-concordant prescribing.[54]

Laboratory assistance in interpreting test orders can also be leveraged in scenarios where interpretation is more complex. In a study at a single facility, pathologist-generated interpretive narratives for coagulation test panels were reported to reduce time to diagnosis for nearly half of ordering physicians.[55]

Problems with tracking, followup, and interpretation of completed test result reports contribute to diagnostic error. Diagnostic stewardship has addressed this issue in limited examples but not within the broad scope of diagnostic testing overall.[56-59] For example, antimicrobial stewardship teams have been involved in interpreting and communicating test results for rapid microbiology testing from blood samples[60] or serial C. difficile testing.[61] These practices suggest the benefit of more thoughtful test reporting and interpretation using diagnostic stewardship.

Effectiveness of diagnostic stewardship interventions

A meta-analysis by Rubinstein, et al., examined the strength of the evidence supporting seven specific practices, as well as "combined practices," to promote appropriate (e.g., guideline-concordant, nonduplicative) use of diagnostic laboratory tests.[35] The authors found evidence that two standalone interventions, modification of CPOE (e.g., limiting test availability in the user interface, alerting clinicians to redundant test orders) and reflex testing, each increased appropriate use of testing.

Evidence was insufficient to make recommendations for or against other specific standalone interventions such as education, feedback, or test review. However, evidence supported "combined" practices, most of which included a clinician education and feedback component. Although these interventions increased appropriate test use, little evidence is available thus far to assess their impact on diagnostic errors.

Diagnostic stewardship has largely been evaluated in relation to infections. Large quality improvement efforts focused on diagnostic stewardship have observed a 30-60 percent reduction in *C. difficile* bloodstream infections and catheter-associated urinary tract infections and associated antibiotic use with these practices.[14,62-65] Diagnostic stewardship of rapid blood cultures improved time to appropriate antibiotic use.[60]

Regardless of target, effective diagnostic stewardship interventions not only shape behavior but also educate clinicians on appropriate use of testing.[14] The design of these interventions must also take into consideration the potential for unintended consequences such as increased clinician workload. Development should involve laboratory professionals, clinician end users, patients,[66] and ideally, informatics and human factors experts as well.[11]

A survey of 78 clinicians in 9 European countries suggested that diagnostic stewardship interventions were acceptable to most clinicians,[67] although other data suggest that clinicians prefer interventions that preserve their autonomy.[68,69] Designing diagnostic stewardship inteventions with the input of clinician end users has improved clinician satisfaction.[70] Balancing the needs and goals of various stakeholders is critical to buy-in and successful implementation.

Diagnostic Stewardship in Action

Diagnostic stewardship is a collaborative effort that requires building and sustaining partnerships between laboratory professionals, clinical care teams, and other experts. Practices to optimize the use of diagnostic testing are often developed around specialty- or disease-specific needs. These models and practices may be worthwhile to replicate to improve the diagnostic process for other diseases or settings. Below we review several models of team-based multidisciplinary collaboration that exemplify diagnostic stewardship.

Diagnostic stewardship in antimicrobial stewardship programs

Antimicrobial stewardship programs aim to promote optimal treatment and reduce harms to individual patients and public health (e.g., antimicrobial resistance). Whereas antimicrobial stewardship programs focus on optimizing management (e.g., reducing inappropriate prescribing of antibiotics), diagnostic stewardship works "upstream" to guide appropriate use of testing and prevent false positives and overdiagnosis.[19,71]

Laboratory professionals have important roles in both antimicrobial stewardship[72] and diagnostic stewardship, but their contributions are central in the latter.[71] Laboratory professionals are essential consultants in the design of diagnostic stewardship interventions, such as:

- Policy changes related to test ordering (e.g., restrictions on repeat testing, specimen criteria).
- Modification to test ordering through required indications for use, specific order sets, CPOE templates, and computerized decision support.
- Clinician education about test selection and interpretation.
- Staff education on appropriate specimen collection procedures, monitoring, and feedback to staff when evidence indicates that the specimen has been collected inappropriately.
- Review and periodic monitoring of "off-menu" test selection and inappropriate orders.

Diagnostic management teams

A diagnostic management team (DMT) is a practice model to assist with diagnostic test selection and interpretation to expedite accurate and timely diagnoses. The DMT is a multidisciplinary effort, often led by the laboratory with collaboration of clinical specialists and, in some cases, others such as informatics professionals.

DMTs typically focus on a specific area of medicine. For instance, Seegmiller, et al., described a DMT for hematologic malignancies that developed several ordering protocols for bone marrow testing. They also provided a service to recommend diagnostic testing based on these protocols, patient history, and preliminary examination of bone marrow specimens. Comparing the 6 months before and 12 months after implementation of this DMT, the authors found reduced costs attributable to inappropriate testing and an increase in the percentage of positive test results. In addition, surveys of oncologists indicated that the DMT was highly acceptable and perceived as helpful.[73]

Another report describes a DMT for coagulation disorders. Its functions included clinician education, correction of erroneous test orders, and feedback with recommendations to ordering clinicians. Longitudinal observations suggested that this DMT's services were also associated with reduced costs and fewer erroneous test orders over time.[28]

Pathology consultation in oncology

Although seldom described as "diagnostic stewardship," the diagnostic process for cancer exemplifies the potential of collaboration between clinicians and diagnostic specialists (mainly pathologists) to optimize diagnostic testing. Intraoperative pathology consultation helps ensure the adequacy of biopsy specimens, confirm the diagnosis before a surgical procedure, and stage new malignancies. Pathologists also provide important diagnostic information as participants in multidisciplinary conferences, or tumor boards.

The pathologist's role in cancer care has expanded in the era of molecular testing and targeted therapies. Despite the essential contributions of pathologists in this setting, variable access to pathology expertise and suboptimal communication within multidisciplinary teams remain challenging in many systems. A workshop hosted by the National Cancer Policy Forum yielded several suggested solutions, including mechanisms to expand access to pathology, better integration of pathologists within the care team, and improved health IT systems.[74]

Multidisciplinary genetic testing teams

The costliness and complexity of genetic testing makes genetic diagnosis a strong candidate for stewardship interventions. Board-certified genetic counselors have specialized education and training in the field of medical genetics and are available to support patients in understanding and making informed decisions relevant to their diagnosis, testing, and treatment. In some cases, these professionals serve within clincal laboratories. Genetic counselors are well positioned to serve on the frontline of stewardship initiatives in clinical genetics, as they can review incoming requests for genetic testing and provide recommendations to modify orders when appropriate.[75,76]

Several examples of closer integration of diagnostic expertise with clinicians may be helpful. Zentner, et al., describe the organization of a cardiac genetics clinic attended by cardiologists, clinical geneticists, and genetic counselors.[77] A multidisciplinary approach helps ensure that genetic test results are interpreted appropriately and that patients are provided with adequate education and clinical recommendations for inherited heart conditions.

Another example of close integration is in teams that provide rapid genome sequencing for critically ill newborns with suspected genetic diseases.[78] The complexity and time-sensitive nature of this testing require effective collaboration between geneticists and neonatal intensive care unit (NICU) clinicians and staff. Kingsmore and Cole have proposed a learning health systems model for implementing rapid whole genome sequencing in the NICU.[34]

When genetic testing is used outside the context of a clinical genetics service, it is also important to have access to assistance with interpretation. For example, a liquid biopsy ordered in patients with solid tumors may reveal incidental germline mutations of clinical significance, in which case the laboratory can provide further guidance.[79]

Potential for diagnostic stewardship to impact blood utilization

Diagnostic stewardship principles are important to ensure appropriate blood use because complete blood counts may be misinterpreted, leading to unnecessary blood transfusions based on test results. While inappropriate transfusion may reflect mismanagement of a correctly diagnosed patient, such incidents could also result from a diagnostic error (e.g., due to misinterpretation of complete blood count in a given clinical scenario).

Blood utilization teams can help promote appropriate test interpretation and, hence, safer and more appropriate use of blood transfusions.[80-82] The goals of these multidisciplinary teams include reducing unnecessary resource use and limiting excess morbidity and mortality attributable to transfusions. To the extent that diagnostic error contributes to inappropriate use of transfusion, diagnostic stewardship can help advance the goals of blood utilization teams.

Evaluation of Diagnostic Stewardship Implementation

Approaches to evaluate the impact of diagnostic stewardship interventions have often focused on resource use and costs. However, what also needs to be determined is if diagnostic stewardship activities are leading to improved diagnosis, improved safety, or reduction of diagnostic error. We propose three approaches to that.

First, structural measures could be used to assess whether interventions affect the capacity of systems and the commitments of organizational resources and personnel to enable implementation of diagnostic stewardship. Examples could be derived from the following resources:

- The Safer Dx Checklist is a 10-item organizational self-assessment tool to assess practices that promote diagnostic safety.[83] One item from the Safer Dx Checklist is particularly relevant to diagnostic stewardship: "Health care organization has in place standardized systems and processes to encourage direct, collaborative interactions between treating clinical teams and diagnostic specialties (e.g., laboratory, pathology, radiology) in cases that pose diagnostic challenges."
- The ONC SAFER guides are a set of risk assessment tools to evaluate the safety and safe use of health IT.[84,85] Several items describe recommended practices to optimize the safety of CPOE, test result reporting and tracking in electronic health records, and electronic communication between clinicians.
- Guidance is available and continues to evolve for diagnostic excellence programs in hospitals and other healthcare organizations.[86,87] One specific program, Core Elements of Hospital Diagnostic Excellence, includes diagnostic stewardship as a key component and is expected to be released by the Centers for Disease Control and Prevention (CDC) and others in late 2024.[88]

Second, it is possible to measure change in processes from specific actions that diagnostic stewardship interventions promote. For example, changes in demand for laboratory consultation and changes in test ordering patterns are types of process changes that can help program leaders assess whether new policies and practices are being implemented as envisioned. Other examples include:

- Frequency of consultations or calls placed to the laboratory for assistance with test selection or interpretation.
- Frequency of orders for tests known to be widely overused or underused.
- Frequency of test orders found to be inappropriate or erroneous upon review by the diagnostic stewardship team.
- Contamination rates for diagnostic specimens.[89]
- Internal laboratory quality measures, such as the percentage of tests followed by protocol-concordant reflex testing.

Third, outcomes could be reviewed to determine whether diagnostic stewardship interventions improved diagnostic safety outcomes and reduced the risk of diagnostic errors. However, it is difficult to infer changes in safety or adverse outcomes based on test use or even inappropriate use alone. An example of a safety-related outcome is a change in diagnosis after review/intervention by a diagnostic stewardship team, which could imply a diagnostic error.

Other potential diagnostic safety outcomes include diagnostic errors in which testing-related factors are found to contribute to error. Diagnostic errors can be identified by reviewing a sample of records from the target population (e.g., patients with coagulation disorders) within a specified time period, using a structured record review process to identify missed opportunities to make a correct or timely diagnosis.[90]

In addition to evaluating changes in safety-related events, it is also important to assess the value, cost-effectiveness, and sustainability of diagnostic stewardship activities and programs. Ideally, approaches to assess successful implementation and outcomes should include measures of harm or clinical impact. It is also important to assess whether the benefits and consequences of diagnostic stewardship extend equitably across populations. For example, research indicates racial[91] and geographic disparities in blood culture contamination.[92,93] Improving the testing process may also facilitate earlier diagnosis of chronic diseases that disproportionately burden certain populations.[94] Diagnostic stewardship should aim not only to improve patient outcomes but also to close these gaps and inequities.

Opportunities and Challenges Ahead

The successful diagnostic stewardship interventions described above can serve as models for populations and settings in which problems with the testing process contribute to diagnostic error. Conditions that are known to be frequently misdiagnosed and have testing-related contributing factors are good candidates for further applications of diagnostic stewardship.

For example, in an analysis of recurring diagnostic "pitfalls," Schiff and colleagues identified multiple cases of wrong (false positive) diagnoses of systemic lupus erythematosus based on misinterpretation of antinuclear antibody (ANA) testing.[95] While interventions have been developed to reduce inappropriate use of ANA testing and followup testing,[96,97] it is less clear whether they ultimately reduce the occurrence of false positive diagnoses that reach the patient and cause harm.

Establishing the effect of these and similar interventions on diagnostic safety measures is an important next step toward defining their role in improving diagnosis. Interventions can take a variety of forms, but a common underlying element is the close collaboration of laboratory testing experts and clinicians.

Healthcare leaders can advance diagnostic stewardship by addressing barriers to effective clinician-laboratory interfaces within their own organizations. A national survey of U.S. physicians revealed that, even when access to diagnostic expertise is desired, physicians often face difficulty contacting the laboratory, uncertainty about whom to contact, and lack of time to make contact.[98] Developing channels for communication and collaboration with the laboratory might entail additional effort and resources, but they can be justified by the benefits these partnerships create.

To sustain these interventions, healthcare leaders are encouraged to look beyond cost savings alone and consider the total value of diagnostic stewardship, including downstream effects on length of stay, adverse events, clinician satisfaction, and patient experience. Clinicians, diagnostic experts, and quality and safety professionals should be involved in efforts to measure these organization-level outcomes as well as those directly related to diagnostic error.

National-level initiatives to promote diagnostic stewardship include champions from professional societies, regulatory agencies, payers, and patient advocates. The American Board of Internal Medicine Foundation's Choosing Wisely campaign was one example. Choosing Wisely promoted recommendations for diagnostic stewardship, among others,[99] that have been adopted within and outside the United States. However, it has been noted that the success of the Choosing Wisely campaign was due in part to the engagement of medical societies in cocreating practice recommendations to reduce overtesting and waste, in contrast to "top-down" edicts from payers and regulators.[100]

Regulators and payers could incentivize diagnostic stewardship while maximizing autonomy and intrinsic motivation to improve care. Healthcare organizations can be encouraged to identify their own targets for improvement based on internal quality and safety measures or feedback from clinicians and laboratory professionals. For example, van Moll and colleagues described an analysis of voluntary incident reports at an academic teaching hospital to understand diagnostic errors resulting from problems in the testing process.[101]

An emphasis on general principles and core features of diagnostic stewardship, rather than prespecified improvement targets, will allow innovation and flexibility to meet local needs. CDC's Core Elements of Antibiotic Stewardship[72] is an example of flexible implementation guidance. While the Core Elements document provides some specifications and priorities for stewardship programs, decisions about which treatment courses to monitor and which specific stewardship practices to implement are left to the organization's discretion.

Successful implementation of diagnostic stewardship in other systems has been slow to translate nationally and may not reach all patients equitably. One potential challenge is that diagnostic stewardship policies and procedures are often organization or even facility specific, making translation across systems difficult.

Multicenter quality improvement collaboratives have shown promise for disseminating diagnostic stewardship interventions and may enable greater reach of these practices. One instance of such a dissemination effort was the Bright STAR Quality Improvement Collaborative, which supported implementation of diagnostic stewardship for blood cultures across 14 pediatric intensive care units.[65]

Another approach is to implement standardized quality measures. For example, CDC released a quality measure to prevent blood culture contamination and improve laboratory diagnosis of bloodstream infections.[43,102,103]

Other barriers to implementing diagnostic stewardship reflect structural challenges, including limited infrastructure to deliver interventions and constraints on reimbursement for recommended testing, which may also disproportionately burden underserved populations. For instance, for recommended genetic testing, such as rapid genomic sequencing for diagnosis in critically ill newborns, scientific evidence of benefit[104-106] has not translated to consistent payer and state-level coverage policies.[34,78,104] Assessing outcomes that matter to clinicians and patients, such as reductions in preventable harm, can help bring to light the impact of diagnostic stewardship interventions.

Conclusion

Diagnostic stewardship represents a partnership between clinicians and diagnostic testing experts to reduce errors in the testing process and, by extension, the diagnostic process. Diagnostic stewardship has been applied to improve testing for a number of conditions. Beyond these current applications, any disease known to be misdiagnosed due to problems in the total testing process could be a target for diagnostic stewardship.

Looking ahead, it will be important to connect the intermediate outcomes of diagnostic stewardship, such as fewer ordering errors and improved communication between clinicians and laboratory personnel, to reductions in diagnostic errors that reach the patient, such as incorrect diagnoses and resulting harm. Given the pivotal role of diagnostic testing in medicine, programs and initiatives to reduce diagnostic error and enhance diagnostic excellence[107,108] should include diagnostic stewardship as a core component.

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Note: All web pages were accessed July 23, 2024.

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