

Consensus Building for Public Reporting on Hospital Readmission

NAHDO's Consensus Report for Coordinating State and Community-based Quality Reporting

Supported by grants from the Agency for Healthcare Research and Quality to NAHDO and the Centers for Disease Control and Prevention to the Rocky Mountain Center for Translational Research on Public Health Informatics

December 2009

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THE NATIONAL ASSOCIATION OF
HEALTH DATA ORGANIZATIONS



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Acknowledgements

This project was supported by grant number 1R13HS017684-01 from the Agency for Healthcare Research and Quality to the National Association of Health Data Organizations (P.I. Denise Love). The content is solely the responsibility of the authors and does not necessarily represent the official views of the Agency for Healthcare Research and Quality. This manuscript was also supported by the Centers for Disease Control and Prevention grant (P01 CD000284) to Utah Research Center of Excellence in Public Health Informatics (P.I. Matthew Samore). No official endorsement by any agency of the federal or state governments is intended or should be inferred. The authors thank all presenters and panelists: Elizabeth Eastman, Marybeth Farquhar, Barry Friedman, Bernard Friedman, Norbert Goldfield, Adrian F. Hernandez, Stephen Jencks, Don Kennerly, Michael Lundberg, Karen Milgate, Michael Pine, Amy Rosen, Barbara Rudolph, Ron Sawdey, Josie Williams, Flossie Wolf, and Wu Xu, who contributed to the success of the conference; and Amy Rosen, Abate Mammo, Mike Martin, Carol Masheter, Sam Hohmann, Jill Miyamura, and Elizabeth Eastman for their review and comments on the draft manuscript.

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Suggested Citation:

Xu, W., E. Sullivan, B.A. Rudolph, J. Bott, M.T. Lundberg, S. McBride, D. Love. 2009. Consensus Building for Public Reporting on Hospital Readmission, Consensus Report by National Association of Health Data Organizations (NAHDO) published at <http://www.nahdo.org/LinkClick.aspx?fileticket=HEWk2x17cF1%3d&tabid=136>

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ABSTRACT

Consensus building among public reporting entities, providers, policy-makers, and researchers can steer discrete efforts in hospital readmission reporting towards a common goal. We conducted a multi-state consensus assessment on perceptions of readmission measures, methods of linking discharges to admission histories, the public's preferences, and possible unintended consequences. These issues were further discussed at the first national conference on readmissions in 2008. Findings suggest that consensus is needed in understanding that readmissions are a system issue, the value of developing public reporting requirements, agreement on readmission metrics for quality improvement, and technical assistance in data linkage methods and preventing unintended consequences.

INTRODUCTION

Evidence suggests that public reporting¹ on healthcare performance measures encourages quality improvement activity at the hospital level (Fung et al., 2008) and increases consumers' awareness about quality variation among providers (Hibbard, Stockard, and Tusler 2005). Among publicly reported performance measures, hospital readmissions are increasingly a matter of concern for health care policymakers because of the implications for both cost and quality of health care, and burden for patients and families (Friedman and Basu, 2004; Friedman et al., 2009; MedPAC, 2007). Yet, few federal or state agencies or health data organizations publicly report on readmissions because they lack access to unique patient identifiers that are needed for creating patient admission histories. Also, no viable consensus on measures for public reporting exists. This study reports on a nationwide effort to build consensus on public reporting on hospital readmissions.

Public reporting on hospital performance has served as cultural and reputation levers (Berry 2005) for consumers, quality improvement organizations, and policy-makers to mount public pressure on healthcare facilities to strive for quality improvement and reduce cost of healthcare. The Agency for Healthcare Quality and Research (AHRQ) has been leading the development and dissemination of Quality Indicators and providing technical specifications and tools (AHRQ, 2009) to support statewide ongoing public reporting programs. The Robert Wood Johnson Foundation provides funding to the National Association of Health Data Organizations (NAHDO) Quality Workgroup to improve the quality and consistency of reporting hospital care quality measures across states and to promote convergence of national and state quality reporting efforts. Several federal and state agencies, and purchaser or consumer alliances recently began public reporting on hospital readmissions. The Centers for Medicare and Medicaid Services (CMS) completed evidence-based studies on congestive heart failure (CHF), acute myocardial infarction (AMI), and pneumonia readmissions within 30 days of hospital discharge for Medicare beneficiaries. CMS published the hospital Risk Standardized Readmission Rates (RSRR) rate on Hospital Compare, a CMS public reporting website, in June 2009. The Leapfrog Group, a membership group composed of large employers and state employee purchasing organizations, collected self-reported all-cause readmission rates within 14 days from the same hospital on two procedures (Coronary Artery Bypass Graft (CABG), Percutaneous Coronary Intervention) and two clinical conditions (AMI, Pneumonia) in 2008. The readmission rates are used as an inflator to adjust the severity of length of stay and contribute to a composite measure for resource utilization and quality called the "efficiency score" (The Leapfrog Group, 2009 and Robinson, 2008). Both CMS and Leapfrog's readmission measures were recently endorsed by the National Quality Forum, a national non-profit organization for healthcare quality measurement and reporting (NQF, 2009). Convened by NQF, the National Priorities Partners established a goal to reduce 30-day readmission rates in the nation.

States have a long history of conducting public reporting on healthcare access, quality, and cost based on statewide all-payer and all-inpatient discharge databases. Currently 18 states release public reports on hospital performance (NAHDO 2009). Of the 18 states, at least four states released reports on readmissions. Virginia Health Information (VHI) began to release quarterly readmission and transfer files for public use in 1999. Virginia reports 30-day hospital readmission rates along with mortality for three clinical areas: medical cardiology, invasive cardiology, and open heart surgery for all patients (VHI, 2009). Since 1997, the Pennsylvania Health Care Cost Containment Council (PHC4) has

¹ "Public reporting" in this study means to produce publicly available information on healthcare performance by providers (e.g. hospitals) or geographic areas (e.g. states or communities). *Hospital Compare*, a website published by the Centers for Medicare & Medicaid Services, is one of the examples.

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reported 30-day readmission rates in their annual Hospital Performance Reports on 51 common medical conditions. Their measures are risk-adjusted including readmissions for all cause and for complication or infection excluding cases for intermediate hospitalizations and outlier length of stays (PHC4, 2008). Probability of death, predicted length of stay, and patient age are used in their risk-adjustment regression models. The Florida Agency for Health Care Administration started public reporting on 30-day hospital readmission for all causes in 2004. In 2008, Florida published their first comparative hospital readmission on-line reporting using the 3M Health Information Systems' Potentially Preventable Readmission (PPR) software (Goldfield, 2008; Florida-AHCA, ongoing). Florida reported 15-day readmissions for 52 conditions in adult patients, excluding malignancies, multiple trauma, burns, neonatal, obstetrical, and other selected admissions. The New Jersey Department of Health and Senior Services released 30-day and 180-day hospital readmission rates for bariatric surgeries in 2005 (NJ-OHCAQ, 2007) and a summary report on New Jersey 30-day hospital readmissions after CABG surgeries in 1999-2001 (NJ-HCAQ, 2004).

In spite of various state applications, national standards on hospital readmissions are non-existent. In 2005, the NAHDO Quality Workgroup, representing all states that publicly report on healthcare quality, identified hospital readmission as a priority topic for quality reporting. In 2007, representatives from five state health agencies, one state hospital association, and three health informatics firms at the NAHDO Readmission Roundtable agreed that it is imperative to have standard methodology to track readmissions and publish nationally endorsed benchmarks for state comparison. In January 2008, AcademyHealth organized an invitational meeting on readmission trends, best practices, and possible policy levers. Participants agreed that public reporting may be effective in raising awareness of the current high rate of hospital readmissions in the nation (Minott, 2009).

Critical mass to promote broader participation in public reporting on hospital readmission is emerging. Based on prior national experience in using the AHRQ Quality Indicators in public reporting, stakeholders in readmission reporting called for nationwide coordination and consensus-building on methodology and reporting practice.

OBJECTIVES

The objectives of the consensus assessment and conference were to (1) bring together researchers and practitioners from various organizations to develop consensus on standard methods in tracking hospital readmissions; (2) establish comparable baselines for various approaches to readmission assessment and reporting; and (3) document and subsequently disseminate the knowledge and experiences shared during the conference. This manuscript reports outcomes for Objectives 1 and 3. "Consensus building" in this project does not mean to reach specific agreement on measures or methods of doing public reporting on hospital readmissions, but rather to build mutual understanding on various perspectives of readmission reporting practice and research. Consensus on next steps will emerge as a result of the process of collective actions and writings that build on this mutual understanding.

METHODS AND DATA

There are various methods for consensus building (Carpenter, 1999). We used a participatory approach involving all potential stakeholders in a process of sharing opinions and expertise to discover a common ground for future action. NAHDO, Utah Research Center of Excellence in Public Health

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Informatics, The Alliance, Dallas Fort Worth Hospital Council, Texas A&M Health Science Center's Rural and Community Health Institute (RCHI), and Institute for Health Care Research and Improvement at Baylor Health Care System jointly conducted an assessment of consensus on hospital readmission reporting. Afterward, a public consensus-building conference, titled "Tracking Hospital Readmissions: Research and Reporting" was held October 28-29, 2008.²

Specifically, this consensus-building process includes three components. First, we planned the readmission conference based on information collected in the prior needs assessment among the previously mentioned stakeholders. Second, we conducted an online consensus assessment survey among prospective conference participants. The purpose of this online assessment survey was to support and facilitate consensus-building discussions at the conference. The authors of the online assessment instrument were members of the conference planning committee who also organized and moderated conference panels. The main assessment questions were consistent with the conference section topics. Third, we invited all conference and assessment participants to participate in developing this consensus paper. Twenty-seven people volunteered and seven of them coauthored this publication.

The assessment tool was an online questionnaire. The targeted population for consensus-building of readmissions reporting was the representatives of public reporting organizations, readmission researchers, and supporting entities such as federal agencies and health informatics firms who might be interested in attending the conference. The online questionnaire was made available from September 5, 2008 through October 17, 2008. The assessment announcement was included with the conference registration and also distributed to members of the NAHDO Quality Workgroup. In total 85 people were invited to complete the assessment. Since this assessment is a tool for consensus-building at the conference, we sent a reminder to all registered attendees to encourage completion of the assessment questionnaire two weeks before, and the day prior to, the assessment closing date. Thirty-four individuals responded to the questionnaire. Participation in the assessment was anonymous. A total of 54 individuals attended the conference. The response rate was estimated as 63% of the targeted population - conference participants, or 40% of individuals who received an email about this assessment but no follow-up reminder.

The questions were constructed in four domains including a total of 25 consensus statements (see Appendix A). A five-point Likert scale was used to ask the participants to specify their level of agreement to a statement, ranging from "strongly agree" (coded as 5) to "strongly disagree" (coded as 1). "Neutral" position (coded as 3) was combined with responses as "not familiar." Consensus score of a statement is the mean of all responded values for a statement. The higher a consensus score is, the more favorable response is received to a statement. Consensus score is also calculated for each domain that is the mean of all statement scores in each domain. Principal component factor analysis was applied in this study to detect potential underlying factors among the 25 consensus statements. T-tests for differences of means of consensus scores were conducted with assumptions of equal variance and independent samples. All statistical analyses were performed using SPSS 12.0 for Windows (SPSS, 2003).

Preliminary results from the assessment questionnaire were reported at the beginning of the conference. Table 1 presents a comparison of distributions between the pre-conference assessment respondents and readmission conference attendees by type of affiliations. Individuals from state organizations and other organizations that are doing public reporting on healthcare made up 65% of the assessment respondents, but only 44% of conference attendees. Representatives from healthcare

² The conference was funded in part by the Agency for Healthcare Research and Quality with additional funding from 3M Health Information Systems, American Heart Association, and the Robert Wood Johnson Foundation.

organizations had a higher presence at the conference (13%) than responding to the assessment questions (6%). Health Information Technology (HIT) companies had a similar level of participation in both settings. The variation of affiliation among the two groups is not statistically significant. Although the findings from the assessment respondents are representative of conference attendees' opinions, we will interpret the results with caution due to the small size of the sample.

Table 1
Percentage Distributions of Pre-conference Assessment Respondents and Readmission Conference Attendees, October 2008

Type of Affiliations	Pre-conference Assessment Respondents	Conference Attendees
States & organizations doing public reporting	65%	44%
Healthcare organizations	6%	13%
Federal or researchers	12%	22%
Informatics companies	18%	20%
	N=34	N=54

Note: The Chi-square test found no statistically significant difference for this contingency table.
 SOURCE: The NAHDO consensus building assessment survey and conference registration, 2008.

The conference attendees represented 40 organizations located in 21 states and eight out of 17 state public reporting agencies in the nation. The conference was recorded with speakers' permissions. Presentations and discussions were transcribed. The narrative data were first analyzed by the authors and then used as complementary interpretations of the assessment results in a following session. The draft manuscript was shared with the 21 volunteered reviewers. Seven of them provided input. All feedback was carefully considered and incorporated as appropriate.

This consensus assessment study has several limitations. First the analysis is based on a small sample. The consensus assessment instrument used predefined statements without detailed elaboration. Respondents with different knowledge and experiences in readmission research or reporting practice may interpret the statements differently. Some statements might include double questions, causing bias in the consensus score unknown to the authors. Furthermore, Likert-scale consensus scores may be subject to distortion from "acquiescence bias;" that is, respondents may be more likely to agree with statements as presented than to present their own views (Smith and Fischer, 2008).

RESULTS

Consensus Variation by Reporting Domain

The 25 consensus statements were grouped into four domains in the survey, building consensus on: (1) measures, (2) reporting unit and interpretation, (3) data and methods, and (4) preventing unintended consequences. At the beginning of each domain we stated, "*We propose to build consensus in PUBLIC REPORTING on hospital readmission rates. Please rate your agreement or disagreement on the following*

statements on... then a domain's name was listed. The number of statements under each domain ranges from two to eleven, with a total of 25 statements across all four domains. Table 2 reports the means of consensus scores for these four domains.

Table 2
Means of Consensus Scores by Domains of Reporting Readmissions

Domain (Code)	N	Mean	95% CI		
			Lower Limit	Upper Limit	
Data and Method (DM)	30	3.41	3.30	3.53	*
Measurement (M)	29	3.68	3.54	3.83	
Unintended Consequences (UC)	32	3.83	3.64	4.02	
Report Unit (RU)	33	4.14	3.99	4.30	

Statistically significantly different from other domain means.

SOURCE: The NAHDO consensus building assessment survey, 2008.

Respondents had the lowest consensus on nine statements related to Data and Method for linking discharge records and reporting readmission (Mean=3.41, 95% CI: 3.30-3.53), followed by the Measurement domain. However, the domain consensus-score of Measurement (3.68) is not statistically different from that of Unintended Consequences (3.83). All three statements in the domain of Report Unit had the highest consensus score among four domains.

Most Favored or Least Favored Responses to the Consensus Statements

Table 3 describes the response variation of consensus scores for each of the 25 statements. Each consensus score was compared to the grand mean (3.65) and tested statistical significance using the 95% confidence interval. If a consensus score is statistically higher than the grand mean, we classify the statement as “favored response.” If a score is statistically lower than the grand mean, it is an “unfavored response.” Others are “neutral or unfamiliar responses,” which indicate a need of knowledge dissemination in these areas.

Table 3
Means of Consensus Scores on Statements about Public Reporting on Hospital Readmission

Section Code - Statement Labels	N	Mean	95% CI		Compare to Grand Mean
			Lower Limit	Upper Limit	
Favored Responses					
M-Need Standardized Measures	34	4.44	4.18	4.71	***
DM-Report Data/linkage Quality	32	4.31	4.11	4.52	***
M-Need Clinically Meaningful	34	4.29	3.94	4.65	***
RU-Population/Area Rates	34	4.24	4	4.47	***
RU-Hospital Preventable Rates	33	4.18	3.97	4.4	***
DM-Validate Linkage Method	32	4.16	3.92	4.39	***
M-Need Risk-adjusted	33	4.15	3.88	4.42	***
DM-Within & Across Hospitals	32	4.13	3.88	4.37	***
RU-Standardized Interpretations	34	4.06	3.77	4.34	***
M-Quality Outcome	34	4.06	3.86	4.26	***
DM-Report Sensitivity/Specificity	32	4	3.77	4.23	***
UC-Prolonged Length of Stay	32	3.97	3.67	4.27	***
Neutral or Unfamiliar Response					
M-Chronic Disease Management	34	3.82	3.58	4.06	**
UC-Readmission From Home Health	32	3.69	3.42	3.96	**
DM-Use Probabilistic Linkage	32	3.53	3.21	3.85	**
M-Efficiency	32	3.47	3.12	3.82	**
DM-Use Deterministic Linkage	31	3.45	3.14	3.76	**
M-Signal for Problems	33	3.39	3.04	3.75	**
M-All Cause Rate	34	3.38	3.1	3.67	**
M-Preventable/Unplanned Only	34	3.32	2.96	3.69	**
Un-favored Response					
M-Quality Process	33	3.06	2.63	3.5	*
M-Condition Based Only	33	2.82	2.44	3.19	*
DM-No Unique ID, Don't Report	32	2.81	2.41	3.21	*
DM-Report Within Same Hospital Only	32	2.16	1.79	2.52	*
DM-Report Across Hospitals Only	31	2.1	1.79	2.4	*
Grand Mean		3.65			

*** significantly higher than the grand mean, ** no difference, * significantly lower than the grand mean.

Survey Section Code: M-Measurement; RU-Report Unit; DM-Data and Method; UC-Unintended Consequences.

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The statement, “There is a need to develop standardized readmission measures” has the highest consensus score (4.44) among all 25 statements. The second most favorable statement is “Data quality and linkage methods should be reported with the readmission analysis (4.31)” and the third, “The measure needs to be clinically meaningful for quality improvement (4.29).” The top two least favored statements are: “We should report readmissions across hospitals only (2.10)” and “We should report the readmission within the same hospital only (2.16).” The third least favored statement is “If a unique patient identifier is not in the data file, public reporting on hospital readmission rates is inappropriate (2.81).”

Seven Underlying Factors for the 25 Statements

The consensus scores reported in Tables 2 and 3 are directly observed indices or authors’ created conceptual domains. To validate the authors’ subjective constructions and further synthesize the 25 opinion statements, we conducted a principal component factor analysis on the 25 statements. A factor in our analysis is a linear combination of its single or multiple statements. The value of a factor loading represents the degree of correlation between a statement and its factor. The Kaiser criterion “eigenvalue³ greater than 1” was used to determine the number of factors. A total of nine factors were extracted from the 25 sets of consensus scores and explained 83% of the variation among the responses to the 25 statements. Table 4 reports seven out of nine factors and the statements with the highest loading score under each factor. These seven factors explained 73% of variation. We excluded two factors from Table 4 because neither of them contained a “highest” loading score from any statement, which posts difficulty to conceptualize meaningful explanations for the remaining 10% of variation. Five out of the seven factors contain statements from at least two authors’ constructed domains, which indicate that the factor analysis is an appropriately alternative method to categorize the respondents’ diverse understanding of and preference for readmission reporting. To reveal the underlying meaning of each factor, we collectively iterated several times to reach consensus on how to label each factor.

³ Eigenvalues are the variances extracted by the factors. If the eigenvalue is less than 1, it is likely that a factor extracts less than one original variable or a statement in this analysis.

Table 4**Factors of Consensus Statements About Public Reporting on Hospital Readmission**

Factor/Statement (Eigenvalue, % of Variance Explained)	Factor Loading
Factor 1: System approach (4.9, 19.5%)	
1.1 DM-Validate Linkage Method	0.82
1.2 M-Efficiency	0.62
1.3 DM-Use Probabilistic Linkage	0.61
1.4 M-Signal for Problems	0.53
1.5 UC-Readmission from Home Health	0.48
1.6 DM-Report Across Hospitals Only	-0.6
1.7 DM-Report Within Same Hospital Only	-0.7
Factor 2: Public reporting requirements (3.8, 15.1%)	
2.1 DM-Report Data/linkage Quality	0.67
2.2 DM-Within & Across Hospitals	0.59
2.3 DM-No Unique ID, Don't Report	0.54
2.4 RU-Population/Area Rates for Policy Maker	0.52
2.5 M-Need Risk-adjusted	0.52
2.6 M-Condition Based Only	-0.51
2.7 RU-Standardized Interpretations for Consumers	-0.63
2.8 M-Need Standardized Measures	-0.68
Factor 3: Readmission metrics for QI (2.8, 11.2%)	
3.1 M-Need Clinically Meaningful	0.63
3.2 M-Quality Process	0.55
3.3 M-All Cause Rate	-0.61
Factor 4: Linkage challenge for chronic disease redmission (2.0, 8.1%)	
4.1 DM-Report Sensitivity/Specificity	0.52
4.2 DM-Use Deterministic Linkage	0.49
4.3 M-Chronic Disease Management	-0.5
Factor 5: Preventable Readmission (2.0, 7.8%)	
5.1 M-Preventable/Unplanned Only	0.76
5.2 RU-Hospital Preventable Rates	0.59
Factor 6: Prolonged Length of Stay (1.8, 7.1%)	
6.1 UC-Prolonged Length of Stay	0.51
Factor 7: Quality Outcome (1.0, 4.0%)	
7.1 M-Quality Outcome	0.53
Survey Section Code: M-Measurement; RU-Report Unit; DM-Data and Method; UC-Unintended Consequences.	

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Factor 1 “System approach” includes seven statements with their highest loading scores. It also has the highest eigenvalue (4.9) and explains 19.5% of consensus variability. Having assessed the seven statements and the direction of the loading scores, we derive the underlying meaning for this factor as: Readmission measures hospital care efficiency and problems related to transitions in care; readmissions from the same hospital and across hospitals should be analyzed; and linkage methods should be validated for ongoing public reporting.

Factor 2 “Public reporting requirements” consists of eight statements and explains 15% of variation. Two statements targeting specific audiences - policymakers and consumers - were all loaded in this factor. We interpret this factor’s underlying meaning as: Public reporting for a specific population or geographic area for policymakers needs to include readmissions from the same hospital and across hospitals; the readmission measures need to be either risk-adjusted or specific condition-based; unique patient identification would increase the quality of readmission data linkage; and, if the above requirements were met, standardized measures or interpretation for consumers might not be necessary.

Factor 3 contains three Measurement statements representing 11.2% variation, labeled as “Readmission metrics for quality improvement (QI).” We think that respondents who need to use clinically meaningful measures for QI may see readmission as a quality process measure. All-cause readmission rate may not be a useful QI measure.

Factor 4 “Linkage challenge for chronic disease readmission” explains 8.1% variation and includes three factor loadings of “Report sensitivity/specificity,” “Using deterministic linkage” and “Readmission is often an indication of the quality of management of chronic illness outside the hospital” with opposite directions, 0.52, 0.49 vs. -0.50 respectively. This may imply a perception of limitation of using a deterministic linkage method to track patient discharge records across hospitals, especially for chronic disease-related readmissions. Since chronic disease-related readmissions often involve cross-setting care, patient medical records may be scattered among different providers without a unique identifier, which suggests challenges for the deterministic linkage method.

Factor 5 “Preventable readmission” encompasses two related statements from the domains of measurement and reporting unit and represents 7.8% variation, which indicates an emerging consensus on reporting preventable readmissions. Factor 6 “Prolonged length of stay” (7.1% variation) and Factor 7 “Quality outcome” (4% variation) contain a single statement with highest loading that indicate these two statements are independent from other statements. Readmission is a quality-outcome indicator regardless of any other considerations in readmission measures. Potential prolonged length of stay could be an unintended consequence independent of other possible unintended consequences. Factors 5, 6, and 7 highlight favorable areas among the assessment respondents.

Consensus Variation by Current Use Cases

Would the current activities of tracking readmission differentiate respondents’ perspectives of measurement, data, methods, and impact of public reporting? We asked respondents in the assessment tool: “Do you or your organization conduct work on readmission for any of the following purposes?” Table 5 listed the five types of major purposes of current activities or uses of readmission, that is, for academic research, public reporting, hospital internal quality improvement, planning to start to work on readmission, and others (i.e., pay for performance, community collaboration, or policy development).

Table 5
Mean Differences in Consensus Scores by Current Use

Factor	Need	Academic Research		Public Reporting		Internal Improvement		Plan to start		Comm. Project/Policy Development	
		N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
1. System approach	Yes	8	3.23	10	3.23	6	3.07	16	3.24	5	3.06
	No	21	3.22	19	3.23	23	3.27	13	3.21	24	3.26
2. Public reporting requirements	Yes	8	3.77	11	3.75	8	3.69	15	3.92	5	3.73
	No	22	3.89	19	3.92	22	3.92	15	3.80	25	3.89
3. Readmission metrics for QI	Yes	8	3.42	13	3.38	9	3.22 *	16	3.69	5	3.13
	No	25	3.64	20	3.72	24	3.72	17	3.49	28	3.67
4. Linkage challenge for chronic disease readmission	Yes	8	4.04 *	11	3.76	9	3.74	16	3.73	5	4.07
	No	23	3.67	20	3.77	22	3.77	15	3.80	26	3.71
5. Preventable readmission	Yes	8	3.81	12	4.04	9	3.44	15	3.70	5	3.90
	No	25	3.74	21	3.60	24	3.88	18	3.81	28	3.73
6. Prolonged Length of stay	Yes	8	3.50	12	4.00	9	3.56	16	4.06	5	3.20 *
	No	24	4.13	20	3.95	23	4.13	16	3.88	27	4.11
7. Quality outcome	Yes	8	3.88	13	4.31	9	4.00	16	4.00	5	4.20
	No	26	4.12	21	3.90	25	4.08	18	4.11	29	4.03

* p. < .05 according to the T-test of difference of means.

SOURCE: The NAHDO consensus building assessment survey, 2008.

We conducted consensus variation analysis at both the statement and factor levels and reported only the factor-level findings in Table 5. In general, we see more consensus than variation among different types of users. Significant variation existed in three out of 35 comparisons between 1) Factor 3 Readmission Metrics for QI and the use for internal improvement, 2) Factor 4 Linkage Challenge and use for academic research, and 3) Factor 6 Prolonged Length of Stay and use for community projects, etc. Respondents who tracked readmission for their hospitals' internal quality improvement have less favorable responses than their counterparts for the statements included in Factor 3 - Readmission metrics for QI (3.22 vs. 3.72). Researchers of readmission analysis were more in favor of the statements in Factor 4 on how to handle the linkage challenges for tracking chronic disease patients' readmission (4.04 vs. 3.67). There was no significant variation on avoiding unintended consequences among all user groups except for the last group, which consisted of tracking readmissions in the areas of pay for performance, policy development, and community-wide collaboration. These findings advise future consensus-building efforts to target specific user groups for specific issues.

Consensus Variation by Future Needs

Will respondents' or their organizations' future needs on public reporting vary their agreements about the consensus statements? Respondents pointed out that public reporting on readmission may need "provider approval," "political will," "consensus on various approaches," "legislative changes," and "opportunities to network with others measuring and reporting readmissions." The assessment identified four common areas: technical assistance (TA) in planning (58% of total responses), indicator technical specifications (81%), software for producing indicators (54%), and TA in patient linkage (50%). If a respondent identified any of the above four types of needs, the response was categorized into a "need" group. No response for a need was classified in the "no-need" group. Multiple needs can be selected in the assessment tool. To anticipate the special needs for consensus-building in future reporting practice, we focus on the differences in each factor between the need and no-need groups in Table 6.

Table 6
Mean Differences in Factor Consensus Scores by Future Needs

Factor	Need	Planning		Indicator Specification		Indicator Software		Technical Assistance on Linkage	
		N	Mean	N	Mean	N	Mean	N	Mean
1. System approach	Yes	15	3.29	20	3.27	13	3.37	8	3.23
	No	14	3.16	9	3.13	16	3.11	21	3.22
2. Public reporting requirements	Yes	14	3.99	20	4.03	13	3.98	8	3.77
	No	16	3.74	10	3.53	17	3.76	22	3.89
3. Readmission metrics for QI	Yes	15	3.76	21	3.78	14	3.88	8	3.42
	No	18	3.44	12	3.25	19	3.37	25	3.64
4. Linkage challenge for chronic disease readmission	Yes	15	3.71	20	3.78	13	3.69	8	4.04
	No	16	3.81	11	3.73	18	3.81	23	3.67
5. Preventable readmission	Yes	15	3.57	20	3.80	13	3.73	8	3.81
	No	18	3.92	13	3.69	20	3.78	25	3.74
6. Prolonged Length of stay	Yes	15	4.07	21	3.95	14	4.00	8	3.50
	No	17	3.88	11	4.00	18	3.94	24	4.13
7. Quality outcome	Yes	15	4.00	21	4.00	14	4.07	8	3.88
	No	19	4.11	13	4.15	20	4.05	26	4.12

* p. < .05 according to the T-test of difference of means.

SOURCE: The NAHDO consensus building assessment survey, 2008.

The public reporting requirements (Factor 2) and readmission metrics for QI (Factor 3) are the only two factors with significant variation of consensus in three future "need" groups. The "planning" group was more favorable for the statements related to public reporting requirements than their counterparts (3.99 vs. 3.74). Respondents who needed readmission indicator specifications had a higher consensus on Factors 2 and 3 than those having no need. A similar pattern of different responses existed between people needing publicly available software for generating readmission indicators and those who did not need.

CONFERENCE DISCUSSION

All conference attendees agree that hospital readmissions are a significant problem in terms of health care cost and patient morbidity. Reducing readmissions should be a priority of healthcare improvement. Effective public policy for quality improvement means to identify where the greatest policy leverage is, which most of the conference attendees believe resides in public reporting. Where there was divergence of opinion was whether the measures should be broad in scope or clinically-specific. These differences in view may be due to differences in applications of the readmission measures. Quality improvement will require more clinical specificity for actions. Public reporting prefers broader global measures which are easier to interpret for policymakers and consumers. All agreed that we must start somewhere and continuously improve as we learn more.

Readmission is a health system problem (Jencks, 2009) and, although there was high variation on this concept among assessment participants (see Table 4), reducing readmissions and making the discharge process work is a team sport. It is not just an issue of hospital accountability; it measures accountability of the entire healthcare community including patient care in both in- and out-patient settings. A success story of community-level reporting was shared at the conference: For one region in Pennsylvania, 43 percent of the CABG patients were readmitted to a different hospital other than where the CABG surgery was performed. As a result, their hospitals' readmission rates were much higher than physicians assumed they were. This example also provides evidence against the top two least favored statements (see Table 3).

As shown by the assessment result, reporting preventable/unplanned readmission is a favored effort, but the devil is in the details. Throughout the conference, participants debated: What is a preventable readmission? What readmission is due to clinical deterioration? What is a system failure? What is acceptable readmission time-period after discharge? It is important to distinguish between related (to certain conditions or procedures) from non-related readmissions, and preventable from non-preventable readmissions (Jiang et al., 2005). Determining preventability of readmissions is difficult. Nationwide dialogue and guidelines are needed, so that subjectivity and variation of reporting can be reduced among different reports to improve validity and reliability of readmissions measures. The conference participants also proposed to examine unplanned readmissions, which are preventable on both a hospital and a physician level. Readmissions attributable to hospitals and physicians are good targets for improving care.

Although respondents expressed lowest consensus for the domain of "Data and Method" in the assessment, conference participants did not discuss much about this topic outside of the method sessions. The lack of consensus in methods may be due to unfamiliarity with technical details. High percentages (34-38%) of responses were "neutral" or "not familiar" for questions on deterministic and probabilistic linkage. Trusted data sources are a key factor for trusted public reporting. Various studies empirically compared deterministic and probabilistic linkage procedures and demonstrated limitation of deterministic linkage and optimal use of probabilistic linkages on hospital patient registries (Gomatam, 2002; Grannis et al., 2002 and 2003). The translation of research knowledge into applicable practice in creating patient-centered readmission data is an urgent task for advancing the readmission reporting agenda.

Assessment respondents reached a consensus on the predication that prolonged length of stay could become a possible unintended consequence of public reporting on readmission. At the conference, attendees shared empirical findings that length of stay of initial hospitalization was the most important variable in predicting readmission in Pennsylvania. The conference discussed how to implement a system-wide approach on readmission reporting. A researcher proposed a simultaneous multiple-

outcome model in quality reporting to prevent unintended consequences, which might report readmission rate, in-hospital mortality, and length of stay at the same time. For example, an in-hospital death precludes a later readmission. Some suggested that examining hospital readmissions be complementary to examining emergency department visits after a hospital discharge or outpatient surgery prior to a readmission. Friedman et al. 2009 found that patient safety events in initial hospitalizations also contribute to readmissions. In sum, the conference discussions echoed and broadened the consensus assessment findings. They also provide in-depth rationale for various opinions.

CONCLUSION

In the last decade, public reporting organizations gradually moved towards using standardized methods to report on standardized indicators. Readmission reporting is evolving in response to healthcare transparency and pay-for-performance initiatives. At its early stage it is expected that consensus about reporting measures and methods has not been achieved. However, effective public reporting on hospital readmission has to be a community-wide and multi-stakeholder effort. Consensus on its goal, direction, and methods will enable the readmission reporting to have practical impact in improving the healthcare system. The reported assessment and conference are both initial steps towards nationwide consensus building on this issue.

Based on the findings of consensus assessment and conference discussions, we identified seven underlying factors for consensus building on readmissions. We propose to focus on four areas to enhance the existing consensus. These are: to establish public reporting requirements; to develop readmission metrics for quality improvement; to address linkage challenges for tracking chronic disease-related readmission; and to avoid unintended consequences of public reporting on readmissions.

Our consensus exercise included major stakeholders in this field. Each stakeholder has its unique role in reducing readmissions in the nation. Researchers need to further develop, evaluate, and elaborate evidence-based readmission reporting metrics. Federal, state, and other public reporting organizations can evaluate existing practices to adopt best practices and develop collective strategies to avoid unintended consequences. Providers and quality improvement organizations are crucial partners and key change agents in tracking and reducing hospital readmissions and ultimately improving the healthcare system.

The national agenda on readmission reporting will be advanced quickly by the American Recovery and Reinvestment Act (ARRA). The ARRA authorizes CMS to provide a reimbursement incentive for physicians and hospitals who are successful in becoming “meaningful users” of an electronic health record (EHR). The ARRA-authorized Office of National Coordinator (ONC) for Health IT Policy Committee proposed to include a 30-day readmission rate as one of the 2011 measures for “meaningful uses” of health information technology in August 2009 (ONC Health IT Policy Committee, 2009). Our consensus building process and findings provide actionable information to the national efforts.

APPENDIX A

CONSENSUS DOMAIN, STATEMENTS AND STATEMENT LABELS

Domain 1: Measurement

1. Readmission is a QUALITY OUTCOME measure of the care received during the previous or index hospitalization. (M-Quality Outcome)
2. Readmission is a QUALITY PROCESS measure of the care received during the previous or index hospitalization. (M-Quality Process)
3. Readmission is an EFFICIENCY measure of the previous or index hospitalization. (M-Efficiency)
4. Readmission is just a “tripwire” SIGNAL for potential problems in the previous or index hospitalization. (M-Signal for Problems)
5. Readmission is often an indication of the quality of management of chronic illness outside the hospital. (M-Chronic Disease Management)
6. There is a need to develop standardized readmission measures. (M-Need Standardized Measures)
7. The measure needs to be clinically meaningful for quality improvement. (M-Need Clinically Meaningful)
8. The measure needs to be risk-adjusted for public reporting. (M-Need Risk-adjusted)
9. We should only report the preventable or unplanned readmissions. (M-Need Preventable/Unplanned Only)
10. We should only report readmission on a condition-by-condition basis. (M-Condition Based Only)
11. All-cause readmission rate is a useful measure. (M-All Cause Rate)

Domain 2: Reporting Unit

12. Hospital annual rate of preventable readmissions or readmission for specific conditions are useful for public reporting for consumers. (RU-Hospital Preventable Rates)
13. Standardized interpretations of a standardized readmissions measure for consumers is needed. (RU-Standardized Interpretations)
14. Annual rate of preventable readmissions or readmission for specific conditions for specific populations or geographic areas are useful for policy-makers. (RU-Population/ Area Rates)

Domain 3: Data and Methods

15. We should report the readmission within the same hospital only. (DM-Report Within Same Hospital Only)
16. We should report readmissions across hospitals only. (DM-Report Across Hospital Only)
17. We should report readmissions both within the same hospital and across hospitals. (DM-Within & Across Hospitals)
18. If a unique patient identifier is not in the data file, public reporting on hospital readmission rates is inappropriate. (DM-No Unique ID, Don't Report)
19. If a unique patient identifier is not in the data file, a record-linkage computer program that requires exact matches of names, date of birth, social security number, and/or other linkage elements, to link multiple hospital admissions to a unique patient for tracking readmission can be used. (DM-Use Deterministic Linkage)
20. If a unique patient identifier is not in the data file, probabilistic record-linkage software, which uses mathematical algorithms to determine linkage weights, to link multiple hospital

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admissions to a unique patient for tracking readmission should be used. (DM-Use Probabilistic Linkage)

21. Data quality and linkage methods should be reported with the readmission analysis. (DM-Report Data/Linkage Quality)
22. If a record linkage method is used for ongoing reporting, the method should be validated. (DM-Validate Linkage Method)
23. If a record linkage method is used sensitivity and specificity of the linkage method should be included in validation and reported. (DM-Report Sensitivity/Specificity)

Domain 4: Prevent Unintended Consequences

24. To reduce readmissions, hospitals may extend patient's length of stay. To prevent unnecessarily prolonged length of stay, we shall consider reporting hospital readmission rates along with length of stay. (UC-Prolonged Length of Stay)
25. Home Health provides special care for some patients discharged to home. It is expected that patients under Home Health's care will have a certain level of re-hospitalization. Source of readmission, such as Home Health, need to be taken into consideration when publicly reporting hospital readmissions. (UC-Readm. From Home Health)

Source: NAHDO consensus building assessment survey, 2008

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