

Developing an Agenda for Laboratory Practice Based Research: A Delphi Approach

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Developing an Agenda for Laboratory Practice Based Research on the 2007 Institute Managing for Better Health

▶ CDC-RFA-C107-708

▶ Participants

- PI: Dana M. Grzybicki, M.D., Ph.D.
- Coinvestigator: Stephen S. Raab, M.D.
- CDC Partners: Shahram Shahangian, Ph.D.,
Anne Pollock

Project activities

- ▶ 2007 Institute on Critical Issues in Health Laboratory Practice: Managing for Better Health
- ▶ Identify quality gaps and critical deficiencies in healthcare information
- ▶ Develop a health laboratory research agenda using an electronic modified Delphi method
- ▶ Prepare a white paper evaluating the agenda and the method

Activity 1: 2007 *Institute*

► Structure

- September 24, 25, 2007, Atlanta
- Approximately 100 invitees
- Wide variety of stakeholders

► For each of three themes, 2007 *Institute* participants defined

- Current and ideal states of laboratory service practice
- identified gaps between the current and ideal states
- Suggested action plans necessary to address the gaps currently separating participants' perceptions of the current and ideal states of laboratory medicine practice

2007 *Institute*

► Themes:

- Advancing collaborative care, or ways to enhance communication and collaboration of providers of laboratory services and consumers, other providers and users of laboratory services, and payers
- Measures of quality, or ways to define quality parameters that will link laboratory service performance with patient outcomes
- Preparing for the future, or ways that laboratory medicine is expected to contribute to the future of health care

2007 *Institute*

► Goals:

- Lay the foundation for strategies to identify and plan immediate actions to optimally use laboratory medicine to improve services
- Develop a 5- to 10-year strategic plan to address the broader roles that laboratory medicine must assume to ensure safe and effective care and improved patient outcomes for all Americans

2007 *Institute*

- ▶ Outcomes to be developed:
 - Identification of unmet challenges
 - Identification of steps to meet challenges
 - Launching an agenda for change
- ▶ Source material for project gap analysis:
 - Written background and *Institute* syllabus material
 - Audiotapes
 - Field notes
 - Breakout group written notes

2007 *Institute*

- ▶ Laboratory medicine quality gaps and potential action plans (n = 40) were classified into one of the six Institute of Medicine (IOM) characteristics of quality:
 - Safety
 - Effectiveness
 - Patient centeredness
 - Timeliness
 - Efficiency
 - Equity

2007 *Institute*

▶ Gap

- Insufficient integration of lab information systems with clinical information systems
- Quality domain: Safety
- Collaborative care group
- Plan: Meet effectively at the table with industry and business IT professionals to collaborate on the adoption/integration of applications already being developed, tested, and/or used

2007 *Institute*

▶ Gap

- Lack of evidence based performance measures
- Quality domain: Effectiveness
- Measures Group
- Plan: Investment of financial and human resources to develop evidence-based performance indicators using previously used and well-described health services research methods

Activity 2: identification of quality gaps

- ▶ Targeted literature review on the information compiled at the 2007 *Institute*
 - Project team completed review of medical and grey literature
 - Additional information obtained from CDC sources
- ▶ Electronically administered needs assessment survey

Needs assessment survey

- ▶ Expert panel composed of laboratory personnel, clinicians, clinician extenders, educators, health services researchers, administrators, payers, patients, patient advocates, and funding agency representatives
- ▶ Different surveys designed for different stakeholder groups
- ▶ Categorical responses analyzed descriptively and open ended questions analyzed with content analysis

Activity 3: Delphi method

- ▶ The Delphi method is a systematic, interactive forecasting method that relies on a panel of independent experts
- ▶ Carefully selected experts answer questionnaires in two or more rounds. After each round, a facilitator provides an anonymous summary of the experts' forecasts from the previous round as well as the reasons they provided for their judgments





Delphi method

- ▶ Participants are encouraged to revise their earlier answers in light of the replies of other members of the group
- ▶ It is believed that during this process the range of the answers will decrease and the group will converge towards the "correct" answer
- ▶ The process is stopped after a pre-defined stop criterion (e.g. number of rounds) and the mean or median scores of the final rounds determine the results

Delphi method

- ▶ The Delphi method was developed at the beginning of the cold war to forecast the impact of technology on warfare
- ▶ In 1946, the Douglas Aircraft company started Project RAND to study "the broad subject of inter-continental warfare other than surface"
- ▶ Delphi method was developed by Project RAND during the 1950-1960s (Helmer, Dalkey, and Rescher)

Delphi method characteristics

- ▶ The initial contributions from the experts are collected in the form of answers to questionnaires and their comments to these answers
- ▶ Participants comment on their own forecasts, the responses of others and on the progress of the panel as a whole. At any moment they can revise their earlier statements
- ▶ In regular group meetings participants tend to adhere to stated opinions and often conform too much to a group leader

Delphi method characteristics

- ▶ Usually all participants maintain anonymity
- ▶ Anonymity lessens participants from using their authority or personality, frees participants to some extent from their personal biases, minimizes the "bandwagon effect" or "halo effect," allows participants to freely express their opinions, and encourages open critique and admitting errors by revising earlier judgments

Delphi method

- ▶ First applications of the Delphi method were in the field of science and technology forecasting
- ▶ The objective of the method was to combine expert opinions on likelihood and expected development time, of the particular technology, in a single indicator
- ▶ One of the first such reports, prepared in 1964 by Gordon and Helmer, assessed the direction of long-term trends in science and technology development

UCD/CDC Delphi method

- ▶ Anonymity by creation of a password protected Web tool
- ▶ Creation of “statements” of critical research necessary to fill gaps
- ▶ Selection of participants (33)
- ▶ Iterative approach to ranking statements (three rounds)

Web tool

- ▶ Initial 50 statements with brief explanations
- ▶ Likert scale 1-10 classifying importance as a topic of study
- ▶ Area for comments on individual statements
- ▶ Ability to review and reclassify
- ▶ Data tables for statistical analysis

Creation of statements

- ▶ 50 statements created by the project team
- ▶ Reviewed by expert panel
- ▶ Reviewed by CDC
- ▶ Examples:
 - Perform cost effectiveness analysis of laboratory services
 - Determine how critical value reporting affects patient care
 - Evaluate how test reporting failures affect patient care

Round 1 results

Statement	Rank	Mean
Evaluate the frequency of lab test result misinterpretation by clinicians and the negative impact on health outcomes	1	7.24
Determine how the use of specific lab medicine quality indicators affects patient outcomes	2	6.79
Develop evidence-based lab performance measures	3	6.68
Determine how the reorganization of lab reimbursement may affect quality of care	4	6.31

Round 1 results

- ▶ The top 18 statements (mean > 5.75, median 5.5) were moved to Round 2
- ▶ Participants reviewed comments for each statement, reviewed their Rank 1 score, and mean and median score
- ▶ Participants rescored each of the 18 statements

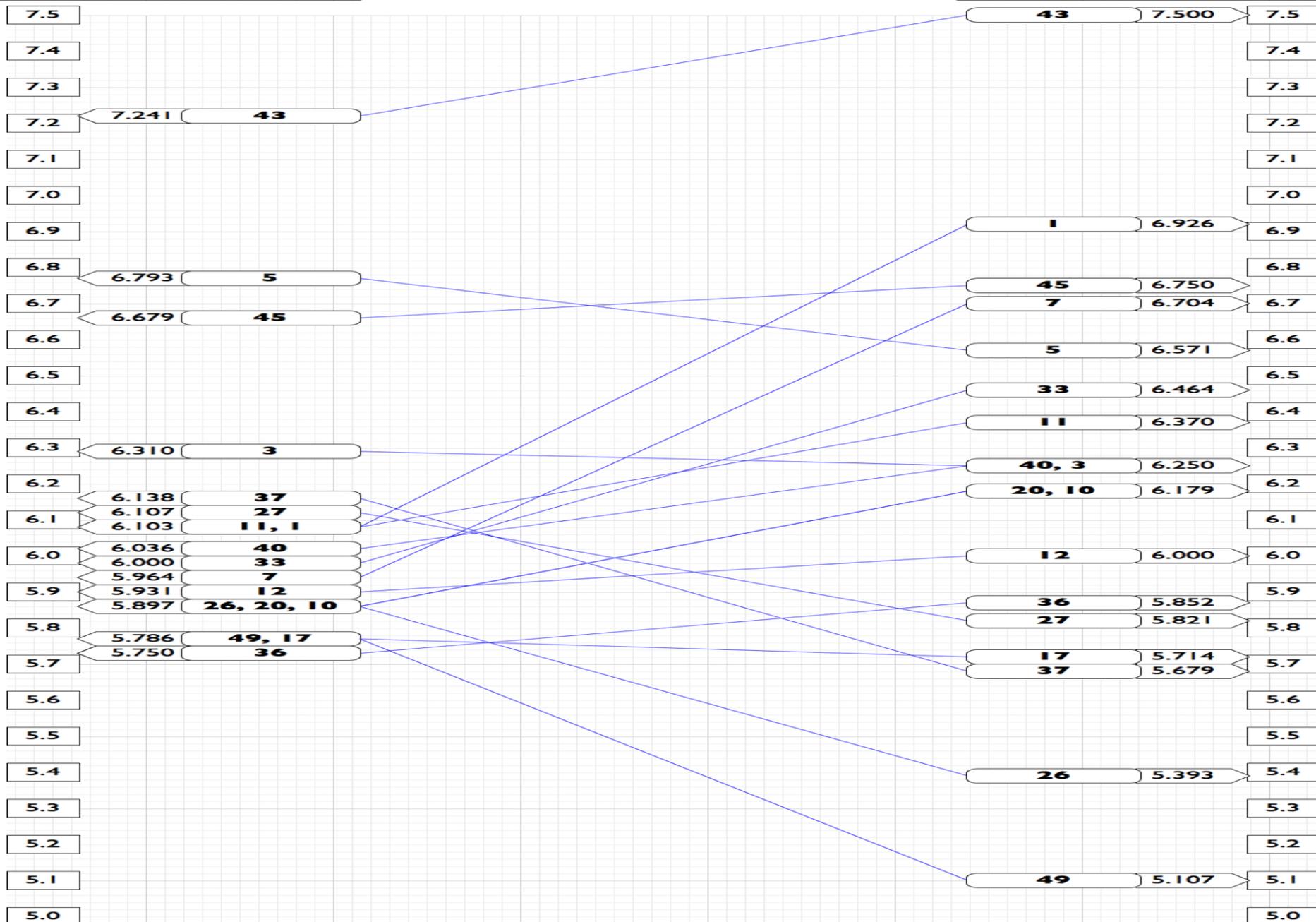
Round 2 results

Statement	Rank	Mean
Evaluate the frequency of laboratory test misinterpretation by clinicians and the negative impact on health outcomes	1 (1)	7.50
Develop standardized measures of error in anatomic pathology	2 (8)	6.93
Develop evidence based laboratory performance measures	3 (3)	6.75
Determine how barriers to national standardization may be removed	4 (11)	6.70

CDC Delphi - Round 1 to Round 2 Results

Round 1 Ranking

Round 2 Ranking



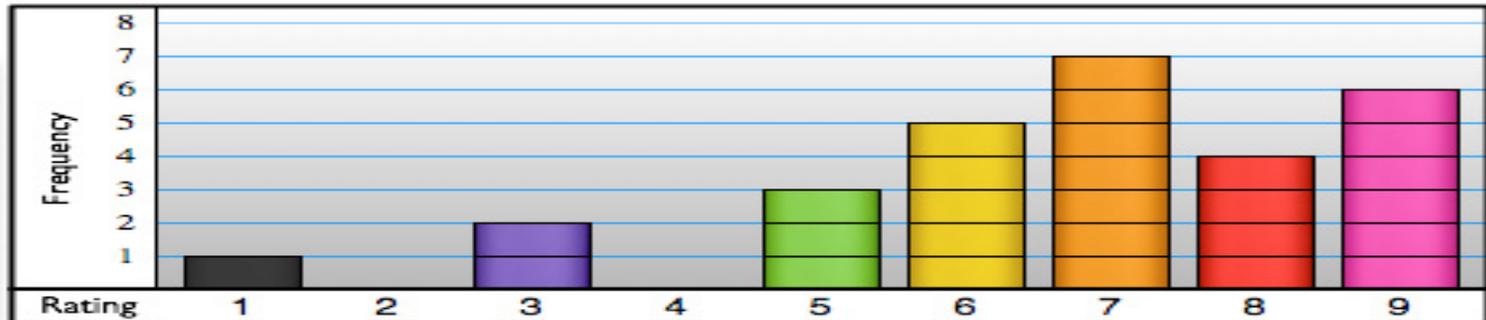
Round 3 results

Statement	Rank	Mean
Evaluate the frequency of laboratory test misinterpretation by clinicians and the negative impact on health outcomes	1 (1, 1)	7.67
Develop standardized measures of error in anatomic pathology	2 (8, 2)	7.19
Develop evidence based laboratory performance measures	3 (3, 3)	7.05
Determine how the use of specific lab medicine quality indicators affects patient outcomes	4 (2, 5)	6.81

Develop evidenced-based laboratory performance measures.

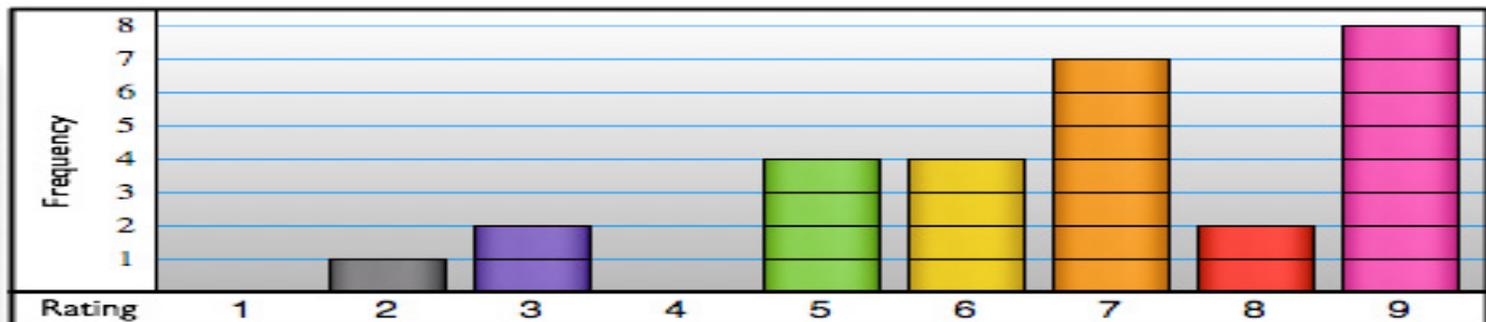
Round 1

Rank	3
N	28
Mean	6.679
Median	7
Min	1
Max	9
Std Dev	2.019
Variance	4.078



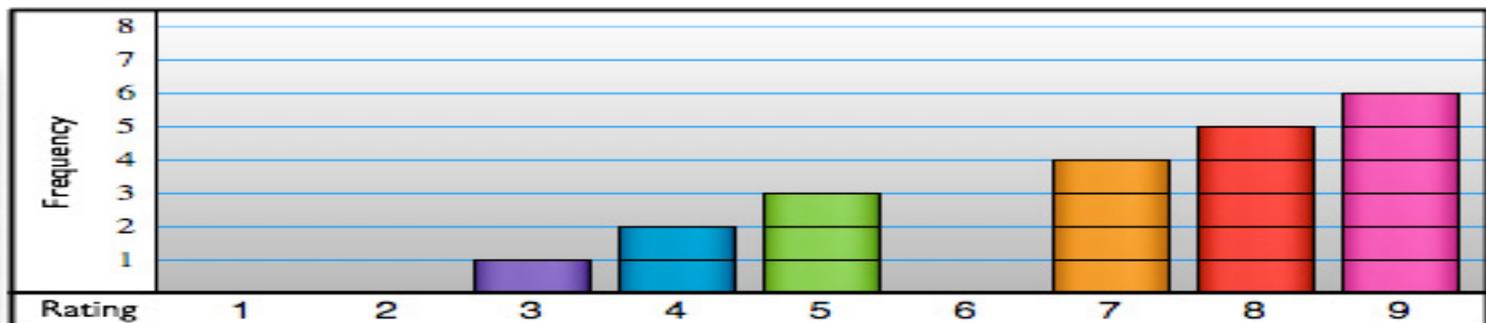
Round 2

Rank	3
N	28
Mean	6.750
Median	7
Min	2
Max	9
Std Dev	2.012
Variance	4.046



Round 3

Rank	3
N	21
Mean	7.048
Median	8
Min	3
Max	9
Std Dev	1.936
Variance	3.748

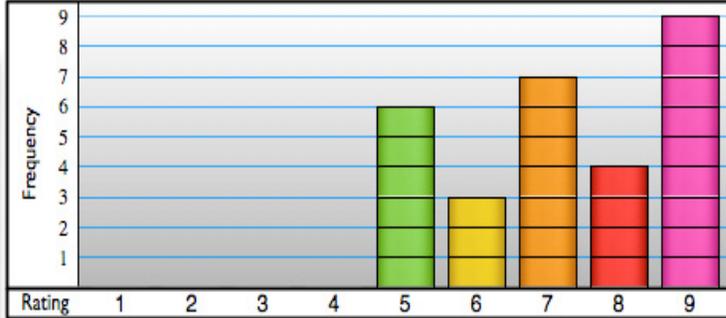


Topic 43CDC Delphi - Final Rank **1**

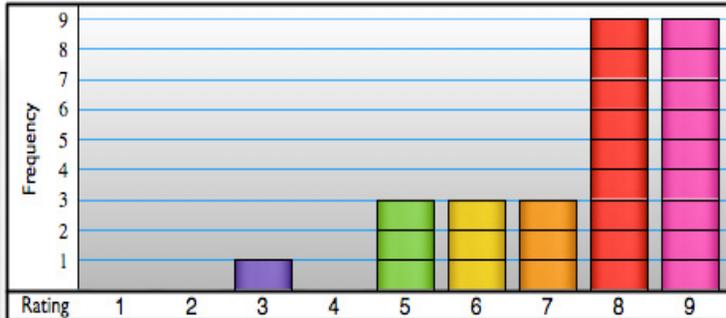
Evaluate the frequency of laboratory test result misinterpretation by clinicians and the negative impact on health outcomes.

Round 1

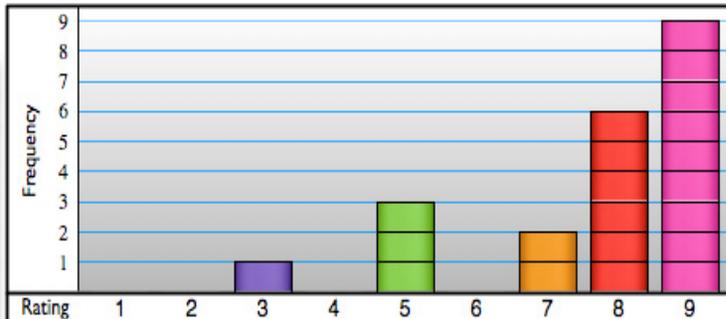
Rank	1
N	29
Mean	7.241
Median	7
Min	5
Max	9
Std Dev	1.527
Variance	2.333

**Round 2**

Rank	1
N	28
Mean	7.500
Median	8
Min	3
Max	9
Std Dev	1.599
Variance	2.556

**Round 3**

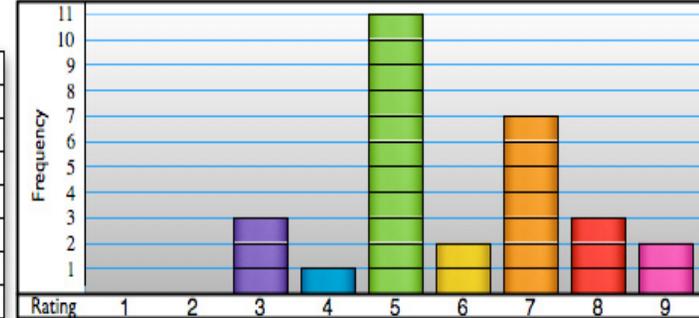
Rank	1
N	21
Mean	7.667
Median	8
Min	3
Max	9
Std Dev	1.742
Variance	3.033

**Topic 20**CDC Delphi - Final Rank **5**

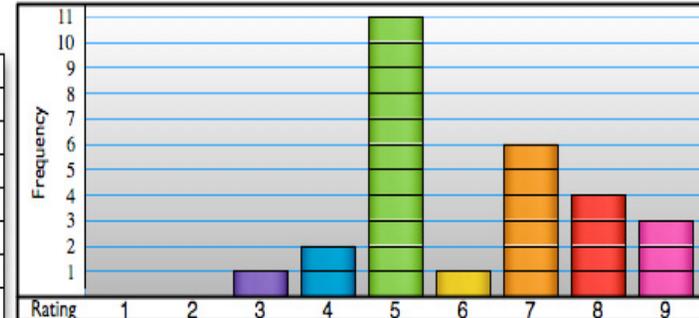
Develop and evaluate the utility of multi-institutional longitudinal tracking of quality assurance measures. Quality assurance measures may include blood culture contamination rates and/or critical value reporting.

Round 1

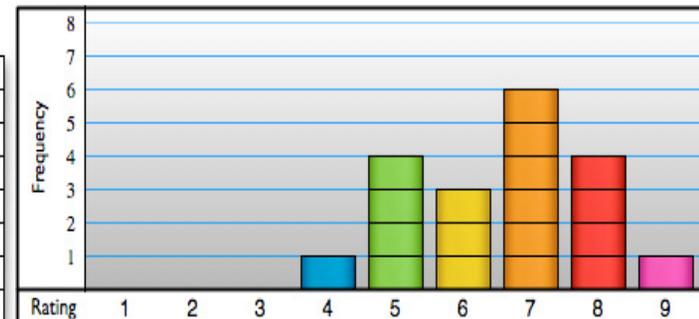
Rank	14
N	29
Mean	5.897
Median	5
Min	3
Max	9
Std Dev	1.676
Variance	2.810

**Round 2**

Rank	10
N	28
Mean	6.179
Median	5.5
Min	3
Max	9
Std Dev	1.679
Variance	2.819

**Round 3**

Rank	5
N	19
Mean	6.579
Median	7
Min	4
Max	9
Std Dev	1.346
Variance	1.813



Additional analyses

- ▶ Content analysis of comments
- ▶ Participants (e.g., Lab personnel versus non-lab personnel)
- ▶ IOM quality domains
- ▶ Testing phase
- ▶ Delphi process
 - Changes in rank order
 - Drivers of change

Questions



References

- ▶ Linstone HA, Turoff M. Editors Linstone & Turoff (1975). *The Delphi Method: Techniques and Applications*.
- ▶ Sackman, H. *Delphi Assessment: Expert Opinion, Forecasting and Group Process*, R-1283-PR, April 1974.
- ▶ Brown T. *An Experiment in Probabilistic Forecasting*, R-944-ARPA, 1972 .
- ▶ Brown BB. Delphi Process: A Methodology Used for the Elicitation of Opinions of Experts. (Document No: P-3925, 1968).
- ▶ Rowe G, Wright G. The Delphi technique as a forecasting tool: issues and analysis. *International Journal of Forecasting*, Volume 15, Issue 4, October 1999.
- ▶ Rowe G, Wright G. Expert Opinions in Forecasting. Role of the Delphi Technique. In: Armstrong (Ed.): *Principles of Forecasting: A Handbook of Researchers and Practitioners*. Boston: Kluwer Academic Publishers, 2001.
- ▶ Rescher N. *Predicting the Future*. Albany, NY: State University of New York Press, 1998.