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Current state of laboratory test utilization practices in the clinical laboratory☆

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A B S T R A C T

Appropriate laboratory test utilization is of growing interest in the face of rising healthcare costs and documented evidence of over- and under-utilization. Building from published literature, laboratory organizations have recently published guidelines for establishing laboratory utilization management programs. However, systematic reviews and meta-analyses have consistently struggled to define rigorous evidence-based best practice recommendations due to the paucity of published data or the heterogeneity of available data. We sought to gain information about utilization practices and programs currently in use and which factors contribute to their success by distributing a survey among laboratory professionals. The survey received seventy-four eligible respondents. We observed a wide range in the duration of laboratory utilization programs and the number of stewardship initiatives. In addition, there was great variety in the utilization practices used and the tests or processes targeted by programs. There was similarity in how initiatives are evaluated and who is involved with utilization programs. Finally, respondents often credited a multidisciplinary committee, support from leadership, and strong IT support/data access as important factors for their program's perceived success. Many of these factors agree with previously published literature.

Keywords: Laboratory stewardship, Laboratory test utilization, Survey

Introduction

The rising costs of healthcare have led to increased interest in appropriate laboratory test utilization. This involves ensuring that non-beneficial tests are not ordered and that appropriate screening or monitoring tests are being employed at recommended intervals. A meta-analysis reviewing studies published from 1997 to 2012 estimated the rate of overutilization at 20.6% and the rate of underutilization at 44.8%.[1] To address these intertwined problems, increasing numbers of institutions have established laboratory test utilization (LTU) or stewardship committees. The impact of these committees or programs at academic medical centers,[2,3] Veterans Affairs hospitals,[4] long-term acute care hospitals,[5] and among primary care and family physicians has been documented.[6,7] As these initiatives have expanded and tackled more complex challenges, there has been greater recognition of the importance of studying what works with particular types of tests, such as coagulation tests or genetic tests.[8,9] There have also been publications reviewing specific challenges, such as that of reference laboratory testing or tests pending at discharge,[10,11] and particular utilization/stewardship practices, such as benchmarking or clinical decision support.[12,13]

The Clinical and Laboratory Standards Institute (CLSI) published a guide about laboratory utilization management programs,[14] and Patient-centered Laboratory Utilization Guidance Services (PLUGS) published guidelines for establishing utilization efforts.[15] Both emphasize the need for support from an organization's leadership and the importance of a multidisciplinary effort. The CLSI guidelines specifically recommend flexibility to facilitate setting up optimal programs at different institutions. However, this flexibility, while certainly critical to programs' success, also contributes to the difficulty in providing best practice guidelines for laboratory utilization programs. Systematic reviews and meta-analyses have consistently struggled to draw clear conclusions due to a lack of data or the heterogeneity of available data.[16–18] The one recommendation they all agree on is that combined interventions are more effective.

The caveat of these reviews is that they rely on published data, which may present a biased picture of utilization efforts, since many less successful or small-scale interventions may never be included in a publication. Therefore, to gather information about the types of utilization/stewardship practices in use and their success, we developed a survey to be shared broadly among laboratory professionals.

☆ This work has previously been presented in the form of a short talk at the PLUGS Summit in Seattle, WA in October 2021.

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Materials and methods

The survey was designed to collect information about the number, type, and duration of LTU initiatives, the composition of laboratory test utilization committees, and the factors that might influence the success of the program. The full list of survey questions is included in the Supplemental Material. The survey was constructed using Qualtrics (Provo, Utah). A link was posted to the American Association for Clinical Chemistry Artery online discussion forum. In addition, it was distributed via email to the members of the Patient-centered Laboratory Utilization Guidance Services (PLUGS) network and to a client email list from a national reference laboratory. Finally, we employed snowball sampling in that the survey invitation email invited recipients to forward the email with the survey link to colleagues or other possible respondents (though we could not trace this). The survey was conducted between November 2019 and February 2020. The first screening questions of the survey were designed to select respondents who were involved with the LTU efforts at their institution (either by formal committee or informal programs). No questions in the survey were required, so there are variable numbers of respondents for each question.

Statistical analysis and figure production was performed using R.[19]

Results

A total of 216 individuals began the survey. Ninety-two passed the screener questions (indicating that some type of LTU effort occurred in the past two years and that they were a member of the LTU team) and were given the option to complete the full survey. Out of that population, 74 answered at least one additional question and were included in the analysis. Of the 43 respondents who provided the location of their institution, 38 were in the United States, three were in Canada and one each was in the United Kingdom and Curaçao. Additionally, 84% of respondents to a question about lab ownership indicated that the lab was owned and managed by the hospital (n = 48).

The survey gathered information about the people involved with LTU efforts. Over 50% of respondents indicated that the LTU team included a pathology department member, a lab supervisor/administrator, another medical professional, or a member of the executive team (Table 1). Just short of 50% of respondents said the team included an IT analyst or a member of the quality team. Members of the finance team, insurance representatives, and nursing staff also were listed as being members for a minority of institutions. The chair or co-chair of the committee (n = 61) was most commonly a pathologist or other physician (42.6%), a lab director (24.6%), or a lab supervisor (9.8%).

There was a wide distribution in the number of LTU initiatives established at different institutions in the previous two-year period, ranging from 0 to 72 with a median of 9 (Fig. 1). There was equal variety in the duration of LTU efforts; approximately half were started in the last two years, but some institutions had started programs more than 8 years ago (Fig. 2). The LTU initiatives encompassed many different LTU practices. Reflex testing was included in 67% of LTU programs (n = 57), and educational lectures or articles were used in 61% of programs (n = 56). Guidance in the computerized-provider-order-entry (CPOE) system, ordering restrictions, prospective order review, and retrospective order feedback were other common practices used by more than 60% of programs (n = 50–56 for each question). Prospective order review was more common for genetic tests versus non-genetics tests (73% versus 64% of programs). Lastly, only 29% of programs provided cost information in the CPOE system (n = 51). When asked just about the most recent LTU effort, the most common methods relied on pre-testing approval or consultation (11.4%), data analysis to guide process changes (10.1%) or education (10.1%) (n = 79 concepts among respondents).

Most respondents indicated that both inpatient and outpatient testing were targeted by LTU efforts; in contrast, 16% targeted only inpatient testing, and 7% targeted only outpatient testing (n = 55). Regarding the tests or processes target by LTU efforts in the past four years, chemistry testing (50.6%) and infectious disease testing (20.9%) were the most popular targets, with CK-MB, vitamin D, and thyroid function testing being the most commonly mentioned chemistry targets, and *C. difficile*, herpes, HIV, and respiratory virus panel testing being the most popular infectious disease targets. General processes (8.7%), immunology testing (7.6%), genetics testing (7.0%), and hematology/coagulation testing (5.2%) were also represented (n = 172 mentioned tests/processes in free text response). When queried about the most recent or representative initiative, the distribution of targets was largely similar: chemistry testing (39.1%) and infectious disease testing (18.8%) were still leading targets. However, general processes (18.8%) were targeted more frequently compared to genetics testing (10.1%), immunology testing

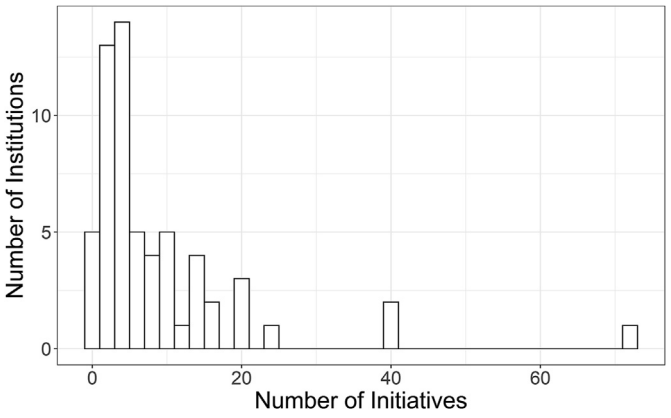

Fig. 1. Distribution of the number of LTU initiatives in the past two years at respondents' institutions (n = 60).

Table 1
Percent and number of respondents including members of various teams in the LTU effort (n = 67)[a].

	Percent	Number
Pathology department member	89.6%	60
Lab supervisor/administrator	86.6%	58
Other medical professional	64.2%	43
Executive team member	59.7%	40
Quality team member	47.8%	32
IT analyst	47.8%	32
Finance team member	31.3%	21
Other IT member	29.9%	20
Insurance representative	16.4%	11
Nursing representative	16.4%	11

[a] Percent responses do not add up to 100% because respondents could select multiple responses.

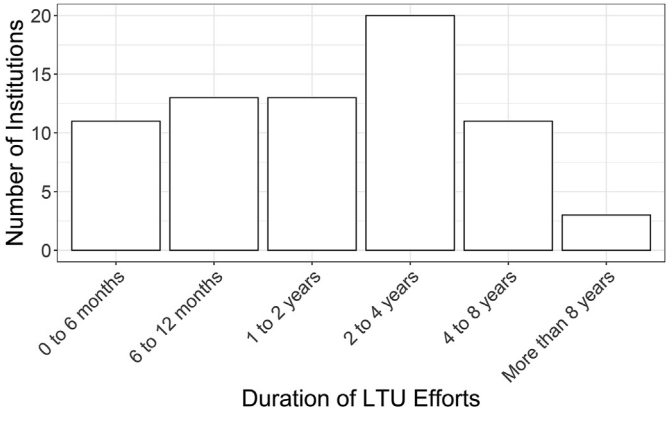

Fig. 2. Distribution of the duration of LTU efforts at respondents' institutions (n = 71).

(7.2%), and hematology/coagulation testing (5.8%) (n = 69 mentioned tests/processes in free text response). Common general process targets included review of reference laboratory testing, duplicate orders, and daily standing orders. Among inpatient testing, concerns listed by more than one respondent included orders in the intensive care unit and orders for genetic tests. Ideas for LTU initiatives hailed from a variety of sources. Respondents listed laboratory staff (41.7%), physicians (29.2%), medical departments (29.2%), and society guidelines (25.0%) as being a source of the idea for the most recent project (n = 48); 41.7% of respondents cited multiple sources of ideas for the most recent project.

To assess the effectiveness of LTU efforts, it is important to monitor them. Monitoring changes in ordering patterns, test volume, and testing costs were the three most common metrics (Table 2). Patient length-of-stay, patient satisfaction, and phlebotomy costs were less common metrics. For respondents who provided an estimate of annual cost savings (n = 29), the majority indicated savings were less than $100,000 (Fig. 3). There was not a significant correlation between the number of initiatives and the estimated average annual cost savings (Spearman's $\rho = 0.252$, $p = 0.215$), and the questions asked in the survey did not allow us to analyze cost-savings on an individual initiative basis.

The vast majority of respondents providing answers about if and how feedback was elicited (n = 48) indicated the feedback was collected either electronically (29%) or in person (60%) during development. Fewer respondents collected in-person feedback (40%) post-implementation, although the same percent collected feedback electronically (29%). Additionally, feedback did not seem to prevent needed modifications to an LTU effort after implementation; out of the 11 respondents who indicated they made a change, 10 had collected in-person feedback during development.

Out of 47 respondents who rated the success of their programs, 55.3% indicated that their programs were “somewhat successful,” 23.4% were “neither successful nor unsuccessful,” 19.1% were “very successful,” and 2.1% were “somewhat unsuccessful.” When asked about what has been most effective or what they have learned about implementation, respondents often emphasized access to data and IT support. In addition, they highlighted the importance of supportive multidisciplinary teams including physicians and genetics specialists (depending on the targeted test). Respondents also mentioned several types of interventions that they found most effective, including changes in the electronic health record or CPOE system (such as hard stops or reflex testing), education, and feedback to providers. A less concrete conclusion mentioned by a few respondents was that it is important to recognize that change will not happen overnight, so patience and persistence are critical.

Discussion

Overall, results from our survey documented a wide variety in the duration and scale of utilization/stewardship programs. The breadth of practices in use suggests the need for customization, both to the institution and the test(s) being targeted. Survey respondents cited a multidisciplinary committee, support from leadership, and strong IT support/data access as key elements for success. These findings are generally in agreement with recommendations from earlier publications.

Table 2
Percent and number of respondents monitoring LTU efforts with each metric (n = 47)[a].

Metric	Percent	Number
Changes in ordering patterns	74.5%	35
Test volume	72.3%	34
Testing costs	66.0%	31
Patient length-of-stay	19.1%	9
Phlebotomy costs	8.5%	4
Patient satisfaction	8.5%	4

[a] Percent responses do not add up to 100% because respondents could select multiple responses.

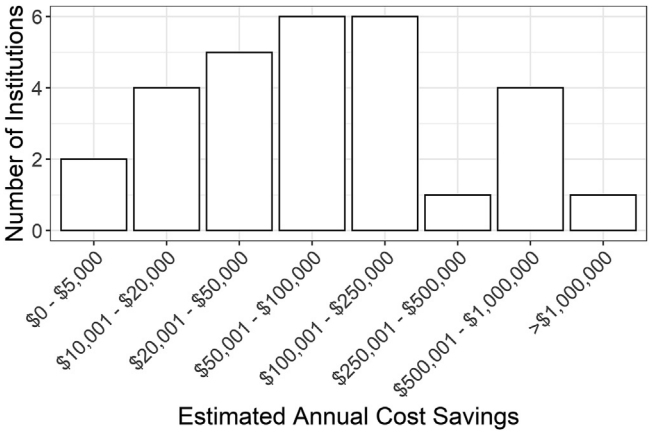

Fig. 3. Distribution of estimated annual cost savings at respondents' institutions (n = 29).

The CLSI and PLUGS guidelines both recommend creation of a multidisciplinary team for utilization/stewardship efforts.[14,15] Several institutions have cited the importance of multiple perspectives, especially from clinical experts, when establishing successful utilization/stewardship initiatives.[2,3,20–22] Strong support from institutional leadership has also been documented as an important factor in the success of utilization programs.[2,22,23] While a part of the multidisciplinary team recommended by guidelines, IT support can be especially critical in three main ways: 1) identification of tests that may be over- or under-utilized depends on being able to access data regarding test ordering patterns, 2) evaluation of utilization efforts depends on reviewing data both pre- and post-intervention, and 3) many utilization/stewardship interventions rely on IT support for implementation (clinical decision support, ordering restrictions, etc.). Therefore, the ability for utilization/stewardship programs to have reliable access to laboratory data and IT support is crucial.[2,3,13,22] While our survey did not explicitly ask about using multiple interventions for a single target test, this can be another successful approach for utilization programs.[16,17,20,21]

Our survey has a few limitations. While over 200 individuals started the survey, only 74 respondents answered enough questions to be included in the final analysis, which still represents a relatively small number of responses given the number of clinical laboratories in the United States alone. We did not require responses, so we received a variable number of answers to each question. Survey questions may also be interpreted differently by respondents despite careful testing during survey preparation. For example, question 9 about the duration of LTU efforts may have elicited responses only about current efforts and not the overall program, as was intended by the question. In addition, the sample represents a convenience sample, meaning that we may not have representative responses from various types of institutions. Finally, the survey is based on self-report. Therefore, while the bias is expected to be less than for publications, the survey may still have a bias if respondents were more likely to respond if their institution had a successful utilization/stewardship program.

Despite these limitations, the survey results provide useful information regarding the current state of active laboratory utilization/stewardship programs. The variety of targeted tests shows the breadth of utilization efforts, and the mixture of various interventions reinforces the importance of designing a customized solution. Focusing on establishing a multidisciplinary team with support from leadership and ample IT resources to access data and implement interventions may be some of the most beneficial actions that stewardship programs can take.

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Declaration of competing interest

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Supplementary data

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