Summary of Workshop 8: Establishing Medically Relevant Performance Goals for the Laboratory

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Key Questions:

1) How are clinically related performance goals established and evaluated?
2) How can clinically related performance goals be translated to medically relevant performance goals?

The Presentations

Relevance means making a difference. Making a positive difference in care processes and care outcomes requires good decision making. Good decisions are required in all phases of health care: the pre-analytical and pre-clinical, the laboratory analytical and clinical, the post-analytical and post-clinical phases. This workshop included five presentations and a vigorous discussion of current knowledge and desired future improvements in clinical decision making utilizing laboratory data. Developing clinically related, medically relevant performance goals requires a clear and quantitative understanding of how a change in the precision and accuracy of a laboratory result may change the decision-making process and therefore may change a health care outcome.

Medical thinking or cognition involves an interplay of at least four different thinking strategies: intuition, probabilistic reasoning, pathophysiologic or causal reasoning and the use of rules or heuristics.[1] Each paper presents details on these cognitive processes.

Dawson discusses the common thought processes used by clinical decision makers. Clinical decisions are at risk for all the potential errors and biases known to occur in other types of decision making. Understanding these errors will facilitate developing analytical goals. More importantly, laboratory reports can be formatted with more appropriate decision aids to prevent the common errors in the decision process.

Dawson points out that clinical decision makers frequently overestimate the likelihood of disease in a given patient. Two cognitive biases contribute to this phenomenon: If the negative consequences of an error of omission (e.g., missing a streptococcal throat infection in patient with previous rheumatic symptoms) far outweigh the consequences of the obverse error, the anticipated regret causes one to overestimate the likelihood of streptococcal throat infection in these patients. Similarly, the availability bias causes one to overestimate the probability of the most easily recalled possibility. All laboratories have seen a change in test utilization after a conference or presentation of a problem patient.

Understanding these predictable biases in decision making can guide efforts to define the precision, accuracy and supporting interpretive information necessary to facilitate the desired decision. Will the decision process and

ultimate clinical outcome be improved if the decision maker knows the thyroid stimulating hormone (TSH) result has an analytical uncertainty of 10%? Will the decision process be improved if the decision maker knows this method for glycosylated hemoglobin is predictably 10% higher than the method used in the Diabetes Control and Complications Trial? Will the decision process change if the blunder rate[2-4] is known to be 1 in 800? Will the decision process be improved if the decision maker knows the frequency of positive streptococcal throat culture in children of this age has been approximately 20%? Or that 99% of people previously tested had a percent transferrin saturation less than this patient? Or 99% of clinic patients had an alanine aminotransferase (ALT) less than this patient? Or that the likelihood percentage for an abnormality of this magnitude is 100?

Bergus discusses the possible errors in evaluating the Bayesian predictive properties of a laboratory test. Adequate interpretive data cannot be provided with inadequate test evaluation. The precision and accuracy of the test strongly influence the predictive value and choice of decision levels. Probabilistic reasoning with laboratory data is a cornerstone for the relevance of laboratory testing. Specificity and sensitivity are not fundamental properties of laboratory tests but rather observations of the interaction of tests and tested populations. Will a change in precision or accuracy change the ability of a test to facilitate a correct decision? How can we determine and assure adequate precision and accuracy and demonstrate these properties to the decision makers?

Keffer outlines the biochemical model of disease and the use of well characterized laboratory tests to identify specific pathophysiologic processes. This is causal reasoning at its strongest. We need to strive for more complete understanding of both health and disease to identify more biochemically defined tests. In causal reasoning is usually found a strong correlation between analytical precision and accuracy and the ability to make an accurate clinical decision.

Schectman shows the positive outcomes associated with decision making by predetermined rules. Displaying drug doses and lipid concentrations together facilitates decisions that produce lower blood lipids. Combining the biochemical model and decision rules can be beneficial.

The Discussion

As laboratorians seek to define relevant goals, we must take a broad view. We must facilitate the four different reasoning strategies. Relevance requires traversing the boundaries between pre-analytical and post-analytical factors. Non-laboratorians rightly expect that laboratory quality will be high. We must continue to provide and improve that quality. The workshop discussants believe the major opportunities for quality improvement lie across the boundaries that traditionally enclose the laboratory.

Medical relevance means attaching laboratory results to other data and interpretive information and integrating the data into the care processes. Medical relevance is providing equal quality results in multiple locations and care settings. Two adjectives were prominent in the group discussion: delightful and informative. The laboratory report must be informative enough to prevent judgment errors and delightful to use. Delightful reports allow easy visual interpretation of both the result and the reference information. Delightful reports will integrate laboratory data with other data such as drug doses and prevalence of specific findings. The delightful report format will improve the intellectual quality of decision

making by leading in the desired direction.

Medically relevant means a positive impact on outcomes. We must know both the expectations for outcomes and the outcomes being achieved. Outcomes are quantitatively measurable. Satisfaction with care, cost of care, days lost from work, and days with impaired activities are a few of the relevant outcomes. These outcomes are not easily measured but we must increase our efforts. Only by knowing if a change in laboratory performance is associated with a change in outcomes will we be able to define relevant goals. Do laboratory data plus sound reasoning reduce later care costs? We need to avoid some of the predictable errors. Charge for care is rarely an acceptable quantitative proxy for cost of care. It is a well known cognitive bias that we tend to under-value the outcomes of preventive care. Are we challenged to evaluate the outcome when nothing bad has happened?

Medically relevant goals must be defined through collaboration of multiple stakeholders. Each stakeholder must also be aided and coached to avoid the cognitive errors discussed. The stakeholders' list is long. One stakeholder has frequently argued the non-relevance of many laboratory procedures through Bayesian logic using one laboratory result at a time and concentrating on the value of the positive results. The discussants believed that multivariate approaches with a more appropriate understanding of the value of the negative or normal result would yield an analysis that more accurately reflected clinical decision making.

Research Agenda

The discussants defined four general areas for fruitful future research: First, outcomes measurement and the attribution of outcomes to laboratory information must be better defined. The gaps between expected outcomes and observed outcomes provide a major opportunity to identify relevant new laboratory practices. Second, the cognitive use of laboratory data offers significant opportunities for improvement. Understanding the impact of results on decisions is largely unknown. Will reports with decision aids impact the decisions and outcomes? Can we devise multivariate predictive schemes to evaluate test impact? What is the decision making value in the normal result? Third, many test evaluations are subject to predictable biases. How can we identify these biases and prevent errors in decision making? Fourth, can improved test request systems providing interpretive information in the pre-analytical phase improve test utilization, other resource utilization and outcomes? Progress in these four research areas will move us toward defining medically relevant analytical performance goals. The discussants encourage taking an enterprise-wide or care system-wide view of the relevance of laboratory tests and discover the impact of changes in laboratory performance on the decision making process and outcomes of the care process.

References:

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