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HIGH-VALUE HEALTH CARE PROJECT

TECHNICAL BRIEF

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ENHANCING HOSPITAL PERFORMANCE MEASUREMENT THROUGH GREATER DATA INTEGRATION: LINKING CLINICAL DATA TO ALL-PAYER ADMINISTRATIVE DATA

Performance measures that address the timeliness, effectiveness, and appropriateness of care often focus on clinical processes rather than clinical outcomes. This is because necessary sources of clinical data – such as electronic reports of laboratory, radiology, and pathology findings – have not been readily accessible for performance measurement. This issue brief describes a project designed to enhance the utility, validity, and credibility of performance measures by using both clinical and administrative data.

VALUE OF CLINICALLY ENHANCED ADMINISTRATIVE DATA

Relying on clinical data for performance measurement enhances the validity and reliability of the measures. It also supports more robust methods to adjust for differences in underlying patient severity and risk, thus addressing a key concern in measuring outcomes. An enhanced risk-adjustment model can lead to more precise performance evaluation of hospitals and providers, resulting in greater provider support for performance measurement and for payment models tied to performance.

The High-Value Health Care (HVHC) Project launched a prototyping project that leveraged an existing Agency for Healthcare Research and Quality (AHRQ) pilot contract with Virginia Health Information (VHI). Through the project, VHI built a hybrid dataset by adding select clinical data elements – lab results and present-on-admission (POA) codes that distinguish between co-morbidities and hospital-acquired complications – to claims data from more than a dozen Virginia hospitals.

The Engelberg Center contracted with VHI to test the application of AHRQ/VHI hybrid data to an enhanced risk-adjustment model for three cardiac care mortality measures endorsed by the National Quality Forum (NQF) – acute myocardial infarction (AMI), congestive heart failure (CHF), and coronary artery bypass graft (CABG) surgery. In addition, VHI was contracted to convene a stakeholder work group composed of representatives from hospitals, health plans,

HIGH-VALUE HEALTH CARE PROJECT

The High-Value Health Care (HVHC) Project – directed by the Engelberg Center for Health Care Reform at Brookings and supported by the Robert Wood Johnson Foundation – is working to make valid, timely, and consistent information about the quality and cost of health care widely available in the United States. Among other goals, HVHC aims to develop national strategies to make performance measurement more valid and comprehensive by augmenting administrative databases with clinical information.

and consumer groups to review the results and comment on their ability to improve outcomes measurement. The review would include input from stakeholders on the information's potential value for quality improvement, public reporting, and pay-for-performance programs.

DEVELOPMENT AND TESTING OF CLINICALLY ENHANCED RISK-ADJUSTMENT MODEL

To develop the clinically enhanced risk-adjustment model, VHI developed risk-adjustment models for mortality using administrative data with high-quality POA coding from 108 hospitals in New York State. The project focused on patients hospitalized for AMI, CHF, and CABG.

Data Collection

VHI established a secure online site for sharing fixed data files submitted by hospitals. In addition to the administrative data maintained by VHI on behalf of all Virginia hospitals, clinical data submissions collected from participating AHRQ-VHI pilot project hospitals included:

Present-on-Admission (POA) values. Required by law for Medicare patients since October 1, 2007, all general acute-care health care providers must identify whether a diagnosis was present upon an inpatient admission. POA indicators apply to all primary and secondary diagnosis codes for certain health care claims. During the AHRQ contract, VHI expanded inclusion of POA information beyond Medicare records to all patients regardless of payment source.

Because POA documentation by physicians and coding by medical record personnel is relatively new, special attention was given to the submission, completeness, and accuracy of POA information submitted by Virginia hospitals. VHI POA reporting is consistent with national billing formats, as specified in the UB-04 claim form. In order for a hospital to be eligible for inclusion in the final hybrid dataset, it had to pass a series of 15 POA data screens ensuring the quality of POA coding.

Laboratory Data. In addition to POA indicators, approximately 30 key laboratory values were collected on each discharge. The selected lab values were based on previous experience risk-adjusting cardiac care outcomes. Logical Observation Identifiers Names and Codes (LOINC) standards were used for lab values. VHI developed a LOINC mapping tool to map local names of hospital laboratory tests to LOINC to facilitate standardized data submission.

Given the volume and the relative complexity of the laboratory data, a significant amount of work went into data management and quality assurance prior to analysis. Results for 25 of 30 lab tests considered for incorporation into a risk-adjustment model to support measurement of AMI, CHF, and CABG mortality.

Of the 28 participating hospitals, 15 provided at least three calendar quarters of laboratory data, and all provided at least three calendar quarters of POA data.

SUMMARY OF RESULTS USING HYBRID DATA TO CALCULATE CARDIAC CARE MEASURES

Fourteen Virginia hospitals successfully submitted lab results for approximately 10,000 discharges. For the three cardiac conditions, analysts compared mortality rates predicted by administrative data alone to mortality rates predicted by hybrid data. Compared to the administrative model, the hybrid model resulted in reduction in bias and substantial improvements in predictive capabilities, as measured by the C-statistic.[1] The C-statistic for the three cardiac conditions ranged from 0.77 to 0.82. Results showed that a limited number of numerical laboratory values for tests performed around the time of admission – when added to administrative data with POA modifiers – can substantially improve the accuracy of risk-adjusted measures of hospital mortality rates.

Table 1: Lab Values Incorporated Into Risk Adjustment Model	
(1) potassium	(14) prothrombin time and international normalized ratio
(2) sodium	(15) partial thromboplastin time
(3) glucose	(16) creatine kinase
(4) creatinine	(17) troponin I
(5) BUN	(18) amylase
(6) hemoglobin	(19) pH
(7) calcium	(20) pCO2
(8) platelet count	(21) HCO3
(9) white blood cell count	(22) base excess
(10) bilirubin	(23) pO2 or O2 saturation with FI O2
(11) albumin	(24) creatine kinase MB
(12) alkaline phosphatase	(25) lactate dehydrogenase
(13) aspartate transaminase	

STAKEHOLDER WORK GROUP FEEDBACK

VHI convened a work group of stakeholders interested in this hybrid dataset's potential value for enhancing quality improvement, public reporting, and pay-for-performance programs. VHI recruited representatives from participating hospitals, health plans, physician groups, employers, and consumers to participate in an in-person meeting to discuss short- and long-term utility, sustainability, and scalability of a clinically enhanced risk-adjustment model.

In reviewing the results, work group members noted the value of clinically-enhanced data for risk adjustment leading to more precise performance evaluation of hospitals and/or physicians. It was noted that improved measurement creates more credible information, which leads to greater acceptance by health care providers and utility of the results to support payment reform programs that reward better quality of care. It was pointed out that the enhanced risk-adjustment model would more likely be adopted if it were seen as an accepted national standard – endorsed by NQF or similar organizations.

FINANCING AND BUSINESS MODELS

Supporting ongoing collection of laboratory data and development of a clinically-enhanced dataset, derivative reports, and products requires a financing and business model that addresses the need for ongoing funding. Costs are incurred by all involved in the development of a hybrid data set and resulting measures, and will include, at a minimum:

- **Hospital Costs.** Hospitals incur costs to extract laboratory data and to map their codes for laboratory tests to standardized LOINC codes for data submission in an electronic record format. In the VHI pilot, some hospitals performed this work using internal resources and some contracted with vendors. The majority of effort and costs were incurred while developing the information for submission, and level of effort was greatly reduced once the process for submission was established.
- **Data Processing Organization Costs.** Costs to the organization include those related to collecting, editing, and housing the data. In the VHI pilot, roughly 500,000 hospital discharges and 15 million laboratory records were collected, edited, and analyzed for accuracy. Replicating this process will require computers to house data and staff resources to collect and process data, including data quality checks.

The National Association of Health Data Organizations reports that some state data organizations or hospital associations charge hospitals fees for data collection and report development. Many state data organizations rely on taxpayer dollars for funding. Some organizations charge fees for licensing data or special reports. For example, VHI charges private organizations such as health care purchasers, health plans, and researchers to access its public and research databases and for custom reports. Such fees from stakeholders interested in utilizing hybrid data can help offset program costs.

FUTURE IMPLICATIONS

Based on favorable results of its hybrid data set pilot, AHRQ has expressed an interest in using the clinically enhanced risk-adjustment model to enhance AHRQ Quality Indicators, and re-submitting them for NQF endorsement. This could result in more widespread adoption of the enhanced risk-adjustment model in performance measurement efforts focused on outcomes.

Applicable to a Variety of Outcomes Measures

In addition to in-hospital mortality, clinically-enhanced hybrid data may be used to measure post-discharge mortality, severe complications, 30-day readmissions, and risk-adjusted length of stay. Broadening the scope of outcome variables can provide information relevant to the many areas of interest within hospital quality improvement programs, payer incentive programs, and consumer engagement activities like public reporting.

OTHER NEEDED EFFORTS

Gaining support from hospitals for full-scale collection of laboratory data through expanded voluntary submission or a statewide mandate may require additional effort. Some possible additional steps include:

- Expanding outcomes measures that use laboratory and POA information to include complications, readmissions, and others described above;
- Developing and demonstrating uses of laboratory data for additional clinical disease applications beyond cardiac care;
- Developing applications using laboratory data that allow hospitals to monitor a patient's risk of adverse events in real time at admission and during a hospitalization; and
- Showing that the benefits of hybrid data and its applications outweigh the burden of submission.

CONCLUSION

This project was one of several undertaken at the Engelberg Center to test approaches to improving performance measurement by combining clinical information from various sources with administrative data.[2]

Measures for AMI, CHF, and CABG calculated using the clinically-enriched risk-adjustment model significantly improved the ability to compare hospitals on mortality. This approach has the potential to improve measurements of other outcome variables such as complications, readmissions, post-hospital mortality, and length of stay.

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1. The C-statistic is used to test the performance or "accuracy" of a prediction model. The range is from 0.5 to 1.0; higher values are better. Higher rates indicate better performance of a model to predict true positives and true negatives.
2. The VHI project's approach contrasts with two efforts that involved the Engelberg Center's collaboration with payers and owners of clinical registries: a collaboration with the American College of Cardiology and UnitedHealthcare to link cath/PCI registry data with claims; and another with WellPoint and the Society of Thoracic Surgeons to link claims with CABG registry data. Issitius dolenih iciisqui commo quidellorpos mint