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Opportunities to Enhance Laboratory Professionals' Role On the Diagnostic Team

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Abstract

Background: The 2015 Institute of Medicine report *Improving Diagnosis in Health Care* highlighted that diagnostic errors cause patient harm and that improvement in the diagnostic process requires better collaboration among physicians and laboratory professionals. The purpose of this study is to understand why physicians do not contact laboratory professionals when facing diagnostic challenges and identify opportunities for laboratory professionals to become more recognized members of the clinical care team.

Methods: A random sample of 31,689 physicians from the American Medical Association Masterfile were surveyed about diagnostic challenges in laboratory test ordering and results interpretation, solutions to these challenges, and interactions with laboratory professionals.

Results: We received responses from 1768 physicians (5.6%). When faced with diagnostic challenges, they reported using electronic resources because they find it difficult and time-consuming to contact the laboratory. Only 20% had an effective way to access laboratory professionals, mostly seeking help for logistical but less for clinical issues. Continuing medical education, professional articles, and updates from the laboratory were helpful.

Conclusions: Laboratory professionals have an opportunity to play a greater role in the diagnostic process by becoming active members of the clinical care team, beyond providing results. This study provides strategies to increase laboratory professionals' role in the diagnostic process.

This work is written by US Government employees and is in the public domain in the US.

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Keywords

laboratory test ordering; laboratory test interpretation; diagnostic team; laboratory medicine practices; medical laboratory practices; physician practice patterns; diagnostic tests; laboratory utilization; diagnosis

Diagnostic errors affect 5% of US adults seeking outpatient care each year, and contribute to approximately 10% of patient deaths and 6% to 17% of hospital adverse events.¹ The 2015 Institute of Medicine (IOM; recently renamed the National Academies of Sciences, Engineering, and Medicine) report *Improving Diagnosis in Health Care* emphasizes that improvement in the diagnostic process hinges on successful professional collaboration among healthcare professionals.¹ The report identifies those in the field of pathology as critical to diagnosis but insufficiently recognized and engaged as full members of the diagnostic team.¹ In the US, medical laboratories are staffed with personnel comprising pathologists and other physicians, board-certified, doctoral-level laboratory directors, and other laboratory professionals in technical and management positions. Laboratory professionals possess a wealth of knowledge that could be valuable in consultation with physicians to improve diagnosis, and their active participation should be essential to optimizing diagnosis.¹ Some laboratory professionals have become an important member of the clinical team by providing interpretive comments, developing reflex testing programs, and participating on multidisciplinary and diagnostic management teams.²⁻⁴

To assess how to improve the communication between primary care physicians and laboratory professionals, the Centers for Disease Control and Prevention (CDC)'s Clinical Laboratory Integration into Healthcare Collaborative (CLIHCC) surveyed family and general internal medicine physicians to gain insights into their uncertainty and challenges in ordering clinical laboratory tests, and interpreting results, and their suggestions for solutions for improvements.⁵ In the survey, physicians reported uncertainty in ordering diagnostic tests in 14.7% of patient encounters and in interpreting test results in 8.3%.⁵ This level of uncertainty raises serious concerns about the safe and efficient use of laboratory testing resources and supports the magnitude of diagnostic errors when considering the millions of patient visits to primary care physicians each year. The survey also found that only 6% of physicians contact laboratory professionals at least once a week or daily.⁵ In fact, this was the least frequently reported approach physicians used to address uncertainty in test ordering and interpretation.

The purpose of this study is to expand the previous report by analyzing additional survey questions to better understand why primary care physicians do not contact laboratory professionals when facing diagnostic challenges. The opportunities identified offer tactics for laboratory professionals to become more recognized members of the clinical care team and strategies to improve the quality of healthcare delivery and potentially reduce diagnostic errors.

Materials and Methods

CLIHG Survey

Survey development and administration processes were described fully in our prior report.⁵ Three focus groups of 9 internal medicine and family physicians each, 27 in all, were held to obtain background information for the survey.⁶ Based on focus-group input, 19 questions with subparts were written to ask physicians about 1) their diagnostic evaluation process, 2) uncertainty and challenges regarding test ordering and results interpretation, 3) tactics they used to overcome uncertainty, 4) factors that influence laboratory test ordering, 5) communication with laboratory professionals, 6) sources of information about new tests, and 7) perceived solutions to improve test ordering and results interpretation. Responses were both forced choice (5-point Likert scale questions) and open ended. Response options for *self-description* ranged from “extremely well” to “not well at all.” Options for *frequency* ranged from “daily” to “never.” Options for *importance/helpfulness/usefulness* ranged from “extremely important/helpful/useful” to “not at all important/helpful/useful.” A random sample of 31,689 family medicine and general internal medicine physicians from the 2011 American Medical Association (AMA) Masterfile were asked to respond to the survey.

Analysis

The quantitative data of the Likert scale forced-choice questions are presented as the percentage of respondents who selected each of the 5 responses, with the exception of Figure 1, which shows the percentage of respondents who selected “extremely well” and “very well,” and Figure 2, which shows the percentage of respondents who selected “never” or “not helpful at all.”

For a subset of survey items with open-ended responses, a thematic analysis was conducted. This process began with identifying broad content categories, or “themes,” found across the qualitative responses during an initial review of each specific question (ie, the familiarization phase). These thematic categories were then refined to minimize overlap of content across themes during coding. Both semantic and latent themes were considered. *Semantic theme* refers to the precise wording and/or overt meaning included in a response. For example, the response “testing at a reference lab” was counted under the category “test at reference laboratory.” *Latent theme*, however, refers to an underlying or implicit idea interpreted from the response. For example, the response, “Previous experience suggests that the person I contact will not be able to help,” was categorized as “expertise unavailable,” as this theme is consistent with the underlying idea of the response, although not stated in those words.

All responses for each of the qualitative questions were then assigned to an appropriate thematic category and tabulated in Excel 2010 (Microsoft; Redmond, WA). The frequency of each theme was quantified using this approach. Individual survey responses that did not correspond to established themes were categorized as “other,” “additional reason,” or “additional source” based on the content of the original survey question. Individual survey responses that did not contain meaningful content (eg, responses such as “n/a”) were not tabulated. Each final dataset was then reviewed for thematic categorization accuracy by the authors prior to analysis and graphing. Results are presented as category percentages of all

open-ended qualitative responses for each question. Data for both quantitative and qualitative analyses were graphed in SigmaPlot 11.0 (Systat Software Inc, San Jose, CA).

Results

Respondent and Practice Characteristics

Although only 5.6% of physicians responded (n = 1768), their demographic characteristics are similar to the AMA Masterfile of physicians in the US. Figure 1 shows the data for how physicians proceed during the diagnostic process; electronic resources were the most common tools to overcome uncertainty in laboratory test ordering. The majority also reported using a core set of 20 or fewer laboratory tests and disclosed more concern about overtesting than undertesting (Figure 1).

Laboratory Consultation

Physicians were asked how often they contact laboratory professionals for information and how helpful were those interactions. The percentage of physicians who reported that they “never” contact laboratory professionals ranged from 47.5% (to ask about “the medical significance of results”) to 9.7% (for “status of missing results”; Figure 2, black bars). The percentage of physicians reporting that these interactions were “not at all helpful” ranged from 10.7% (for “assistance with appropriate test ordering”) to 1.2% (for “status of missing results”; Figure 2, gray bars).

Major reasons physicians gave for not consulting with laboratory professionals are shown in Figure 3. For example, almost half of the respondents chose “too difficult to contact person who can answer my questions” as a “very” and “extremely” important reason for not consulting with the laboratory. “Previous experience with unreliable information” was rated the highest “not at all important” score and lowest “extremely important” score. Analysis of open-ended comments (Figure 4) revealed that additional reasons for not consulting with laboratory professionals are often related to time constraints and expertise being perceived as unavailable.

Sources of Information About New Tests

Physicians were also surveyed on the usefulness of sources of information about new tests. Over half reported that continuing medical education (CME), professional articles, and colleagues are either “extremely useful” or “very useful” to helping them learn about new tests (Figure 5, black and red bars). In addition, updates from the laboratory were noted as helpful in 15.9% of open-ended comments (Table 1). Laboratory sales representatives, pathologists, and scientists had the highest percentage of “not at all useful” vs all other response categories (Figure 5, blue bars).

Discussion

The results of this national survey show that clinical laboratory professionals are underutilized as support for physicians when ordering and interpreting laboratory tests. Some physicians do not consider the laboratory an available or viable resource, and many of

them never contact the laboratory when uncertain about what test to order or how to interpret results.

Physicians frequently reported in their open-ended responses that to obtain information from the laboratory was generally time consuming and too difficult. Only about 1 in 5 physicians reported that they have worked out an effective way to access and utilize pathologists and laboratory scientists. One physician commented in a focus group, “You don’t talk to a radiologist or pharmacist in a hospital; you talk to a colleague. [When] you talk to a lab, it’s a black box.”⁶

Physicians were asked about the specific reasons and frequency for contacting laboratory professionals, and to rate the helpfulness of that communication. Only 6% of physicians contact laboratory professionals,⁵ primarily for help when facing “confusing ordering options on the computer/electronic medical record” or “when the lab results do not match the patient symptoms.” When such communications pertain to logistical and technical issues (eg, status of missing test results), they tend to rank these interactions as more helpful and pursue them more frequently. Less frequently used communications related to clinical care were rated less helpful (eg, “assistance with appropriate test ordering” and “medical significance of results”).

The current healthcare environment and the efforts to implement the recommendations of the 2015 IOM report will push laboratory professionals to concentrate more on clinical care (patient care-centric) issues, in addition to delivering accurate, fast, and low-cost test results (operational efficiency).¹ Improving relationships between laboratory professionals and clinicians would support the first goal of the 2015 IOM report: “Facilitate more effective teamwork in the diagnostic process among healthcare professionals, patients, and their families.” The report also highlights the need to “provide coverage for time spent ... in advising ordering clinicians on the selection, use, and interpretation of diagnostic testing.” Physicians mentioned their positive relationships with radiologists and pharmacists, and were receptive to developing similar relationships with laboratory professionals.⁶ Physicians who utilized laboratory professionals found them helpful in test selection and results interpretation if/when they had consultative-type relationships with them. One physician said, “If it’s an interpretation or a discrepancy, then I just call [name], who’s in charge of the lab, a good guy, and he knows everything.” Another physician said, “I call my friendly local pathologist and have excellent feedback/assistance.”

Developing and disseminating laboratory updates for physicians, contributing to and/or offering educational programs associated with CME credit, and publishing quality improvement projects and/or guidance on test utilization in primarily clinical journals would make physicians more aware of the value of laboratory professionals’ expertise as patient care consultants and how they can contribute to the diagnostic process. Laboratory professionals also need to be actively involved in developing and guiding the integration and usage of clinical decision support tools, such as electronic ordering guidance, trending of results, and test characteristics in the electronic health record, all of which guide appropriate test ordering and interpretation. Additionally, they must seek active participation in

hospitals' multidisciplinary teams, practice guideline development, and other policy committees that help guide clinical care.

The low response rate in this survey (5.6%), small number of comments, and inclusion of only primary care physicians limits the generalizability of these results. However, the respondents' demographic characteristics are similar to those of the population included in the AMA Masterfile of family physicians and general internal medicine physicians in the United States.⁵

In conclusion, clinical laboratory testing is an integral part of medical diagnosis. As more recognized, valued members of the clinical care team, laboratory professionals can play an essential role for improving the quality of medical care and reducing diagnostic errors. Future research should be directed at evaluating the effectiveness of laboratory-initiated interventions described here to improve appropriate clinical laboratory utilization and reduce diagnostic errors.

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Abbreviations

AMA	American Medical Association
CDC	Centers for Disease Control and Prevention
CLIHC	Clinical Laboratory Integration into Healthcare Collaborative
CME	Continuing Medical Education
IOM	Institute of Medicine (recently renamed to National Academies of Sciences, Engineering, and Medicine)

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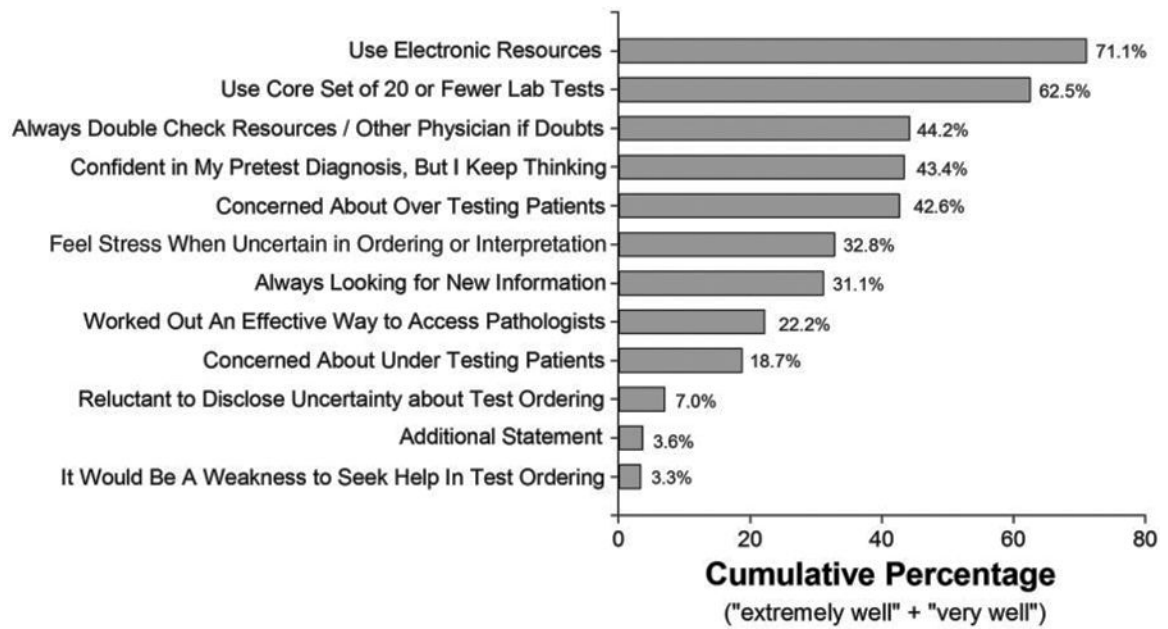


Figure 1.

Responses to survey item “My Diagnostic Evaluation Processes.” Participants were asked to indicate how accurately each of the items described themselves. Shown are the cumulative percentage of responses for selections “extremely well” and “very well.” Item descriptors listed on the Y-axis were truncated (from full sentences) for clarity.

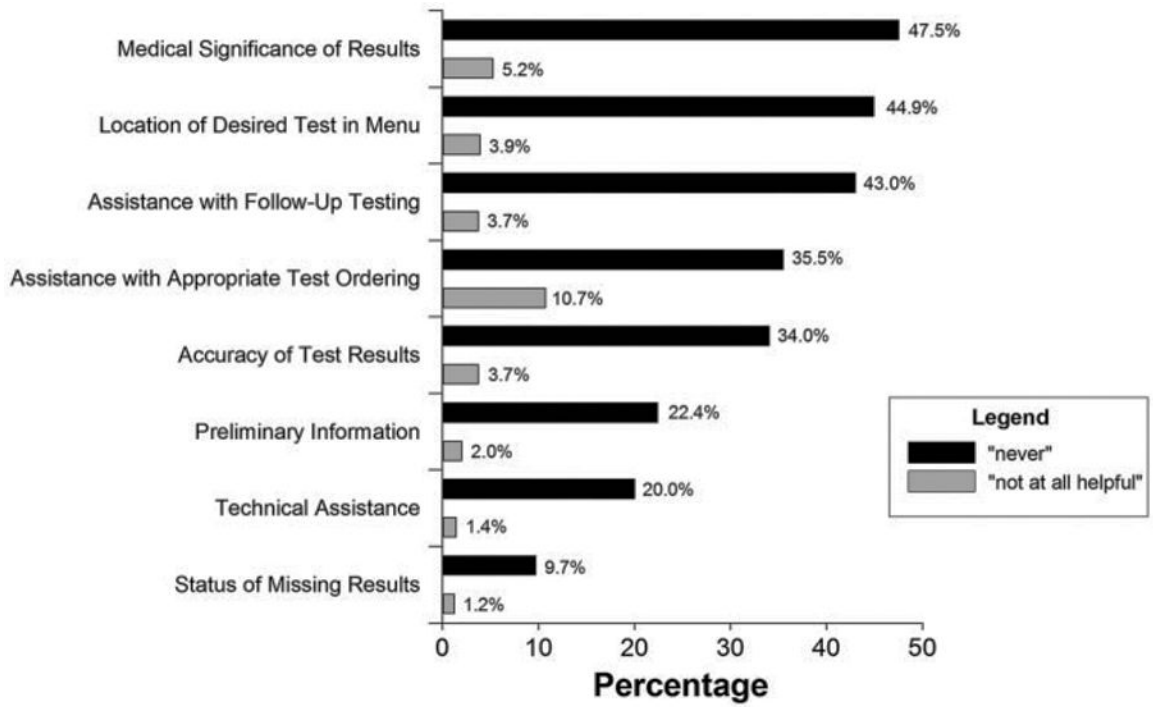


Figure 2. Frequency and helpfulness of physicians' communications with laboratory professionals. Survey questions include: "How often do you initiate communication with laboratory professionals concerning each of the following" (% reported "never"); and, "Please rate the helpfulness of communication with laboratory professionals regarding each of the following" (% reported "not helpful at all").

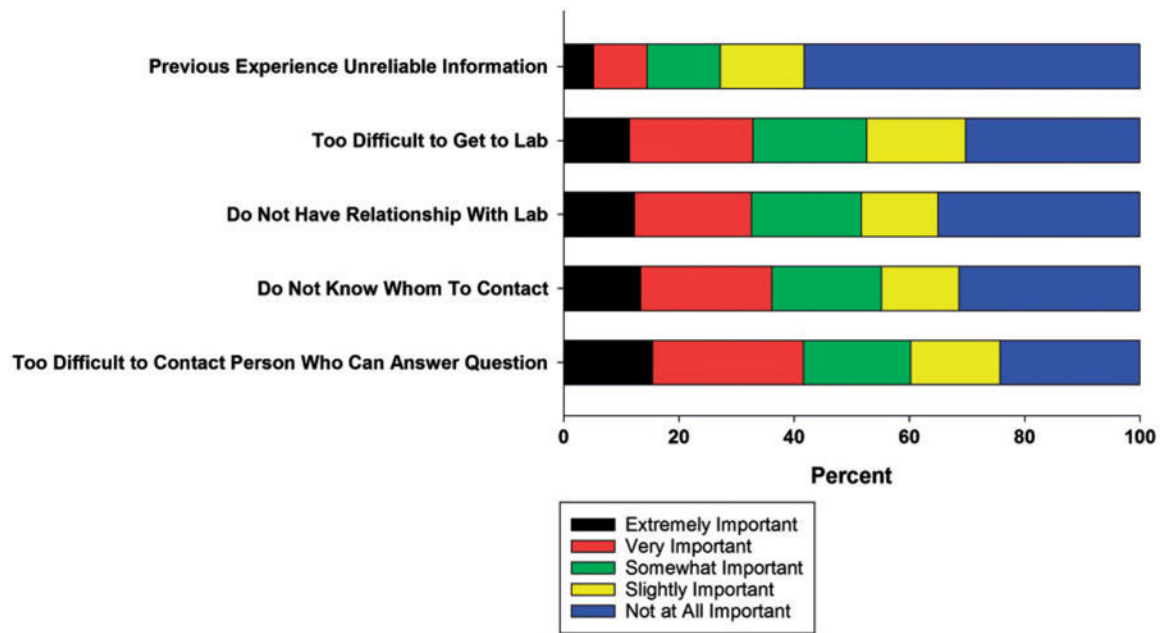


Figure 3. Reasons physicians frequently do not consult with laboratory professionals: All response categories. Stacked horizontal bar chart showing breakdown of all responses' percentages for each category.

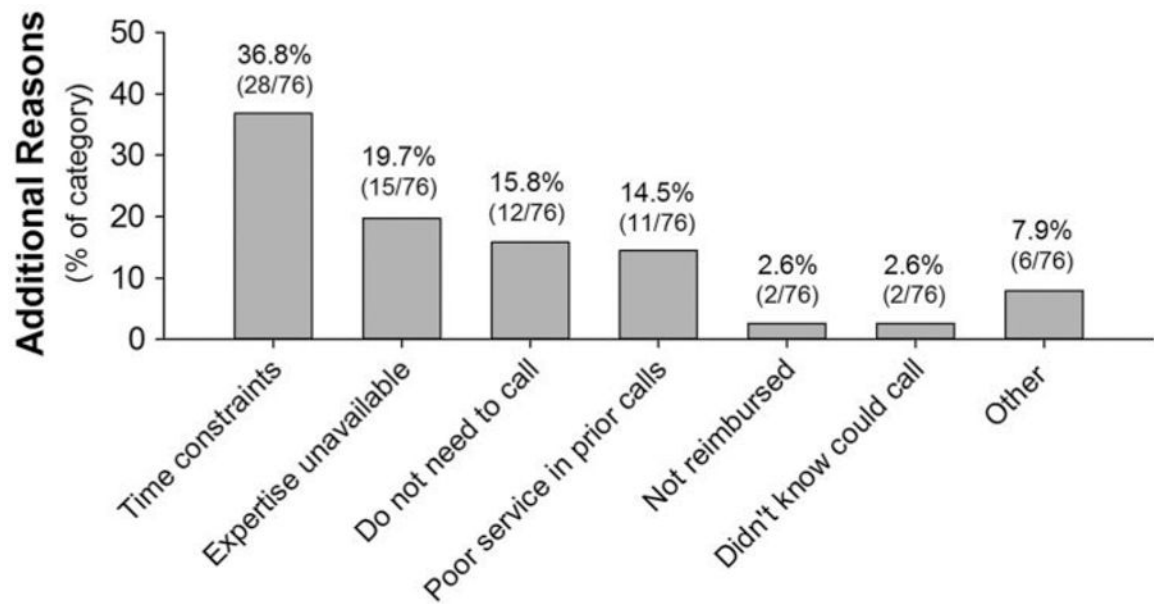


Figure 4. Additional reasons physicians frequently do not consult with laboratory professionals: Open responses. The “additional reason” open responses (n = 76) were sorted into categories (see Materials and Methods section) and are displayed as the percentages of responses in each category.

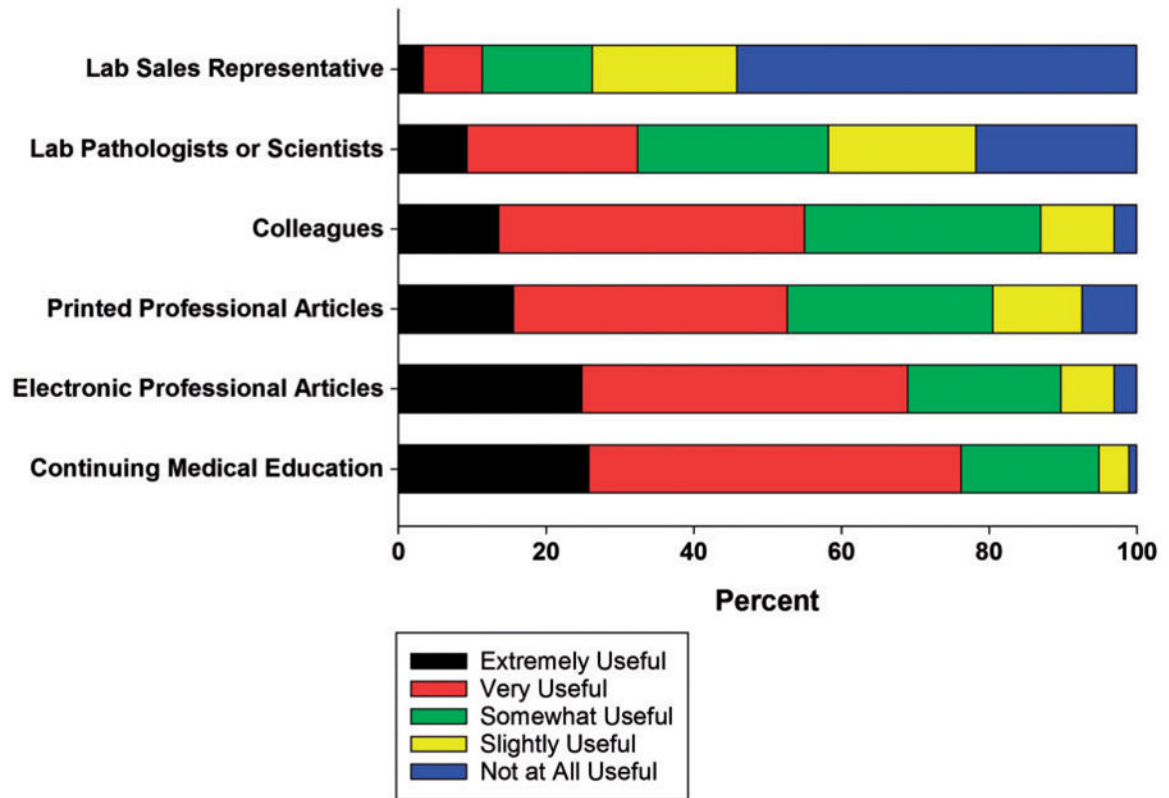


Figure 5. Sources of information about new lab tests: All response categories. Stacked horizontal bar chart showing breakdown of all responses' percentages for each category. Survey question: What sources of information about new tests are most useful to you?

Table 1.

Additional Sources of Information About New Tests: Open Responses

Survey question: Please specify the additional source of information about new tests that is useful to you.

Comment Category	Comments (No.)	Comments (%)
Written or electronic resources	15	34.1
Updates from the lab	7	15.9
Experts	4	9.1
CME/Educational activities	4	9.1
Patient Follow-up or record	2	4.5
Patient requests	2	4.5
Department/institution updates	2	4.5
News	2	4.5
Insurance companies	1	2.3
Computerized physician order entry	1	2.3
Other	4	9.1

The “Additional Reason” open responses^a (n = 44) were sorted into categories (see “Materials and Methods”), and are displayed as the number of comments and percentage of responses in each category.

^aSample comments include the following:

- “I read books and websites that are useful and helpful”
- “by reviewing specialists’ reports”
- “talking to colleagues from specialties”
- “laboratory updates emailed to me regularly”