

HOSPITAL BRIEFING MEMORANDUM
HYBRID HOSPITAL DATABASE PROJECT ORIENTATION
Minnesota Hospital Association
November, 2008

A. Introduction – Background, Objectives, and Overview of Hospital Involvement

Until now, there have been two distinctly different approaches to obtaining data to support hospital-level analyses of clinical performance. The simplest approach was to utilize administrative claims data that were relatively easy and inexpensive to collect and compile but which yielded analytic results that were of questionable validity. The second was to abstract clinical data from medical records, a labor-intensive relatively expensive procedure but one that supported analyses that were far more credible to clinicians and experts in quality monitoring. With the advent of more sophisticated electronic methods of collecting and storing clinical data and new widely-accepted standards for the management of electronic medical data (e.g., LOINC[®] for laboratory data), it now is possible to enhance administrative data by merging them with clinical data readily available in electronic format at the vast majority of hospitals in the United States today. This project will use principles and methods from recent research completed for AHRQ by Abt Associates and Michael Pine and Associates to facilitate the cost-effective enhancement of state hospital administrative databases with clinical data without waiting for comprehensive electronic medical records and robust regional health information exchanges to become a reality. It also will incorporate improved coding practices (at a minimum, the proper use of a present-on-admission modifier) into this hybrid administrative-clinical data set.

This pilot project is designed to demonstrate that improvements in comparative analyses of hospital performance demonstrated using clinical data abstracted from medical records in AHRQ's study Adding Clinical Data Elements to Administrative Data for Hospital-Level Quality Reporting can be achieved using clinical data obtained from electronic medical records and develop protocols that will enable statewide organizations to obtain and utilize these hybrid databases from hospitals with very different health information systems without imposing undue burdens on either the hospitals or the statewide organizations. By integrating experiences for multiple sites and diverse organizations, this pilot project should provide proof of concept, guides for implementation, and an informed constituency of statewide data organizations that are ready and willing to begin enhancing their current hospital claims databases. These efforts also should provide a basis for enriching these databases as new information technology becomes more widely available.

To these ends, the Minnesota Hospital Association (MHA) and its subcontractor, Michael Pine and Associates, Inc. (MPA) will work to:

- prove the feasibility of statewide data organizations creating cost-effective hybrid hospital administrative-clinical databases from electronic data submitted by hospitals that will improve the measurement of risk-adjusted hospital performance,

- identify and document best practices for data capture, transmission, integration, validation, and utilization for organizations with different information capabilities,
- engage multiple stakeholders and peer-group organizations to share and disseminate information and stimulate and support efforts to create and utilize hybrid hospital administrative-clinical databases, and
- set the stage for enrichment of these hybrid databases as improved health information technology becomes more widely available.

Specifically, MHA and MPA will recruit a diverse set of hospitals willing to supply required administrative and clinical data and obtain buy-in and cooperation from all important stakeholders. Working with participating hospitals and expert advisory groups, they will:

- create and fully specify mandatory and optional data elements to be collected,
- develop customized cost-effective methods of obtaining and transmitting these data in one or more data streams,
- merge data whenever necessary to create a unified database,
- screen data for inconsistent and implausible data elements, correct errors whenever possible and flag remaining questionable data,
- develop risk-adjusted measures of selected AHRQ inpatient quality indicators and patient safety indicators using already available reference data,
- recalibrate, perfect, and validate these measures with prospective data collected from Minnesota hospitals as these data become available,
- perfect and apply methods to evaluate these prospectively collected data for data quality and work with participating hospitals to improve the quality and usefulness of their data,
- prepare reports of comparative risk-adjusted clinical performance for participating hospitals, and
- transfer technology from MPA to MHA to enable MHA to continue and expand monitoring clinical outcomes using a hybrid administrative-clinical database.

A timeline for performing these tasks is presented in Appendix 1.

B. Steps in Implementation

Hospital Orientation and Support

On January 15, 2008, MHA will convene an orientation meeting of all Minnesota hospitals that have expressed an interest in participating in this pilot project. A proposed agenda for this meeting is attached as Appendix 2. Feedback for potential participants is requested prior to the meeting to permit project staff to perfect the agenda and structure presentations and discussions according to the needs of participants.

MHA also is seeking volunteers from interested hospitals to serve on one of three advisory groups: a Hospital Information Technology Advisory Group, a Medical Record Coding Advisory Group, and a Quality Monitoring and Improvement Advisory Group. These groups will supplement the expertise and experience of project staff assigned to this project. The Hospital Information Technology Advisory Group will consist of personnel responsible for the database architecture, operation, maintenance, and upgrading of their hospitals' information systems. The

Medical Record Coding Advisory Group will consist of personnel responsible for medical record coding. The Quality Monitoring and Improvement Advisory Group will consist of personnel responsible for clinical quality monitoring and improvement whose engagement and support are critical to the recruitment and continued support of participating hospitals.

Joseph Schindler, Senior Director of Data and Finance Policy at MHA and Barbara Jones, Vice President for Data Management at MPA will coordinate the work of the Hospital Information Technology Advisory Group. Michael Pine, President of MPA and Barbara Jones will coordinate the work of the Medical Record Coding Advisory Group. Mark Sonneborn, Vice President of Information Services at MHA and Donald Fry, M.D., Executive Vice President for Clinical Outcomes at MPA will coordinate the work of the Quality Monitoring and Improvement Advisory Group. These groups will meet face-to-face in breakout sessions during the hospital orientation meeting in St. Paul in January, 2008. After this initial meeting, individual consultations and conference calls will be arranged as required.

Hospital representatives attending the meeting will meet project leaders and will receive detailed information about the objectives and requirements of the pilot project and about potential benefits to participating hospitals. Project leaders will present a preliminary data set that combines administrative and clinical data elements and will obtain feedback from potential participants about the utility and ease of obtaining specific data elements. Dr. Pine will explain how MPA will work with staff at each participating hospital to identify the most cost-effective method of capturing and submitting required data electronically using currently available resources. Dr. Pine also will explain how MPA will develop and utilize screening criteria for proper use of present-on-admission codes. He will explain how reports of comparative risk-adjusted hospital performance on a selected set of AHRQ Inpatient Quality Indicators and Patient Safety Indicators will be prepared from the enhanced administrative data set created for this pilot project. As further inducements to participate and submit complete, accurate data, all participating hospitals will receive reports on the quality of their present-on-admission coding and their risk-adjusted mortality and adverse outcome rates.

MHA also will establish a liaison between the project team and important stakeholders in Minnesota including relevant government agencies (e.g. Minnesota Department of Health – MDH - epidemiologists and researchers), health care quality organizations (e.g. Stratis Health, Minnesota’s QIO), and the regional health information exchange organization (e.g., MDH’s E-Health Advisory Group and the independent Minnesota Health Care Connection) to keep them informed about the project and to obtain their direct assistance if and when it is needed. MPA will consult with researchers, clinicians, and quality measurement professionals with whom it has long-standing relationships to share thoughts about this new initiative, to obtain guidance about how to best achieve the goals of the pilot, and to obtain assistance in overcoming specific obstacles, if and when they are encountered.

Selection and Specification of Clinical Data Elements

Standard UB-92 data will be enhanced with present-on-admission (POA) codes following guidelines established by CMS for reporting POA. Instructions for coding POA shown in Appendix 3 will be reviewed and modified by the Medical Record Coding Advisory Committee.

This material will serve as the basis for a POA training program that MHA will make available to all participating hospitals. Project staff at MHA and MPA will be designated to answer specific questions about POA coding raised by medical record abstractors at participating hospitals.

These data will be supplemented by numerical laboratory data elements that MPA has found to be important predictors of inpatient mortality and surgical complications for a wide variety of conditions and procedures. Three sets of numerical laboratory data are considered prime candidates for inclusion in the hybrid database: blood gas determinations; clinical chemistry analyses, and hematological results.

Numerical values related to blood gas determinations are pH, pCO₂, base excess, pO₂, O₂ saturation, and FIO₂. While pO₂ determinations, like measured pH and pCO₂, generally are available electronically, O₂ saturations frequently are obtained in place of full sets of blood gases and may not be as readily available in an electronic format. The FIO₂ when pO₂ or O₂ saturation is measured is important for correct clinical interpretation of findings, but may not be included in electronic reports, either because the FIO₂ has not been reported to the laboratory performing the test or because the laboratory does not include FIO₂ in its electronic database. Base excess, which was a useful independent laboratory value in a number of risk-adjustment equations, can be calculated directly from measured pH and pCO₂ using the Henderson-Hasselbalch and Siggaard-Anderson equations.

Results of blood chemistry analyses most likely to be useful and easily obtained in electronic format are blood urea nitrogen, creatinine, glucose, sodium, potassium, albumin, calcium, total bilirubin, aspartate aminotransferase (AST/SGOT), alkaline phosphatase, creatine phosphokinase (CPK), CPK-MB, and troponin-I.

Hematological results most likely to be useful and easily obtained in electronic format are hemoglobin, hematocrit, white blood count, platelet count, prothrombin time, international normalized ratio prothrombin (INR), and partial thromboplastin time (PTT).

Consideration also will be given to bacteriological data (e.g., positive culture results), cardiac ejection fraction, numerical vital signs (i.e., temperature, pulse, respiratory rate, and systolic and diastolic pressures), preoperative ASA classification, and Glasgow Coma Score.

Criteria for selection of clinical data elements for inclusion in the hybrid database are potential usefulness in defining populations of cases for analysis of clinical performance, potential usefulness in improving the accuracy of clinical outcome indicators, potential usefulness in enhancing the accuracy of risk-adjustment algorithms, availability in electronic format, cost of collection if not available in electronic format, ease and accuracy of identifying appropriate values for inclusion in an analytic hybrid database, and ease and accuracy of combining data submitted by different facilities.

MHA, MPA, MediQual, the Medical Record Coding Advisory Committee, and representatives of participating hospitals also will explore the utility of systematically coding ICD-9-CM codes for signs, symptoms, and conditions that may not ordinarily be coded consistently due to current

coding conventions. These include codes for tachycardia (785.0), tachypnea (786.06), fever (780.6), hypotension (458 series), coma (780.01), stupor (780.09), convulsions (780.3), severe malnutrition (261, 262), morbid obesity (278.01), body mass index (V85 series), previous coronary artery bypass graft surgery (V45.81), previous heart valve replacement (V42.2, V43.3), intraventricular conduction disturbance (426.2 - 426.6), pleural effusion (511.1, 511.8, 511.9), decubitus ulcer (707.0), skin edema (782.3), congestive heart failure (428 series), lower respiratory inflammation (490, 491 series, 494), chronic lung disease (493.2, 496, 500 - 505), peripheral vascular disease (440.2 series, 443.9), chronic renal disease (585), and a history of cancer (V10 series). In previous research, MPA found that if these signs and symptoms are coded consistently when they are present on admission, they are important predictors of adverse clinical outcomes. Hospitals that can record and submit these supplementary codes to MPA without corrupting their submitted claims will be encouraged to do so, but not doing so will not eliminate hospitals from participating in the study. If a sufficient volume of supplementary ICD-9-CM codes can be obtained to permit the use of these codes in risk-adjustment models, MPA will evaluate the cost and benefits associated with adding these additional data to the hybrid databases created for all participating hospitals. By making this additional coding optional, MHA and MPA potentially can enhance the utility of the pilot database without eliminating potential participants that can submit only administrative and numerical laboratory data.

Careful consideration will be given to specifying additional clinical data elements to be collected. MHA, MPA, MediQual, and the Quality Monitoring and Improvement Advisory Group Rules will collaborate to develop rules to select which of several alternative values should qualify as an authoritative admission finding. Issues to be address will include the use of preadmission test results, the avoidance of post-interventional test results, and the creation of easy-to-apply algorithms to identify values that best represent a patient's status on admission. Algorithms also will be created to integrate corresponding data obtained or reported in different units. In some cases this process will be trivial (e.g., converting Centigrade to Fahrenheit). In other cases, empirical analyses may be required to develop satisfactory algorithms (e.g., integrating measures of CPK-MB levels obtained using different analytic methods, assessing oxygenation based on pO₂ or O₂ saturation with or without corresponding FIO₂, combining INRs and prothombin times when some hospitals report both and some only one or the other).

Collection, Transmission, and Security of Data

Appropriate staff at each participating hospital will work closely with Barbara Jones, Vice President of Data Management at MPA, to develop an individualized protocol for data retrieval and submission. Ms. Jones also will work with appropriate personnel at participating hospitals to implement and perfect present-on-admission coding practices based on CMS guidelines. Ms. Jones has successfully managed customized data collection from diverse hospitals to create hybrid databases for analysis by MPA for almost two decades. She will be aided by technical staff at MHA and MPA, by the project's Hospital Information Technology Advisory Group and Medical Record Coding Advisory Group, and by ongoing advice and problem solving from Linda Hyde and Richard Johannes, M.D., both of whom have extensive expertise and experience implementing and maintaining electronic systems to capture and integrate administrative and clinical data from hospitals utilizing MediQual's performance monitoring system.

Strategies for obtaining lab data electronically from current systems will be developed by collaborating with the subject matter experts from the project team and from participating hospitals to clarify data structures, processes used to update data, and potential linkages available to create an enhanced data set. Logical Observation Identifiers Names and Codes (LOINC[®]), which were developed by the Regenstrief Institute and are in the public sector, will serve as the preferred data structure and reference for data transmission. After initial face-to-face meetings of the Hospital Information Technology Advisory Group and the Medical Record Coding Advisory Group at the orientation session, members of these teams of experienced hospital information and systems specialists and of experienced coding personnel from participating hospitals will provide individual consultations and participate in group conference calls as required.

Because the goal of this pilot is to develop techniques that can be disseminated rapidly, data will be merged at hospitals only when this is the most cost-effective method of obtaining and submitting data. (Although merging data prior to transmission to a central site is appealing, disseminating this technology to all hospitals participating in statewide databases would be a relatively daunting task. Requiring hospitals with very different information systems and capabilities to develop or purchase software systems to merge data prior to their submission will be a major barrier to creation of statewide enhanced administrative databases.)

Protocols for data transmission, storage, analysis, and reporting will include safeguards to protect confidentiality and maintain data security. Appropriate data-use agreements will be executed. Hospitals that submit multiple files either will encrypt patient identifiers before submitting their data to MPA, or alternatively MPA will encrypt their data, will send a file containing encrypted and actual identifiers to the reporting hospital, and then will remove actual identifiers from MPA's database. This approach permits linking data without retaining actual patient identifiers and permits hospitals to retrieve actual patient records for validation of data whenever necessary. MHA and MPA has excellent arrangements to maintain data security (see Appendix 4 for further details) and have received, merged, and analyzed highly sensitive health data for many years without a breach in security.

Merging, Cleaning, and Analyzing Data

Analytic staff at MPA will process data received from hospitals and will merge these data to create a consolidated hybrid database. This database will be evaluated to determine the consistency and plausibility of data. The enhancement of administrative data with numerical laboratory data will permit MPA to detect obvious individual inconsistencies (e.g., case with the first pH on the day of admission of 7.41 that has acidosis coded as a secondary diagnosis present on admission; case with a principal diagnosis of osteoarthritis and a knee replacement performed on the first hospital day that has sepsis coded as a secondary diagnosis present on admission) and more subtle institutional inconsistencies (e.g., a hospital with 14 of 43 cases with principal diagnoses of pneumonia that have normal white blood cell counts). Participating hospitals will be given information about questionable data and will have an opportunity to correct errors when they are identified. Inconsistent and implausible data either will be corrected or will be flagged as having questionable validity.

MPA will analyze a reference research database that contains administrative and clinical data elements to develop preliminary risk-adjustment models for selected inpatient quality indications and patient safety indicators using data elements being collected for the pilot project. Predictive models for mortality will be developed for five medical Inpatient Quality Indicators (IQI; acute myocardial infarction [IQI 15], congestive heart failure [IQI 16], acute stroke [IQI 17], gastrointestinal hemorrhage [IQI 18], and pneumonia [IQI 20]), for one surgical IQI (coronary artery bypass graft surgery [IQI 12]) and for one procedural IQI (percutaneous transluminal coronary angioplasty [IQI 30]). Predictive models also will be developed for four post-operative complications validated using laboratory data to confirm their occurrence after admission (respiratory failure [Patient Safety Indicator; PSI 11], pulmonary embolism or deep vein thrombosis [PSI 12], sepsis [PSI 13], and acute myocardial infarction [not currently monitored as a PSI]). These risk-adjustment models will be developed using the same methods MPA employed to create and evaluate risk adjustment models for the study of “Enhancement of Claims Data to Improve Risk Adjustment of Hospital Mortality” published in JAMA 297(1), 71-76 on January 3, 2007. Analyses of these clinical outcomes also will evaluate the structure of the IQIs and PSIs themselves to determine whether additional clinical data can be used to improve the validity of outcome measures as well as the accuracy of risk-adjustment.

Use of this reference data set will permit the study team to “jump-start” the analytic phase of this research with a large high-quality, well-validated database that parallels data being collected from participating hospitals. Because adequate data for development of risk-adjusted models for IQIs and PSIs will not be available until fairly late in the second year of the project, completion of preliminary analytic work in the first year will be important to ensure the timely completion of the project. Creating preliminary models using a large reference data set will permit analyses to begin before prospective data are available from participating hospitals. Prospective data then can be used to refine and validate models and to explore differences between numerical laboratory data abstracted from medical records and numerical laboratory data captured electronically and processed according to different algorithms to identify which results qualify to be used as valid risk factors. Also, preliminary models created using reference data will serve as benchmarks to assist in assessing the quality of data collected and transmitted by participating hospitals and in identifying and solving problems in data specification, collection, transmission, and aggregation during rather than after a full year of data have been collected. This approach will permit more extensive and detailed analyses of merged data than could be completed if analyses were delayed until adequate prospective data were collected.

In addition to predictive models for categorical outcomes used as quality and patient safety indicators, MPA will develop predictive models for hospital length of stay for uncomplicated live discharges admitted for medical care and for post-operative length of stay for uncomplicated live discharges admitted for surgical procedures. Techniques to select and calibrate variables and validate these predictive models will parallel those used to select and calibrate variables and validate predictive models for adverse outcomes except that analytic techniques appropriate for continuous rather than categorical variables will be employed (e.g., linear rather than logistic regression). Complicated cases will be identified based on their unusually long risk-adjusted lengths of stay compared to patients hospitalized for the same medical condition or surgical procedure. The normal upper bound for risk-adjusted lengths of stay for cases discharged alive from individual hospitals will be computed using control charts with outliers removed and upper

bounds recalibrated until all live discharges have risk-adjusted lengths of stay that are shorter than the computed upper confidence limit. (See Pine M. Crafting valid, relevant measures of clinical performance. In: Kongstvedt PR, Plocher DW, editors. Best Practices in Medical Management. Gaithersburg: Aspen Publishers; 1998. Chapter 35 for a more detailed description of this method of identifying complicated cases.) These predictive models will be developed using reference data and will be applied to prospective data from a Minneapolis hospital whenever sufficient data are available to compute an accurate upper bound for a medical condition or a surgical procedure. The percentage of cases discharged alive with prolonged risk-adjusted lengths of stay that do not have at least one secondary diagnosis coded as not having been present on admission will be computed. These percentages will be reported to hospitals along with standard rates based on overall results from participating hospitals and identifiers of cases suspected of having hospital-acquired complications that were not coded as such. Hospitals with high rates of prolonged risk-adjusted lengths of stay that are not associated with reported hospital-acquired complications will be advised to validate their coding practices and permitted to submit corrected administrative and/or clinical data.

Using techniques described above, MPA has detected substantial variation among hospitals in the quality of their application of present-on-admission codes and in the completeness of their coding hospital-acquired complications. MPA anticipates similar findings when Minnesota hospitals begin using present-on-admission modifiers and enhancing their administrative data submission with numerical laboratory data. Achieving a satisfactory degree of accuracy and completeness in coding will be a challenge for MHA, MPA, and participating hospitals. On the other hand, the projected use of present-on-admission coding to determine hospital reimbursement (i.e., differential reimbursement depending upon whether specific secondary diagnoses were comorbidities present on admission or hospital-acquired complications) makes the development of powerful data-quality screening methods and evaluation of their usefulness in programs to improve data quality well worth the effort.

MPA will prepare data quality reports for each hospital whenever information of importance becomes available. Upon completion of analyses for this pilot project, MPA will prepare comparative performance reports for participating hospitals for each outcome assessed. Data in these reports will be aggregated to levels sufficient to insure patient confidentiality.

C. Coordination and Management of Project Staff and Activities

MHA and MPA will coordinate their efforts to capitalize on the unique capabilities of each organization. MHA will provide leadership and will serve as a bridge between local and peer-group participants and stakeholders and the technical and analytical capabilities of MPA's project team. MHA's project team has considerable experience working with Minnesota hospitals to collect electronic data and has strong roots in the Minnesota healthcare community. MPA's tightly knit team has extensive experience as consultants and sub-contractors on developmental and pilot projects such as this.

MHA has a longstanding commitment to transparency in the area of hospital performance and has worked with its hospital membership to create useful databases and provide comparative analyses to inform the public and support clinical and administrative quality improvement. As a hospital association, its core competency is convening and collaborating with hospitals to

achieve common objectives such as creating more useful centralized databases or advocating for or against a particular piece of legislation. MHA has decades of experience cost-effectively and securely managing the collection of the administrative data for more than 600,000 hospitalizations and over six million emergency room and ambulatory care visits annually. In this pilot project, MHA will apply its documented experience and proven expertise, build on its excellent rapport with its hospital constituency and, at the same time, improve its current hospital database and enhance its position as a leader in health data acquisition, integration, and dissemination.

MHA will be assisted by MPA, which has been a leading innovator in the measurement and improvement of clinical quality since its inception in 1988. It has been an advocate of present-on-admission coding for almost two decades and began advancing the concept of using hybrid administrative-clinical data sets to measure risk-adjusted hospital performance more than a decade ago. Its work for AHRQ under Contract #233-02-0088, Task Order 13: Adding Clinical Data Elements to Administrative Data for Hospital-Level Quality Reporting has provided valuable information used that will aid in completing this project successfully.

MPA is nationally recognized for its expertise in measuring risk-adjusted hospital outcomes using administrative, laboratory, and pathophysiological data. The firm has extensive experience and expertise in combining administrative and clinical databases to support the measurement of comparative risk-adjusted hospital outcomes. It has worked with numerous large and small hospitals to develop customized protocols for data collection and transmission and has successfully merged administrative and clinical data sets for analyses of hospital performance. MPA's recent work for AHRQ on the effect of adding increasingly complex clinical data to administrative data on the quality of risk-adjustment models for hospital mortality and surgical complications has been cited as a basis for the currently proposed pilot project.

The staff of MPA has a clear understanding of the past 15 years of research in the field of hospital performance monitoring and has made original contributions to this field. Dr. Pine has written and lectured extensively on this subject. The firm has extensive experience combining rigorous statistical methods with clinical and operational insight to create performance measures and risk-adjustment equations that have excellent predictive power and that are reliable, clinically plausible, statistically valid, and operationally sound. It has prepared numerous reports of comparative hospital performance and has dissected reasons for observed variations in analytic results. The firm has often been required to compare alternative measures and risk-adjustment models and to recommend the best approach to achieve our clients' goals. Many developmental and analytic techniques commonly used in this field today were pioneered by MPA.

While the overall concept and design of this pilot project are relatively straightforward, the interrelationship of the tasks required to complete it successfully make careful, skilled coordination and management essential. Responsibility for the overall management of this project will rest with its Project Director, Mark Sonneborn, a senior manager at MHA with extensive experience in developing and managing health information systems. He also will have

direct responsibility for managing collaboration with the multiple stakeholders whose support and participation are essential for the pilot's success.

Michael Pine, the Associate Project Director, will lead MPA's technical team. As founder and president of MPA, Dr. Pine has 19 years of experience managing projects of this nature and working closely with clients to enhance their capabilities and achieve their goals. He will maintain close contact with Mr. Sonneborn to ensure that MHA and MPA achieve maximum synergy in achieving the objectives of the pilot. Dr. Pine also will have direct responsibility for managing all data analyses, preparation and dissemination of related technical and analytical information and reports, and the transfer of technology from MPA to MHA and potential beneficiaries of this developmental effort. Dr. Pine will report directly to Mr. Sonneborn.

Joseph Schindler, a seasoned senior manager at MHA, will serve as Project Manager, with day-to-day responsibility for monitoring and coordinating efforts and for solving unanticipated problems that may occasionally arise. In this capacity, he will work closely with Mr. Sonneborn and Dr. Pine covering all aspects of the project. He also will have direct responsibility for managing the development of an implementation plan, for information-sharing and dissemination activities, and for preparation of a final report. Mr. Schindler will report directly to Mr. Sonneborn.

Barbara Jones, MPA's Vice President for Data Management and Analysis, will have direct responsibility for managing the collection, exchange, merging, cleaning, and managing of the electronic data required to create and utilize the hybrid hospital administrative-clinical data set envisioned in AHRQ's RFP. In this capacity, Ms. Jones will work directly with management and data personnel at participating hospitals and related data intermediaries to assist them in implementing cost-effective methods of data retrieval and transmission of data required to create the desired centralized database and will have direct responsibility for maintaining data security throughout the process of data transmission and retention at MPA's facility. Ms. Jones has almost two decades of experience managing these functions for MPA. Ms. Jones will report directly to Dr. Pine.

MHA's Information Services (IS staff - Neil Negstad, Gayle Kayfes, Jaclyn Roland, Bonnie Gazda) staff will be primarily involved in the implementation plan, electronic exchange and linking of data sets and information sharing and dissemination activities and report directly to Joseph Schindler. While initial participation will be to ensure ongoing collection of the administrative data, MHA's IS staff will also collaborate with both stakeholder hospitals and MPA to develop data handling and linking methodologies. The plan for implementing collection of present on admission (POA) data will primarily fall to MHA. MPA will take the lead in the initial phases of the clinical data linkages and the transfer its methods, lessons learned and proposed reports to MHA IS staff for dissemination. Neil Negstad will be primarily responsible for modifying systems to accommodate accepting the administrative data with additional clinical data. Gayle Kayfes, senior programmer analyst, will work to develop data integrity checks, establish data linkage protocols and report routines for Jaclyn Roland and Bonnie Gazda in their roles of data tracking, editing and report functions.

MHA's Education department, headed by Peggy Westby, Vice President, Education, will be involved in the planning and execution of at least two stakeholder meetings with hospitals: an initial kick-off meeting and a project wrap-up. Mark Sonneborn will coordinate the communications and planning for these events.

It is anticipated MHA's patient safety department, headed by Tania Daniels, Vice President of Patient Safety, and working with Julie Apold, Director, will provide assistance with identifying key patient safety data elements and analyzing merged data results. Their insights and expertise administering Minnesota's Adverse Health Events registry will be invaluable in evaluating the patient safety and quality measures within the scope of this project. Mark Sonneborn will coordinate their participation in the project.

Donald Fry will contribute additional clinical and research expertise to the pilot project. Dr. Fry will report directly to Dr. Pine. Roger Meimban will perform advanced SAS programming and support data manipulation and analyses. Dr. Meimban will report directly to Ms. Jones. Carolyn Dixon will provide administrative and clerical support to the MPA team. Ms. Dixon will report directly to Dr. Pine.

Because MHA and MPA are relatively compact organizations with highly collaborative corporate styles, service-oriented corporate cultures, and long experience assuming the roles they will assume in this pilot project, informal mechanisms that support internal communication, quality and cost control, effective and efficient resource utilization, and responsiveness to the needs of external parties will be extremely useful in ensuring satisfactory management of this pilot project.

MHA and MPA anticipate some unanticipated internal problems arising in the course of this pilot project, but the experience and expertise of the two groups should be more than adequate to manage them successfully. On the other hand, MHA and MPA both anticipate difficulties obtaining high quality data from participating hospitals whose information services departments are generally stretched thin because of high turnover rates and a chronic lack of qualified personnel to meet the ever-increasing demands upon these units. Because of MHA's excellent relationships with information departments at Minnesota hospitals and MPA's expertise and experience obtaining high quality data from hospitals experiencing the anticipated difficulties, MHA and MPA believe these difficulties will not be insurmountable. By customizing data collection and transmission protocols and providing strong, experienced, user-friendly support, MPA will minimize the added burden of this project to hospital information departments and reinforce their willingness to cooperate. Furthermore, because these problems will arise whenever hospitals attempt to enhance centralized administrative databases, knowledge gained identifying and working to overcome problems arising at contributing hospitals should be extremely useful in facilitating the successful creation of fully functional hybrid hospital administrative-claims databases by statewide health data organizations throughout the nation.

Appendix 1 TIMETABLE

Time	Activity
10/1/2007 – 1/15/2008	Recruit hospitals and advisory groups Prepare for orientation meeting in St. Paul
1/15/2008	Orientation meeting in St. Paul Organize advisory groups Complete recruitment of hospitals
1/15/2008 – 2/15/2008	Collaborate with hospitals and advisory groups to prepare preliminary protocols for data collection and transmission
1/15/2008 – 3/31/2008	Test, modify, and implement protocols for data collection and transmission utilizing advisory groups as required
1/15/2008 – 6/30/2008	Develop protocols to merge and clean data from hospitals to create an integrated hybrid (i.e., clinical/administrative) database
4/1/2008 – 3/31/2009	Hospitals collect and transmit electronic data Assist hospitals with data collection and transmission problems as they arise utilizing advisory groups as required
7/1/2008 – 9/30/2008 & Quarterly thereafter	Evaluate each quarter of electronic data from hospitals for consistency and quality and for analytic comparability to reference data
9/1/2008 – 9/30/2008 & Quarterly thereafter	Prepare and send data quality reports to hospitals Assist hospitals with data collection and transmission problems uncovered by quality analyses utilizing advisory groups as required
4/1/2009 – 5/31/2009	Transfer data management protocols from MPA to MHA Continue data collection, transmission, and database creation at MHA
4/1/2009 – 6/30/2009	Complete risk-adjusted model development and validation for selected IQIs and PSIs using hybrid database collected from Minnesota hospitals Compare these final models to preliminary models developed using Atlas™ data to uncover any potential problems with data
6/1/2009 – 8/31/2009	Prepare individual clinical quality reports for participating hospitals Transfer analytic protocols from MPA to MHA Prepare for summary conference in St. Paul for participating hospitals and advisory groups
9/2009	Summary conference with participating hospitals and advisory groups in St. Paul

Appendix 2 in Orientation Package = Appendix C in Implementation Plan

Appendix 3 in Orientation Package = Appendix D in Implementation Plan

Appendix 4 in Orientation Package = Appendix F in Implementation Plan

Present on Admission Reporting Guidelines

Introduction

These guidelines are to be used as a supplement to the *ICD-9-CM Official Guidelines for Coding and Reporting* to facilitate the assignment of the Present on Admission (POA) indicator for each diagnosis and external cause of injury code reported on claim forms (UB-04 and 837 Institutional).

These guidelines are not intended to replace any guidelines in the main body of the *ICD-9-CM Official Guidelines for Coding and Reporting*. The POA guidelines are not intended to provide guidance on when a condition should be coded, but rather, how to apply the POA indicator to the final set of diagnosis codes that have been assigned in accordance with Sections I, II, and III of the official coding guidelines. Subsequent to the assignment of the ICD-9-CM codes, the POA indicator should then be assigned to those conditions that have been coded.

As stated in the Introduction to the ICD-9-CM Official Guidelines for Coding and Reporting, a joint effort between the healthcare provider and the coder is essential to achieve complete and accurate documentation, code assignment, and reporting of diagnoses and procedures. The importance of consistent, complete documentation in the medical record cannot be overemphasized. Medical record documentation from any provider involved in the care and treatment of the patient may be used to support the determination of whether a condition was present on admission or not. In the context of the official coding guidelines, the term “provider” means a physician or any qualified healthcare practitioner who is legally accountable for establishing the patient’s diagnosis.

General Reporting Requirements

These requirements pertain to all claims involving inpatient admissions to general acute care hospitals or other facilities that are subject to a law or regulation mandating collection of present on admission information.

Present on admission is defined as present at the time the order for inpatient admission occurs -- conditions that develop during an outpatient encounter, including emergency department, observation, or outpatient surgery, are considered as present on admission.

POA indicator is assigned to principal and secondary diagnoses (as defined in Section II of the Official Guidelines for Coding and Reporting) and the external cause of injury codes.

Issues related to inconsistent, missing, conflicting or unclear documentation must still be resolved by the provider.

If a condition would not be coded and reported based on UHDDS definitions and current official coding guidelines, then the POA indicator would not be reported.

Reporting Options

Y – Yes

N – No

U – Unknown

W – Clinically undetermined

Unreported/Not used – (Exempt from POA reporting)

Reporting Definitions

Y = present at the time of inpatient admission

N = not present at the time of inpatient admission

U = documentation is insufficient to determine if condition is present on admission

W = provider is unable to clinically determine whether condition was present on admission or not

Assigning the POA Indicator

Condition is on the “Exempt from Reporting” list

Leave the “present on admission” field blank if the condition is on the list of ICD-9-CM codes for which this field is not applicable. This is the only circumstance in which the field may be left blank.

POA Explicitly Documented

Assign Y for any condition the provider explicitly documents as being present on admission.

Assign N for any condition the provider explicitly documents as not present at the time of admission.

Conditions diagnosed prior to inpatient admission

Assign “Y” for conditions that were diagnosed prior to admission (example: hypertension, diabetes mellitus, asthma)

Conditions diagnosed during the admission but clearly present before admission

Assign “Y” for conditions diagnosed during the admission that were clearly present but not diagnosed until after admission occurred.

Diagnoses subsequently confirmed after admission are considered present on admission if at the time of admission they are documented as suspected, possible, rule out, differential diagnosis, or constitute an underlying cause of a symptom that is present at the time of admission.

Condition develops during outpatient encounter prior to inpatient admission

Assign Y for any condition that develops during an outpatient encounter prior to a written order for inpatient admission.

Documentation does not indicate whether condition was present on admission

Assign “U” when the medical record documentation is unclear as to whether the condition was present on admission. “U” should not be routinely assigned and used only in very limited circumstances. Coders are encouraged to query the providers when the documentation is unclear.

Documentation states that it cannot be determined whether the condition was or was not present on admission

Assign “W” when the medical record documentation indicates that whether or not the condition was present on admission cannot be clinically determined.

Chronic condition with acute exacerbation during the admission

If the code is a combination code that identifies both the chronic condition and the acute exacerbation, see POA guidelines pertaining to combination codes.

Assign “Y” if the combination code only identifies the chronic condition and not the acute exacerbation (e.g., acute exacerbation of CHF).

Conditions documented as possible, probable, suspected, or rule out at the time of discharge

If the final diagnosis contains a possible, probable, suspected, or rule out diagnosis, and this diagnosis was suspected at the time of inpatient admission, assign “Y.”

If the final diagnosis contains a possible, probable, suspected, or rule out diagnosis, and this diagnosis was based on symptoms or clinical findings that were not present on admission, assign “N”.

Conditions documented as impending or threatened at the time of discharge

If the final diagnosis contains an impending or threatened diagnosis, and this diagnosis is based on symptoms or clinical findings that were present on admission, assign “Y”.

If the final diagnosis contains an impending or threatened diagnosis, and this diagnosis is based on symptoms or clinical findings that were **not** present on admission, assign “N”.

Acute and Chronic Conditions

Assign “Y” for acute conditions that are present at time of admission and N for acute conditions that are not present at time of admission.

Assign “Y” for chronic conditions, even though the condition may not be diagnosed until after admission.

If a single code identifies both an acute and chronic condition, see the POA guidelines for combination codes.

Combination Codes

Assign “N” if any part of the combination code was not present on admission (e.g., obstructive chronic bronchitis with acute exacerbation and the exacerbation was not present on admission; gastric ulcer that does not start bleeding until after admission; asthma patient develops status asthmaticus after admission)

Assign “Y” if all parts of the combination code were present on admission (e.g., patient with diabetic nephropathy is admitted with uncontrolled diabetes)

If the final diagnosis includes comparative or contrasting diagnoses, and both were present, or suspected, at the time of admission, assign “Y”.

For infection codes that include the causal organism, assign “Y” if the infection (or signs of the infection) was present on admission, even though the culture results may not be known until after admission (e.g., patient is admitted with pneumonia and the provider documents pseudomonas as the causal organism a few days later).

Obstetrical conditions

Whether or not the patient delivers during the current hospitalization does not affect assignment of the POA indicator. The determining factor for POA assignment is whether the pregnancy complication or obstetrical condition described by the code was present at the time of admission or not.

If the pregnancy complication or obstetrical condition was present on admission (e.g., patient admitted in preterm labor), assign “Y”.

If the pregnancy complication or obstetrical condition was not present on admission (e.g., 2nd degree laceration during delivery, postpartum hemorrhage that occurred during current hospitalization, fetal distress develops after admission), assign “N”.

If the obstetrical code includes more than one diagnosis and any of the diagnoses identified by the code were not present on admission assign “N”.

(e.g., Code 642.7, Pre-eclampsia or eclampsia superimposed on pre-existing hypertension).

If the obstetrical code includes information that is not a diagnosis, do not consider that information in the POA determination.

(e.g. Code 652.1x, Breech or other malpresentation successfully converted to cephalic presentation should be reported as present on admission if the fetus was breech on admission but was converted to cephalic presentation after admission (since the conversion to cephalic presentation does not represent a diagnosis, the fact that the conversion occurred after admission has no bearing on the POA determination).

Perinatal conditions

Newborns are not considered to be admitted until after birth. Therefore, any condition present at birth or that developed in utero is considered present at admission and should be assigned “Y”. This includes conditions that occur during delivery (e.g., injury during delivery, meconium aspiration, exposure to streptococcus B in the vaginal canal).

Congenital conditions and anomalies

Assign “Y” for congenital conditions and anomalies. Congenital conditions are always considered present on admission.

External cause of injury codes

Assign “Y” for any E code representing an external cause of injury or poisoning that occurred prior to inpatient admission (e.g., patient fell out of bed at home, patient fell out of bed in emergency room prior to admission)

Assign “N” for any E code representing an external cause of injury or poisoning that occurred during inpatient hospitalization (e.g., patient fell out of hospital bed during hospital stay, patient experienced an adverse reaction to a medication administered after inpatient admission)

**Codes and Categories EXEMPT
From “Diagnosis Present on Admission” Requirement**

Note: “Diagnosis present on admission” for these code categories are exempt because they represent circumstances regarding the healthcare encounter or factors influencing health status that do not represent a current disease or injury or are always present on admission

137-139, Late effects of infectious and parasitic diseases
268.1, Rickets, late effect
326, Late effects of intracranial abscess or pyogenic infection
438, Late effects of cerebrovascular disease
650, Normal delivery
660.7, Failed forceps or vacuum extractor, unspecified
677, Late effect of complication of pregnancy, childbirth, and the puerperium
905-909, Late effects of injuries, poisonings, toxic effects, and other external causes
V02, Carrier or suspected carrier of infectious diseases
V03, Need for prophylactic vaccination and inoculation against bacterial diseases
V04, Need for prophylactic vaccination and inoculation against certain viral diseases
V05, Need for other prophylactic vaccination and inoculation against single diseases
V06, Need for prophylactic vaccination and inoculation against combinations of diseases
V07, Need for isolation and other prophylactic measures
V10, Personal history of malignant neoplasm
V11, Personal history of mental disorder
V12, Personal history of certain other diseases
V13, Personal history of other diseases
V14, Personal history of allergy to medicinal agents
V15, Other personal history presenting hazards to health
V16, Family history of malignant neoplasm
V17, Family history of certain chronic disabling diseases
V18, Family history of certain other specific conditions
V19, Family history of other conditions
V20, Health supervision of infant or child
V21, Constitutional states in development
V22, Normal pregnancy
V23, Supervision of high-risk pregnancy
V24, Postpartum care and examination
V25, Encounter for contraceptive management
V26, Procreative management
V27, Outcome of delivery
V28, Antenatal screening
V29, Observation and evaluation of newborns for suspected condition not found
V30-V39, Liveborn infants according to type of birth
V42, Organ or tissue replaced by transplant
V43, Organ or tissue replaced by other means
V44, Artificial opening status
V45, Other postprocedural states
V46, Other dependence on machines
V49.60-V49.77, Upper and lower limb amputation status

V49.81-V49.84, Other specified conditions influencing health status
 V50, Elective surgery for purposes other than remedying health states
 V51, Aftercare involving the use of plastic surgery
 V52, Fitting and adjustment of prosthetic device and implant
 V53, Fitting and adjustment of other device
 V54, Other orthopedic aftercare
 V55, Attention to artificial openings
 V56, Encounter for dialysis and dialysis catheter care
 V57, Care involving use of rehabilitation procedures
 V58, Encounter for other and unspecified procedures and aftercare
 V59, Donors
 V60, Housing, household, and economic circumstances
 V61, Other family circumstances
 V62, Other psychosocial circumstances
 V64, Persons encountering health services for specific procedures, not carried out
 V65, Other persons seeking consultation
 V66, Convalescence and palliative care
 V67, Follow-up examination
 V68, Encounters for administrative purposes
 V69, Problems related to lifestyle
 V70, General medical examination
 V71, Observation and evaluation for suspected condition not found
 V72, Special investigations and examinations
 V73, Special screening examination for viral and chlamydial diseases
 V74, Special screening examination for bacterial and spirochetal diseases
 V75, Special screening examination for other infectious diseases
 V76, Special screening for malignant neoplasms
 V77, Special screening for endocrine, nutritional, metabolic, and immunity disorders
 V78, Special screening for disorders of blood and blood-forming organs
 V79, Special screening for mental disorders and developmental handicaps
 V80, Special screening for neurological, eye, and ear diseases
 V81, Special screening for cardiovascular, respiratory, and genitourinary diseases
 V82, Special screening for other conditions
 V83, Genetic carrier status
 V84, Genetic susceptibility to disease
 V85 Body Mass Index
 V86 Estrogen receptor status

E800-E807, Railway accidents
 E810-E819, Motor vehicle traffic accidents
 E820-E825, Motor vehicle nontraffic accidents
 E826-E829, Other road vehicle accidents
 E830-E838, Water transport accidents
 E840-E845, Air and space transport accidents
 E846-E848, Vehicle accidents not elsewhere classifiable
 E849.0-E849.6, Place of occurrence
 E849.8-E849.9, Place of occurrence

E883.1, Accidental fall into well
E883.2, Accidental fall into storm drain or manhole
E884.0, Fall from playground equipment
E884.1, Fall from cliff
E885.0, Fall from (nonmotorized) scooter
E885.1, Fall from roller skates
E885.2, Fall from skateboard
E885.3, Fall from skis
E885.4, Fall from snowboard
E886.0, Fall on same level from collision, pushing, or shoving, by or with other person, In sports
E890.0-E89.9, Conflagration in private dwelling
E893.0, Accident caused by ignition of clothing, from controlled fire in private dwelling
E893.2, Accident caused by ignition of clothing, from controlled fire not in building or structure
E894, Ignition of highly inflammable material
E895, Accident caused by controlled fire in private dwelling
E897, Accident caused by controlled fire not in building or structure
E898.0-E898.1, Accident caused by other specified fire and flames
E917.0, Striking against or struck accidentally by objects or persons, in sports without subsequent fall
E917.1, Striking against or struck accidentally by objects or persons, caused by a crowd, by collective fear or panic without subsequent fall
E917.2, Striking against or struck accidentally by objects or persons, in running water without subsequent fall
E917.5, Striking against or struck accidentally by objects or persons, object in sports with subsequent fall
E917.6, Striking against or struck accidentally by objects or persons, caused by a crowd, by collective fear or panic with subsequent fall
E919, Accidents caused by machinery
E921.0-E921.9, Accident caused by explosion of pressure vessel
E922.0-E922.9, Accident caused by firearm and air gun missile
E924.1, Caustic and corrosive substances
E926.2, Visible and ultraviolet light sources
E927, Overexertion and strenuous movements
E928.0-E928.8, Other and unspecified environmental and accidental causes
E929.0-E929.9, Late effects of accidental injury
E959, Late effects of self-inflicted injury
E970-E978, Legal intervention
E979, Terrorism
E981.0-E980.9, Poisoning by gases in domestic use, undetermined whether accidentally or purposely inflicted
E982.0-E982.9, Poisoning by other gases, undetermined whether accidentally or purposely inflicted
E985.0-E985.7, Injury by firearms, air guns and explosives, undetermined whether accidentally or purposely inflicted
E987.0, Falling from high place, undetermined whether accidentally or purposely inflicted, residential premises

E987.2, Falling from high place, undetermined whether accidentally or purposely inflicted,
natural sites

E989, Late effects of injury, undetermined whether accidentally or purposely inflicted

E990-E999, Injury resulting from operations of war

POA Examples

General Medical Surgical

1. Patient is admitted for diagnostic work-up for cachexia. The final diagnosis is malignant neoplasm of lung with metastasis.

Assign “Y” on the POA field for the malignant neoplasm.. The malignant neoplasm was clearly present on admission, although it was not diagnosed until after the admission occurred.

2. A patient undergoes outpatient surgery. During the recovery period, the patient develops atrial fibrillation and the patient is subsequently admitted to the hospital as an inpatient.

Assign “Y” on the POA field for the atrial fibrillation since it developed prior to a written order for inpatient admission.

3. A patient is treated in observation and while in Observation, the patient falls out of bed and breaks a hip. The patient is subsequently admitted as an inpatient to treat the hip fracture.

Assign “Y” on the POA field for the hip fracture since it developed prior to a written order for inpatient admission.

4. A patient with known congestive heart failure is admitted to the hospital after he develops decompensated congestive heart failure.

Assign “Y” on the POA field for the congestive heart failure. The ICD-9-CM code identifies the chronic condition and does not specify the acute exacerbation.

5. A patient undergoes inpatient surgery. After surgery, the patient develops fever and is treated aggressively. The physician’s final diagnosis documents “possible postoperative infection following surgery.”

Assign “N” on the POA field for the postoperative infection since final diagnoses that contain the terms “possible”, “probable”, “suspected” or “rule out” and that are based on symptoms or clinical findings that were not present on admission should be reported as “N”.

6. A patient with severe cough and difficulty breathing was diagnosed during his hospitalization to have lung cancer.

Assign “Y” on the POA field for the lung cancer. Even though the cancer was not diagnosed until after admission, it is a chronic condition that was clearly present before the patient’s admission.

7. A patient is admitted to the hospital for a coronary artery bypass surgery. Postoperatively he developed a pulmonary embolism.

Assign “N” on the POA field for the pulmonary embolism. This is an acute condition that was not present on admission.

8. A patient is admitted with a known history of coronary atherosclerosis, status post myocardial infarction five years ago is now admitted for treatment of impending myocardial infarction. The final diagnosis is documented as “impending myocardial infarction.”

Assign “Y” to the impending myocardial infarction because the condition is present on admission.

9. A patient with diabetes mellitus developed uncontrolled diabetes on day 3 of the hospitalization.

Assign “N” to the diabetes code because the “uncontrolled” component of the code was not present on admission.

10. A patient is admitted with high fever and pneumonia. The patient rapidly deteriorates and becomes septic. The discharge diagnosis lists sepsis and pneumonia. The documentation is unclear as to whether the sepsis was present on admission or developed shortly after admission.

Query the physician as to whether the sepsis was present on admission, developed shortly after admission, or it cannot be clinically determined as to whether it was present on admission or not.

11. A patient is admitted for repair of an abdominal aneurysm. However, the aneurysm ruptures after hospital admission.

Assign “N” for the ruptured abdominal aneurysm. Although the aneurysm was present on admission, the “ruptured” component of the code description did not occur until after admission.

12. A patient with viral hepatitis B progresses to hepatic coma after admission.

Assign “N” for the viral hepatitis B with hepatic coma because part of the code description did not develop until after admission.

13. A patient with a history of varicose veins and ulceration of the left lower extremity strikes the area against the side of his hospital bed during an inpatient hospitalization. It bleeds profusely. The final diagnosis lists varicose veins with ulcer and hemorrhage.

Assign “Y” for the varicose veins with ulcer. Although the hemorrhage occurred after admission, the code description for varicose veins with ulcer does not mention hemorrhage.

Obstetrics

1. A female patient was admitted to the hospital and underwent a normal delivery.

Leave the “present on admission” (POA) field blank. Code 650, Normal delivery, is on the “exempt from reporting” list.

2. Patient admitted in late pregnancy due to excessive vomiting and dehydration. During admission patient goes into premature labor

Assign “Y” for the excessive vomiting and the dehydration. Assign “N” for the premature labor

3. Patient admitted in active labor. During the stay, a breast abscess is noted when mother attempted to breast feed. Provider is unable to determine whether the abscess was present on admission

Assign “W” for the breast abscess.

4. Patient admitted in active labor. After 12 hours of labor it is noted that the infant is in fetal distress and a Cesarean section is performed

Assign “N” for the fetal distress.

Newborn

1. A single liveborn infant was delivered in the hospital via Cesarean section. The physician documented fetal bradycardia during labor in the final diagnosis in the newborn record.

Assign “ Y” because the bradycardia developed prior to the newborn admission (birth).

2. A newborn developed diarrhea which was believed to be due to the hospital baby formula.

Assign “ N” because the diarrhea developed after admission.

Table 5: Summary For Each IQI Showing Individual Variables By Model Levels 2 Through 5

Variable ¹	Label	AAA Repair	AMI	CABG	CHF	Cran-iotomy	CVA	Pneum-onia	GI Hem-orrhage
Laboratory values on admission (Level 2)									
L2_M3039	SGOT		x	x	x	x	x	x	x
L2_M3070_3_4	CPK MB		x		x			x	x
L2_M3180	K	x	x		x		x	x	x
L2_M3200	Na		x	x	x	x	x	x	x
L2_M3297	Troponin I				x		x	x	
L2_M3300	pH	x	x	x	x	x	x	x	x
L2_M3314_23	PO2.sat		x	x	x		x	x	x
L2_M3317	pCO2		x		x	x	x	x	x
L2_M3463_60	International Normalized Ratio Prothrombin	x	x		x	x	x	x	x
L2_MC3030	Albumin		x		x			x	x
L2_MC3040	Base Excess		x			x	x	x	
L2_MC3048	Total Bilrubin				x				x
L2_MC3050	Calcium						x	x	x
L2_MC3080	Creatinine		x				x		x
L2_MC3170	Glucose		x			x	x	x	
L2_MC3206	Alkaline phosphatase					x			
L2_MC3260	Blood urea nitrogen		x	x	x	x		x	x
L2_MC3560	Hematocrit							x	
L2_MC3600	Platelets		x		x	x	x	x	x
L2_MC3660	White blood cells		x		x	x	x	x	x
Vital signs on admission and other lab values (level 3)									
L3_4005_NE4700	Blood/Lymph Culture-Positive							x	
L3_M4023_NE4700	GI except Biliary Culture-Positive							x	
L3_M5010	Pulse	x	x		x		x	x	x
L3_M5020	Systolic Blood Pressure		x		x	x	x	x	x
L3_M5024	Diastolic Blood Pressure		x		x			x	
L3_M5030	Respiration		x		x		x	x	x
L3_M5532	Ejection Fraction		x	x					
L3_MC5000	Temperature		x		x		x	x	x

Summary Table For Each IQI Showing Individual Variables By Model Levels 2 Through 5

Variable ¹	Label	AAA Repair	AMI	CABG	CHF	Cran-iotomy	CVA	Pneumonia	GI Hemorrhage
Detailed abstraction of clinical conditions (level 4)									
L4_M1000_9401	Brain Mass						x		
L4_M1000_9481_9584	Abdominal/GI except Biliary Mass						x		
L4_M1043	Severe Malnutrition		icd		icd			icd	icd
L4_M1321_9453	Respiratory Effusion						x		x
L4_M1321_9441	Chest Effusion				icd		icd		icd
L4_M1321_OTH	Cardiac Effusion								x
L4_M1399_9541	Systemic Edema				x				
L4_M1400_1407_9441	Respiratory Inflammation/Infection						icd		
L4_M2010	Coma/Stupor		icd		icd	icd	icd	icd	icd
L4_M2020	Lethargy		x		x				
L4_M2100_02_08_4900	High Risk Acute Neurologic Disorder				x				
L4_M2100_4900	Acute Paresis						x		
L4_M2108_4900	Acute Flaccidity		x				x		
L4_M5513	Intraventricular Conduction Disturbance		icd						
L4_M819	Immunocompromised			x					
L4_M817	History Peripheral Vascular Disease		x	x					
L4_M828_831	Previous CABG / Heart Valve Prosthesis			icd					
L4_MD1105	Decubitus Ulcer								icd
L4_M832	History of CHF			x					
L4_M840	History of Chronic Lung Disease	icd							
L4_M890	Current Med: Anticoagulant								x
L4_M892	Current Med. Immunosuppressive Agent		x	x			x		x
Abstraction of clinical summary scores (level 5)									
L5_ASA3	ASA CLASS	x		x					
L5_MD5043_46	Coma Score		x		x	x	x		

¹Core data includes age, sex, principal diagnoses, secondary diagnoses, and procedure with the hospital day on which each procedure was performed. "icd" indicates that the data element has a corresponding ICD-9-CM code

Summary Table For Each PSI Showing Individual Variables by Model Level 2 Through 5

Variable ¹	Label	Postop pulmonary embolism or deep vein thrombosis	Postop physiologic or metabolic derangement	Postop respiratory failure	Postop sepsis
Laboratory values on admission (Level 2)					
L2_M3039	SGOT			x	
L2_M3060	CPK		x		x
L2_M3070_3_4	CPK MB			x	
L2_M3180	K		x		
L2_M3200	Na	x		x	
L2_M3300_V_1	pH	x	x		x
L2_M3314_23	PO2.sat	x			x
L2_M3450	PTT	x	x	x	
L2_M3463_60	INR:PT	x			x
L2_MC3030	Albumin	x			
L2_MC3080	Creatinine		x	x	
L2_MC3260	Blood urea nitrogen	x			x
L2_MC3560	Hematocrit	x			
L2_MC3600	Platelets			x	
L2_MC3660	White blood count	x		x	x
Vital signs on admission (level 3)					
L3_4005_NE4700	Blood/Lymph Culture-Positive				x
L3_M5010	Pulse	x		x	
L3_MC5000	Temp				x

Summary Table For Each PSI Showing Individual Variables by Model Level 2 Through 5

Variable ¹	Label	Postop pulmonary embolism or deep vein thrombosis	Postop physiologic or metabolic derangement	Postop respiratory failure	Postop sepsis
Detailed abstraction of clinical conditions (level 4)					
L4_M1001_9441	Respiratory Lesion	x		x	
L4_M1323_1351_9455	Vascular Aneurysm / Bleeding		x		
L4_M1361_9441_OTH	Skin Edema	icd			icd
L4_M1373_9441	Brain Stenosis	x			
L4_M1373_9455	Respiratory Stenosis	x			
L4_M1399_9521	Skin Tear	x			
L4_M1500	CHF			icd	
L4_M2100_4900_OTH	Seizure	icd			
L4_M810	History of Cancer				icd
L4_M833	Chronic Renal Disease		icd		
L4_M840_5050	Chronic Lung Disease / Apneic Episode			icd	
L4_M890	Current Med. Anticoagulant	x			
L4_M892	Current Med. Immunosuppressive Agent	x			
L4_M894	Current Med. Insulin		x	x	
L4_MANY_4905	Chronic Neurologic Findings			x	
Abstraction of clinical summary scores (level 5)					
L5_ASA	ASA CLASS	x	x	x	x
L5_MD5043	Coma Score	x			

¹Core data includes age, sex, principal diagnoses, secondary diagnoses, and procedure with the hospital day on which each procedure was performed.
 "icd" indicates that the data element has a corresponding ICD-9-CM code

Appendix F

DATA SECURITY HYBRID HOSPITAL DATABASE PROJECT Minnesota Hospital Association

MHA's offices include personal computers for all employees including several laptop computers for meetings. Executives are also equipped with Blackberry organizers and cell phones for ease of communications with members, partners and colleagues. MHA makes use of four servers for processing UB administrative data. These servers run a combination of Microsoft Windows, SQL, SPSS and Visual Basic products.

The MHA office is a secured office within a building that has cardkey access for employees only after hours and security services personnel available during non business hours. The UB administrative data is housed in a secured computer server room with cardkey access for authorized personnel only. The network topology is configured such that the servers are behind multiple layers of firewalls. Access to these servers from the network is also controlled and authorized for key personnel only with appropriate signed data use agreements. MHA has configured a secure FTP site for our member hospitals to facilitate data transfers. Data can also be accepted on CD-ROM or DVD. MHA has signed HIPAA Business Associate and Data Use Agreements with all of its participating hospital members.

MPA's office is located in a secure building with a doorman and 24-hour security team. The office is locked when staff is not present. MPA specializes in the evaluation of risk-adjusted clinical outcomes and routinely receives, stores, and analyzes extremely sensitive data from health care providers. MPA has not experienced a breach of security or confidentiality in the 19 years the firm has been in existence.

MPA's office has two computer networks, one for general business operations and one for data storage and analysis. The networks are independent and access to each is restricted to employees with appropriate authorization. A high speed connection links the network used for general business operations to the internet through a state-of-the-art hardware firewall system. This permits electronic files to be sent and received. We also are able to configure secure FTP sites for our clients to facilitate data transfers. Data also can be accepted on CD-ROM or DVD.

Data for this project will be stored and analyzed on dedicated, networked computers in the office of MPA. The network used for data storage and analysis is closed and is physically inaccessible from the Internet. Once at MPA, data files will be password protected. Access to restricted patient-level data will be restricted to the following investigators and analytic staff: Michael Pine, M.D., M.B.A., Donald E. Fry, M.D., F.A.C.S., Barbara Jones, M.A., and Roger Meimban, Ph.D. All personnel with access to secured patient data are required to sign confidentiality agreements.

MPA recently upgraded its data storage and analysis systems. MPA runs its analyses on SUN servers on Solaris and Linux operating systems. There is currently space for nearly two terabytes of data and the capacity to expand to just over twenty terabytes. MPA maintains licenses with

SAS for their statistical software. Our systems have merged and analyzed numerous large, complex healthcare databases including national Medicare Part A and B data, HCUP hospital data, commercial insurance claims data, and Pennsylvania Health Care Cost Containment Council administrative and Atlas™ clinical databases.