Recommended Reading


**Abstract:**
As the clinical laboratory test menu has significantly expanded in volume and complexity, there is a rapidly growing need by clinicians for narrative interpretations of complex studies that resemble those provided in anatomic pathology and radiology. In this report, the impact of advice on laboratory test selection and interpretation is presented with regard to providing adequate quality of care, reducing medical error, and reducing the cost for health care. In addition, past and current attempts to address the physician's need for advice on laboratory test selection and interpretation are also described. These include curbside consultations, intelligent laboratory information systems, and medical information from the Internet. Each is presented with examples from the literature and with its advantages and disadvantages for practicing clinicians confronting large, expensive test menus and the results of esoteric assays.

**Abstract:**
Objective: The goal of this study was to identify the activities in clinical pathology training and the length of time required in each to effectively train residents as consultants on laboratory test selection and interpretation.
Methods: The information needed to address these questions was obtained from a study of 20 residents in clinical pathology at our institution between 1990 and 1996. In the survey participants were asked to assess the value of specific training activities in developing their confidence when addressing consultative questions on laboratory test use and interpretation. Participants were also asked to assess the length of time required to gain confidence in performing this role.
Results: The results of the study demonstrate that confidence in providing advice on clinical laboratory test selection and interpretation is acquired to a significant but not absolute degree after an intense 8-week experience in a single clinical laboratory subspecialty, during which time no other responsibilities are assigned. The data also indicate that interactions with clinical pathologists and formal lectures provided to the trainees during their rotations are critical components of the consultation service. There was a significant decrease in the length of time required to provide effective information on test selection and interpretation as the residents progressed through their training.
Conclusions: For all of the major subspecialties in clinical pathology, the residents gained significant confidence by 4 weeks of intense training, and by 8 weeks participants were very confident in answering consultation questions. Even after 8 weeks, however, fewer than 10% of the residents felt absolutely confident in their own decisions regarding laboratory test use and interpretation prior to discussion with senior residents and faculty. Thus, acquisition of expertise to effectively provide advice on laboratory test selection and interpretation required up to 8 weeks of focused training in each clinical laboratory subspecialty. Gaining confidence in multiple areas requires a significant commitment of full-time training. This study provides an understanding of the type and extent of training required to attain the skills necessary to effectively provide consultation in clinical pathology.


Abstract:
Over the past decade, the test menu in the clinical laboratory has increased dramatically in size, cost, and complexity. Most practicing physicians would agree that it is a challenge to select the appropriate tests, and only the appropriate tests, with a clinical laboratory test menu of thousands of assays, many of which are genetic tests. This results in delayed diagnoses or incorrect diagnoses form errors in test selection and a failure to interpret tests correctly. Teams of diagnostic experts in a variety of specialty areas in laboratory medicine to aid treating physicians in test selection and result interpretation are being implemented to address this growing problem which frequently leads to significant diagnostic errors and the associated financial consequences.


Abstract:
Mr. Paul Mango, Chief Operating Officer of a hospital-based clinical laboratory network in Pittsburgh, recently performed a survey of patients presenting for phlebotomy. The survey included the question, "What does a pathologist do?" The results were that 50% of the patients had no idea what a pathologist did, and 30% of the patients stated that pathologists examined dead bodies. It is not surprising that there is a limited understanding by patients of the activities of pathologists because patients do not usually see pathologists. However, beyond autopsy and surgical pathology, the activities of pathologists are also not well known to nonpathologist physicians and hospital administrators. A poor understanding of activities in clinical pathology have placed these clinical responsibilities of the pathologist under particular scrutiny for cost reduction. The quantitation of output from anatomic pathology, in number of slides reviewed or number of autopsies performed, is objective and easily understood. As noted in the list of clinical pathology activities that follows, the responsibilities within the clinical laboratory are highly diverse and, if the pathologist handles them successfully, highly contributory to patient care. Thus, it is
timely that a compilation of activities in clinical pathology be issued for review by the pathologist community. I would hope that this list will serve as a starting point for a universally accepted group of activities that describes clinical pathology today and that it will be useful for pathologists to make their significant contributions in the clinical laboratory apparent to administrators, fellow physicians, and patients. The clinical laboratory responsibilities should also be valuable to directors of residency training programs to focus training in clinical pathology toward the development of currently desirable expertise.


Abstract:
Data from recent studies suggest that the highest incidence of laboratory-related errors occurs in the pre-analytical phase of laboratory testing. However, few studies have examined the frequency of errors in laboratory test selection and interpretation. A survey of physicians who use our clinical laboratory demonstrated that the largest number of test ordering errors appear to involve physicians simply ordering the wrong test. Diagnostic algorithms providing guidance for test selection in specific disorders are also used as the basis for the establishment of reflex protocols in the clinical laboratory. The provision of an expert-driven interpretation by laboratory professionals resulted in improvements both in the time to and the accuracy of diagnosis. A survey of our physician staff has shown that in the absence of such an interpretation, for patients being assessed for a coagulation disorder, approximately 75% of the cases would have involved some level of test result misinterpretation.


Abstract:
Context: Complex coagulation test panels ordered by clinicians are typically reported to clinicians without a patient-specific interpretive paragraph.
Objectives: To survey clinicians regarding pathologist-generated interpretations of complex laboratory testing panels and to assess the ability of the interpretations to educate test orderers.
Design: Surveys were conducted of physicians ordering complex coagulation laboratory testing that included narrative interpretation. Evaluation of order requisitions was performed to assess the interpretation's influence on ordering practices.
Setting: Physicians ordering coagulation testing at a large academic medical center hospital in Boston, Mass, and physicians from outside hospitals using the academic medical center as a reference laboratory for coagulation testing.
Outcome Measures: Physician surveys and evaluation of laboratory requisition slips.
Results: In nearly 80% of responses, the ordering clinicians perceived that the interpretive comments saved them time and improved the diagnostic process. Moreover, the interpretations
were perceived by ordering clinicians to help prevent a misdiagnosis or otherwise impact the
differential diagnosis in approximately 70% of responses. In addition, interpretations appeared to
be able to train the ordering clinicians as to the standard ordering practices.
Conclusions: The results demonstrate physician satisfaction with an innovative information
delivery approach that provides laboratory diagnostic interpretation and test-ordering education to
clinicians in the context of their daily workflow.

MacMillan DH, Laposata M. Income opportunities for lab medicine: The clinical laboratory's
interpretive service is a valuable tool that enhances patient care and provides an opportunity to

MacMillan DH, Soderberg BL, Laposata M. Regulations regarding reflexive testing and narrative
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Abstract: The use of reflexive test selection and patient-specific narrative interpretations in laboratory
medicine is associated with a host of compliance issues and government regulations. Reflexive
testing is associated with many advantages for patients and their physicians, but if not adequately
organized it has the potential for inefficient test ordering and abuse by physicians and laboratories. Patient-specific narrative interpretations in laboratory medicine, much more than
fixed comments generated by a computer with a specific test result, also provide clinical and
financial benefit when done effectively. Regulations exist to ensure that the physician-provided
information has clinical value. This report describes the compliance and billing regulations
regarding reflex testing and narrative interpretations. The codes used for narrative interpretations
in laboratory medicine are also presented, as well as the use of those codes to obtain payment for
the interpretation provided.

Sarkar MK, Botz CM, Laposata M. An assessment of overutilization and under-utilization of
laboratory tests by expert physicians in the evaluation of patients for bleeding and thrombotic
Abstract: Background: Diagnostic error is extremely common in the United States and likely around the
world. A major reason for the diagnostic error is both the overutilization and the underutilization of
laboratory tests. Using a panel of two to four experts in coagulation, test selection was reviewed in
clinical context and in real time, and consensus determinations were made to derive conclusions
about the extent of overutilization and underutilization.
Methods: Two hundred cases of patients being evaluated for bleeding or thrombotic issues were
presented at each daily meeting of the diagnostic management team, and a review of each case
for appropriate utilization of tests was completed.
Results: Two hundred randomly selected cases revealed diagnostic errors in 77.5% (155 cases).
Sixteen percent were associated with overutilization of laboratory tests, 44% were associated with
underutilization, whereas 17.5% were associated with both. The annual cost burden estimated for
overutilization alone in one institution of 450 beds was on the order of $20,000. The cost burden
for the delay in diagnosis or the misdiagnosis in cases with underutilization is orders of magnitude
greater ($200,000 or more), but it is impossible to determine the cost of a misdiagnosis in an individual case because it can produce many different clinical outcomes.

Conclusions and relevance: This was a rare opportunity for experts in a given field to review cases in real time and in clinical context and provide immediately a consensus answer about test utilization. The results of this study show errors in test selection in nearly 75% of the cases evaluated.


Abstract:
Objectives: To address the overuse of testing that complicates patient care, diminishes quality, and increases costs by implementing the diagnostic management team, a multidisciplinary system for the development and deployment of diagnostic testing guidelines for hematologic malignancies.

Methods: The team created evidence-based standard ordering protocols (SOPs) for cytogenetic and molecular testing that were applied by pathologists to bone marrow biopsy specimens on adult patients. Testing on 780 biopsy specimens performed during the six months before SOP implementation was compared with 1,806 biopsy specimens performed during the subsequent 12 months.

Results: After implementation, there were significant decreases in tests discordant with SOPs, omitted tests, and the estimated cost of testing to payers. The fraction of positive tests increased. Clinicians reported acceptance of the new procedures and perceived time savings.

Conclusions: This process is a model for optimizing complex and personalized diagnostic testing.