Implementing the Information Quality Survey: A Case Study

Baseline vs. Follow-Up Results of an IQ Survey for the Cedars-Sinai Health System

Alein T. Chun, Ph.D., M.S.P.H.
Manager, Data & Methods Section
Alein.Chun@cshs.org

Bruce N. Davidson, Ph.D., M.P.H.
Director
Bruce.Davidson@cshs.org

Resource & Outcomes Management Department
Cedars-Sinai Health System
Los Angeles, CA

Abstract This paper describes the implementation of the Information Quality (IQ) Survey at a large academic medical center. First, the current IQ context is described, including the adaptation of the IQ Survey to meet the specific requirements of the context. Then, the baseline and follow-up administrations are characterized in terms of the subjects, respondents, and results. Special attention is devoted to a comparison of the baseline and follow-up survey results in relation to evaluating the impact of IQ improvement initiatives underway. Generally, the IQ Survey, as adapted here, was found to exhibit a considerable degree of face validity, and appeared to provide results which were consistent with expectations, thereby establishing credibility with leadership. In conclusion, the IQ Survey will continue to be utilized on a longitudinal basis in this context to provide trended data tracking changes in the perception of IQ improvement efforts by data producers, data custodians, and data users.

1. Cedars-Sinai Health System

The Cedars-Sinai Health System is made up of an 875-bed academic medical center plus affiliated physician groups, outpatient clinics, and the full range of post-acute services, including skilled nursing beds, a separate rehabilitation unit, and a home healthcare agency. The medical center is the largest non-profit hospital in the western United States, with an annual volume of about 50,000 inpatient admissions, including deliveries, and 150,000 outpatient and emergency room visits.

In this setting, as in most major hospital-centered healthcare delivery entities, the data derived from operational transaction systems (Admission, Discharge, and Transfer; Medical Records; Patient Billing; Laboratory; Pharmacy; etc.) feeds into strategic analyses and to external review agencies. This data has

essentially been regarded as a byproduct of the provision of care to patients and of secondary importance. Moreover, in many ways, the 'gold standard' means of data transmission in healthcare is essentially an illuminated manuscript in the form of the patient's medical record. Now, however, many strategically important initiatives (such as clinical quality and efficiency improvement, business development analyses, required regulatory and governmental reports, etc.) are seen to be at risk because the data used to monitor and support these organizational processes have been recognized to be incorrect or incomplete or otherwise faulty to some degree.

Not only does the current level of data quality compromise the ability of the organization to operate successfully in a competitive managed care environment, but it also places it at risk of being subject to audit by external agencies such as the Office of the Inspector General and the Joint Commission on Accreditation of Healthcare Organizations. Recognizing that data is a valuable corporate asset, leadership concluded that the strategic use of data from diverse internal transaction system sources demands intelligent and disciplined management of data quality. Administrative leadership has been successful in introducing and nurturing a customer-oriented accountability system with a big focus on measurable continuous improvement in the last six to eight years, so addressing these information quality issues was framed in this CQI context, and IQ goals were included as part of the annual planning process beginning with the 1997-1998 fiscal year.

2. IQ Context at Cedars-Sinai

The administration of the IQ Survey for the Cedars-Sinai Health System was sponsored by the Data Provider Group, a multi-departmental working group convened to address ongoing data discrepancies. The Data Provider Group was chartered by the CEO during the latter part of the 1996-1997 fiscal year to address ongoing discrepancies observed in analyses produced by different departments using different databases that supposedly contained the same information.

The Data Provider Group is chaired by the Senior Vice Presidents of Medical Affairs and of Finance.

The membership includes the Vice Presidents of Medical Affairs, Information Systems, and Finance, as well as representatives from the following Departments: Information Systems, Resource & Outcomes Management, Health Information/Medical Records, Patient Accounting, Cost Accounting, Budget, and Reimbursement. In the 1997-1998 institutional goals, a specific accountability had been established for the Data Provider Group to coordinate the production of a basic set of on-line management reports, with the measure of success being an increase in the level of "satisfaction" with the management reports throughout the health system. The Data Provider Group decided to use the IQ Survey to measure this, and decided to establish a baseline assessment for all "data users" throughout the health system with the first administration of the IQ Survey in December 1998.

When the administration of the IQ Survey was announced at management meetings, and in the cover memo accompanying it, it was presented as one part of Cedars-Sinai's ongoing effort to improve information quality. Thus far, the changes had been well received and so the IQ Survey was introduced in an atmosphere of credibility.

Since March 1997, in an effort to create a more customer-oriented and efficient Information Systems function, the Senior Vice President had been restructuring that function and communicating regularly with the management group about these changes. These changes included: a new oversight system for IS governance made up of multidepartmental committees of IS customers; a new, systematic approach to evaluating all Information System acquisitions; the systematic replacement of outdated hardware and software, including making PCs more widely available and establishing a common e-mail and calendar-scheduling system; the construction of an institutional intra-net for the on-line distribution of various kinds of information; the construction of a new ORACLE data warehouse, and the implementation of a new generic data query/report-writing tool for data analysis; the design and implementation of a basic set of management reports accessible on-line; and the establishment of plan to systematically identify, monitor, and address data quality problems.

3. The Survey: Instrumentation and Administration

The purpose of IQ Survey is described as an evaluation of "the extent to which our information is 'fit for use' for data-driven decision-making processes." Senior leadership has requested reporting in the form of a "Dashboard" using an annotated trend chart to document the impact over time of information quality improvement projects on perceptions of information quality. We plan to use a single aggregated measure derived from the IQ Survey scores at each adminstration, graphed to show trends over time, and annotated to indicate the times at which information quality improvement projects are initiated.

The survey is to be administered periodically, with a goal of finding a frequency that would balance between providing the ability to evaluate the impact of specific improvement projects, and being too burdensome on the survey subjects. A frequency of every six months has been selected initially by the Data Provider Group, so after the baseline of December 1998, the first follow-up survey was sent out in May 1999. The plan at this time is to send out additional waves of the survey two times per year.

Particularly to meet the need of the Data Provider Group for a measure of "satisfaction with management information" at this time, the subject pool is defined as "data users," including analysts who use the data to prepare reports as well as members of the management team who use reports to make decisions. The other two sets of constituents in the data production model, "data producers" and "data custodians," will be wrapped into the survey process at a later date. Also, since we included "data users" across the health system, we asked them to respond on the basis of the report or database they used most frequently, and to write in the name of that report or database.

We adapted the MIT TDQM IQ Survey for this purpose. We used the basic structure, retaining three basic sections (Background Information, Information Quality Assessment, and Information Importance Rating) but we modified it to reduce the number of items and to simplify the response options. Our pilot tests of the original instrument showed excessive respondent burden and poor response rates.

We reduced the number of items by collapsing the original sixteen information quality dimensions

to eight, and by reducing the number of items used to assess each dimension to only two, yielding a battery of only 16 items for the Information Quality Assessment. We conducted focus groups of typical employee respondents and found considerable face validity in combining certain IQ dimensions. It was extremely difficult for these subjects to distinguish the difference between eight pairs of IQ dimensions, and so we collapsed the framework to the following: accessibility, believability, completeness, conciseness, easy to understand, free of error, timeliness, and value-added. In addition, using more than 2 items per dimension in the Assessment battery was seen to be excessively repetitive and burdensome.

We also simplified the response scale from 10 response options to five. This is more in keeping with other surveys used in healthcare, and also has been to be the simplest scale that still preserves desirable response distribution patterns.

4. Baseline Survey: Subjects, Respondents, Results

The baseline IQ Survey was sent to "information users" throughout the Cedars-Sinai Health System, including 51 analysts who use data to prepare reports and 222 members of the management team who use reports to make decisions. Overall, the response rate was 51% (138/273). The breakdown of respondents was 48 upper management, 63 lower management, and 27 analysts.

In evaluating the results of the baseline survey, three same dimensions were consistently rated most important by all respondents: believability, free of errors, and timeliness. The three dimensions most needing improvement were also consistently chosen by all respondents: accessibility, completeness, timeliness.

5. Follow-Up Survey: Subjects, Respondents, Comparison to Baseline

The follow-up survey was sent to a subset of "information users," 79 members of the upper management team who use reports to make decisions, defined as Directors and above. A response rate of 31.6% (25/79) was achieved for this administration. The analysis comparing baseline to follow-up results was thus performed by comparing the upper management respondents from the baseline adminstration

with all respondents from the follow-up administration.

5. What We Learned So Far

These comparisons have provided us with a number of new insights. First of all, we did observe an overall gain in an aggregated assessment score. In addition, there were gains in the assessment scores for several particular dimensions. The biggest gains were observed in accessibility, completeness, and timeliness.

We were also able to make distinctions in response patterns among several divisions. On this basis, respondents from the Clinical Care Services division show less improvement than other respondents to date in the timeliness dimension, and respondents from the Medical Network Services division show less improvement than other respondents to date in the accessibility and believability dimensions.

Finally, and of particular interest to the Data Provider Group, we observed favorable trends in the limited number of respondents who self-identified as using the new online management reports.

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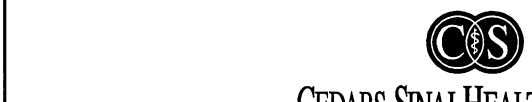

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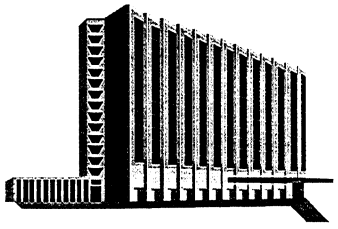
CEDARS-SINAI HEALTH SYSTEM.

OVERVIEW

- Cedars-Sinai Health System
- IQ Context at Cedars-Sinai
- Baseline Survey: Subjects, Respondents, Results
- Follow-Up Survey: Subjects, Respondents, Comparison to Baseline
- What We Learned So Far

CEDARS-SINAI HEALTH SYSTEM.

- 875 Bed Academic Medical Center plus Affiliated MD Groups, Clinics, and Post-Acute Services
- Largest Non-Profit Hospital in the Western US
- Basic Statistics
  - 50,000 inpatients/deliveries
  - 150,000 outpatients/ER visits



WHO SPONSORED THE IQ SURVEY AT CEDARS-SINAI?

The Data Provider Group

- Convened and chartered by CEO about 2 yrs ago to address ongoing data discrepancies
- Chaired by SrVP's of Medical Affairs and Finance
- Includes VPs of Medical Affairs and Finance, as well as representatives from the following Departments: IS, Resource & Outcomes Management, Health Information/Medical Records, Patient Accounting, Cost Accounting

BASIC APPROACH FOR FIELDING THE IQ SURVEY AT CEDARS-SINAI

- Presented as one part of Cedars-Sinai's ongoing effort to improve information quality.
- Baseline established in 12/98 of the extent to which our information is "fit for use" for data-driven decision-making processes.
- Follow-up sent out 5/99 to evaluate impact of improvement projects to date.
- Plan to send additional waves 2x per year and create trended data display.

CONTEXT: ONGOING IQ IMPROVEMENT PROJECTS

- New on-line management reports
- New ORACLE data warehouse
- New generic data query/report-writing tool
- New, systematic approach to evaluating all Information System acquisitions
- Establishment of plan to identify, monitor, and address data quality problems

PLAN FOR CEDARS-SINAI DATA QUALITY MANAGEMENT

- Data Quality Working Group
  - Chartered by Senior Management through Data Provider Group
- Indicators of Data Quality
  - Requested as part of organizational performance improvement dashboard
- Data Model & Data Dictionary
  - DQ being built into redesigned systems

DATA QUALITY WORKING GROUP

Charge & Membership

- Assure that Cedars-Sinai's data is "fit for use" for our decision-making requirements
- Representation from data producers, data custodians, and data users
- Chaired by Resource & Outcomes Management as institutional "Super-Users"

DATA QUALITY WORKING GROUP

Basic Functions

- Establish routine processes to identify, track and resolve data problems
- Establish both objective and subjective indicators of data quality
- Measure these indicators and produce routinely updated and trended dashboards

WHAT DOES THE CEDARS-SINAI IQ SURVEY COVER?

- Part I: Background Information
  - Role and Primary Database or Report
- Part II: Information Quality Assessment
  - Indicate extent of agreement with 16 statements about 8 dimensions of Information Quality
- Part III: Information Importance Rating
  - Indicate degree of importance of each dimension of Information Quality

THE EIGHT DIMENSIONS OF INFORMATION QUALITY WE USED

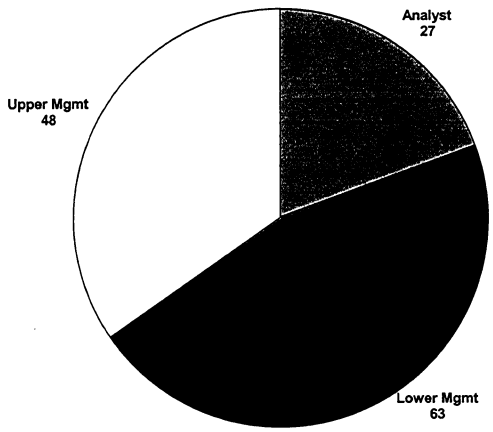
- Accessibility
- Believability
- Completeness
- Conciseness
- Easy to Understand
- Free of Error
- Timeliness
- Value Added

WHO RECEIVED THE BASELINE INFORMATION QUALITY SURVEY?

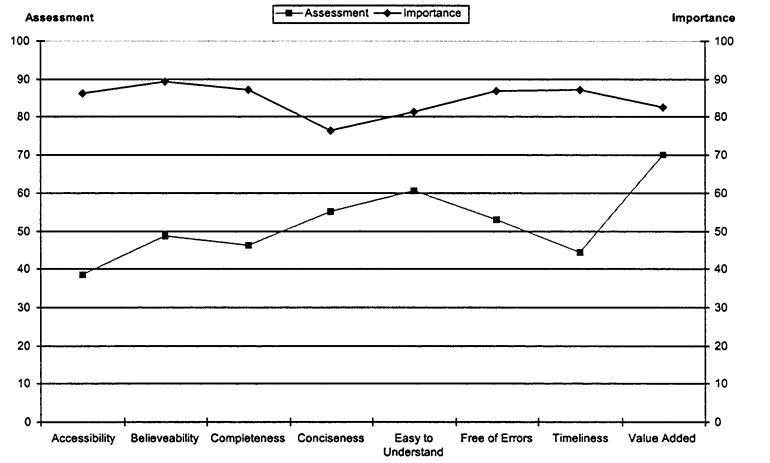
"INFORMATION USERS"

- 51 analysts who use data to prepare reports
- 222 members of the management team who use reports to make decisions
- Overall response rate of 51% (138/273)

PROFILE OF RESPONDENTS TO BASELINE IQ SURVEY



Baseline Results
Overall (138)



Baseline Conclusions

SIMILAR PATTERN FOR ALL RESPONDENTS

- 3 Dimensions Rated Most Important
  - Believability, Free of Errors, Timeliness
- 3 Dimensions Rated Most Needing Improvement
  - Accessibility, Completeness, Timeliness

WHO RECEIVED THE FOLLOW-UP INFORMATION QUALITY SURVEY?

"UPPER MANAGEMENT INFORMATION USERS"

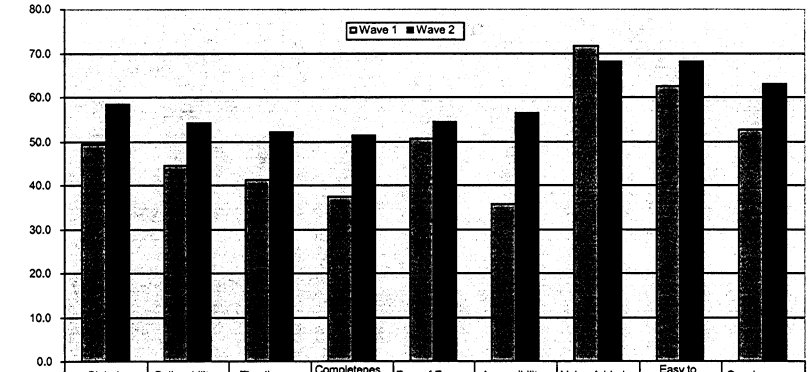
- 79 members of the upper management team who use reports to make decisions, defined as Directors and above
- Response rate of 31.6% (25/79)

Baseline vs Follow-Up: Upper Management Survey Subjects

Baseline (November 1998) Subject Profile:				Follow-Up (May 1999) Subject Profile:			
Division	Response	Non-Response	Response Rate	Division	Response	Non-Response	Response
Clinical Care S	19	9	67.9%	Clinical Care S	11	15	42.3
Medical Affairs	7	9	43.8%	Medical Affairs	8	7	53.3
MNS	8	7	53.3%	MNS	3	10	23.1
Finance	3	4	42.9%	Finance	2	4	33.3
Academic Affairs	3	3	50.0%	Academic Affairs	0	6	0.0
System Development	2	3	40.0%	System Development	0	5	0.0
Human Resources	2	2	50.0%	Human Resources	1	3	25.0
Other	0	4	0.0%	Other	0	4	0.0
Unknown	3						
Total	47	38*	55.3%	Total	25	54	31.6
* Adjusted for "Unknown" area respondents.							

Baseline vs Follow-Up:
<u>All</u> Upper Management Responses

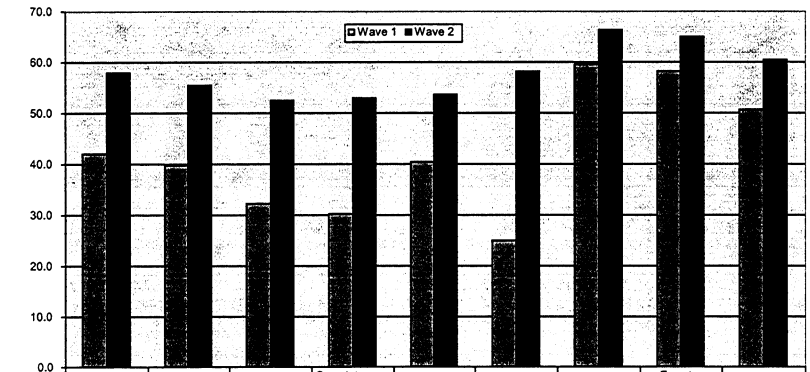
Wave 1 (n=47) & Wave 2 (n=25)



	Global	Believability	Timeliness	Completeness	Free of Errors	Accessibility	Value Added	Easy to Understand	Conciseness
Wave 1	49.4	44.6	41.3	37.5	50.5	35.6	71.7	62.5	52.7
Wave 2	58.5	54.1	52.1	51.5	54.5	56.5	68.1	68.1	63.1

Baseline vs Follow-Up:
<u>Matched</u> Upper Management Responses

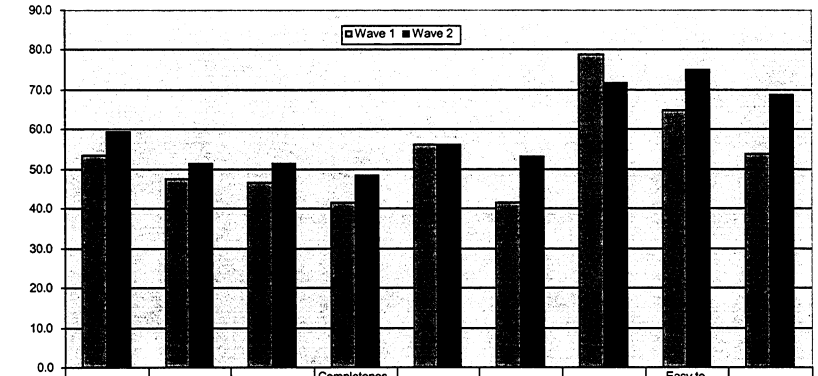
Waves 1 & 2 Matched Results (n=17)



	Global	Believability	Timeliness	Completeness	Free of Errors	Accessibility	Value Added	Easy to Understand	Conciseness
Wave 1	42.0	39.7	32.4	30.1	40.4	25.0	59.6	58.1	50.7
Wave 2	57.9	55.4	52.4	52.9	53.6	58.1	66.4	64.9	60.5

Baseline vs Follow-Up:
<u>One-Survey</u> Upper Management Responses

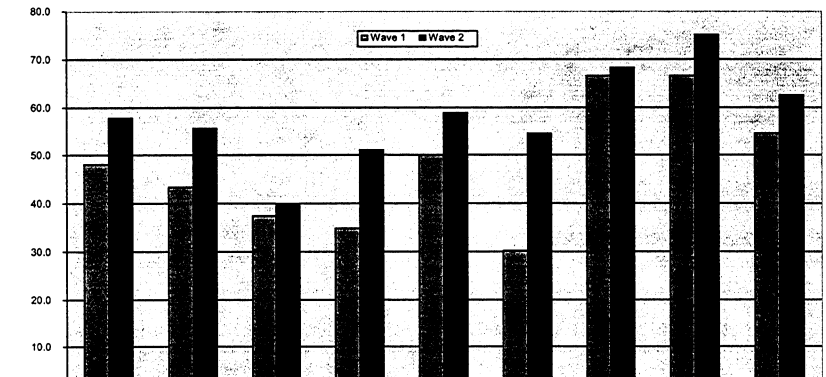
Wave 1 (n=30) & Wave 2 (n=8)



	Global	Believability	Timeliness	Completeness	Free of Errors	Accessibility	Value Added	Easy to Understand	Conciseness
Wave 1	53.6	47.4	46.6	41.7	56.3	41.7	78.9	65.0	53.8
Wave 2	59.6	51.6	51.6	48.4	56.3	53.1	71.9	75.0	68.8

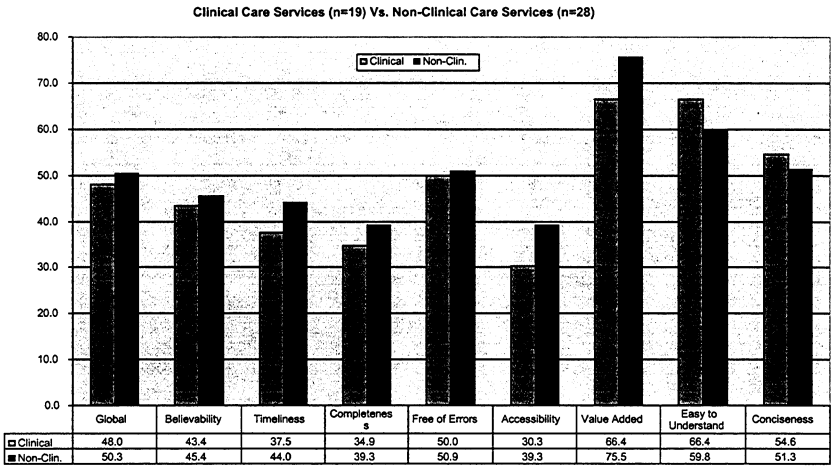
Baseline vs Follow-Up:
<u>Clinical Care</u> Upper Management Responses

Wave 1 (n=19) & Wave 2 (n=11)



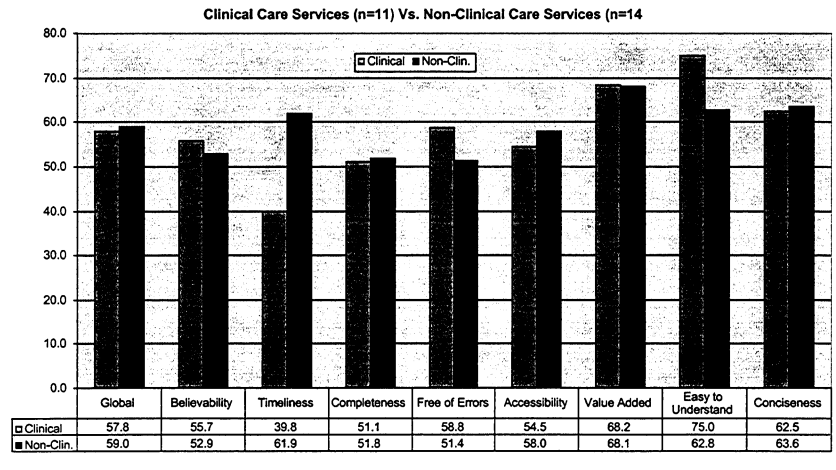
	Global	Believability	Timeliness	Completeness	Free of Errors	Accessibility	Value Added	Easy to Understand	Conciseness
Wave 1	48.0	43.4	37.5	34.9	50.0	30.3	66.4	66.4	54.6
Wave 2	57.8	55.7	39.8	51.1	58.8	54.5	68.2	75.0	62.5

Baseline: Clinical Care vs Non-Clinical Care Upper Management Responses



	Global	Believability	Timeliness	Completeness	Free of Errors	Accessibility	Value Added	Easy to Understand	Conciseness
Clinical	48.0	43.4	37.5	34.9	50.0	30.3	66.4	66.4	54.6
Non-Clin.	50.3	45.4	44.0	39.3	50.9	39.3	75.5	59.8	51.3

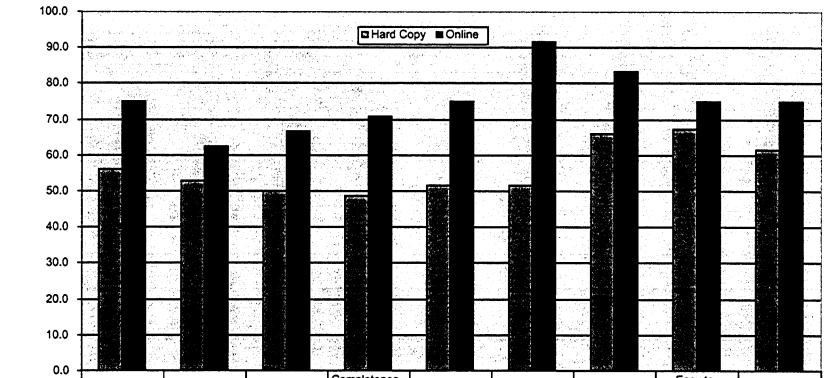
Follow-Up: Clinical Care vs Non-Clinical Care Upper Management Responses



	Global	Believability	Timeliness	Completeness	Free of Errors	Accessibility	Value Added	Easy to Understand	Conciseness
Clinical	57.8	55.7	39.8	51.1	58.8	54.5	68.2	75.0	62.5
Non-Clin.	59.0	52.9	61.9	51.8	51.4	58.0	68.1	62.8	63.6

Follow-Up: Hard-Copy vs Online User Upper Management Responses

Hard Copy User (n=22) & Online User (n=3)



	Global	Believability	Timeliness	Completeness	Free of Errors	Accessibility	Value Added	Easy to Understand	Conciseness
Hard Copy	56.2	53.0	50.2	48.9	51.5	51.7	66.1	67.2	61.5
Online	75.0	62.5	66.7	70.8	75.0	91.7	83.3	75.0	75.0

Conclusions: Baseline vs Follow-Up IQ Surveys

- Overall gain in global and dimension scores
  - Biggest gains in "Accessibility," "Completeness," and "Timeliness"
- Opportunities remain in specific divisions
  - Clinical Care Services, "Timeliness"
  - MNS, "Accessibility" and "Believability"
- Favorable trends seen in limited online adopters