

EVALUATION OF HEALTHCARE COST
AND UTILIZATION PROJECT (HCUP)
DATA IN HEALTHCARE RESEARCH

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DEFINITION OF TERMS

Healthcare Cost and Utilization Project (HCUP)

The HCUP is a system of databases that was first developed in 1994 and is sponsored by the Agency for Healthcare Research and Quality (AHRQ)¹. First collected in 1988, this family of interrelated databases contains inpatient, outpatient and emergency department patient information that is updated annually. The HCUP is a compilation of patient data gathered by state data organizations, hospital associations, private data organizations and the federal government. These combined efforts have made the HCUP into the largest collection of multi-year hospital care data in the United States¹.

Nationwide Inpatient Sample (NIS)

The Nationwide Inpatient Sample (NIS) is the largest database in the United States that provides inpatient information on up to 8 million hospital stays in a given year. This value continues to increase with the availability of data sources. Currently, the data is collected from 45 participating states comprising a total of 1051 hospitals¹. The NIS provides charge information on patients that use Medicare, Medicaid, private insurance companies or have no insurance. Hospital and county identifiers are included to allow investigators to link the NIS data to various data sets such as the National Hospital Discharge Survey (NHDS) and the National Survey of Ambulatory Surgery (NSAS)¹. Some of the variables that are included within the NIS database are primary and secondary diagnoses, procedures, admission status, discharge status,

demographic information, expected payment source, total charge information, length of stay and hospital information (e.g., ownership, size, teaching status)¹.

Kids' Inpatient Database (KID)

The Kids' Inpatient Database (KID) focuses on child health data and is the only database in the United States that provides all-payer inpatient data for children. All-payer inpatient data includes payment information from Medicaid and Medicare, private health insurance, and self-insured employer plans. Like the NIS database, the KID has a large sample size that allows for the investigation of rare conditions. These include diseases, treatments, and population characteristics¹.

Nationwide Emergency Department Sample (NEDS)

The Nationwide Emergency Department Sample (NEDS) is the largest all-payer emergency department patient sample in the nation¹. This database was comprised from data found in the State Emergency Department Database (SEDD) and the State Inpatient database (SID). (Figure-2)

State Emergency Department Database (SEDD)

The SEDD is comprised from patient data from 27 states and concentrates on “treat and release” outpatients that leave the hospital soon after emergency treatment¹.

State Inpatient Database (SID)

The SID has patient data from 46 states and focuses on patients that use the emergency department as a point of entry and are later transferred to other departments to become a part of the inpatient sample¹.

State Ambulatory Surgery Database (SASD)

The State Ambulatory Surgery Database (SASD) is comprised of patient data from 30 different states that focuses on same-day surgery and release¹.

Figure 1- Department of Health and Human Services Organizational Structure

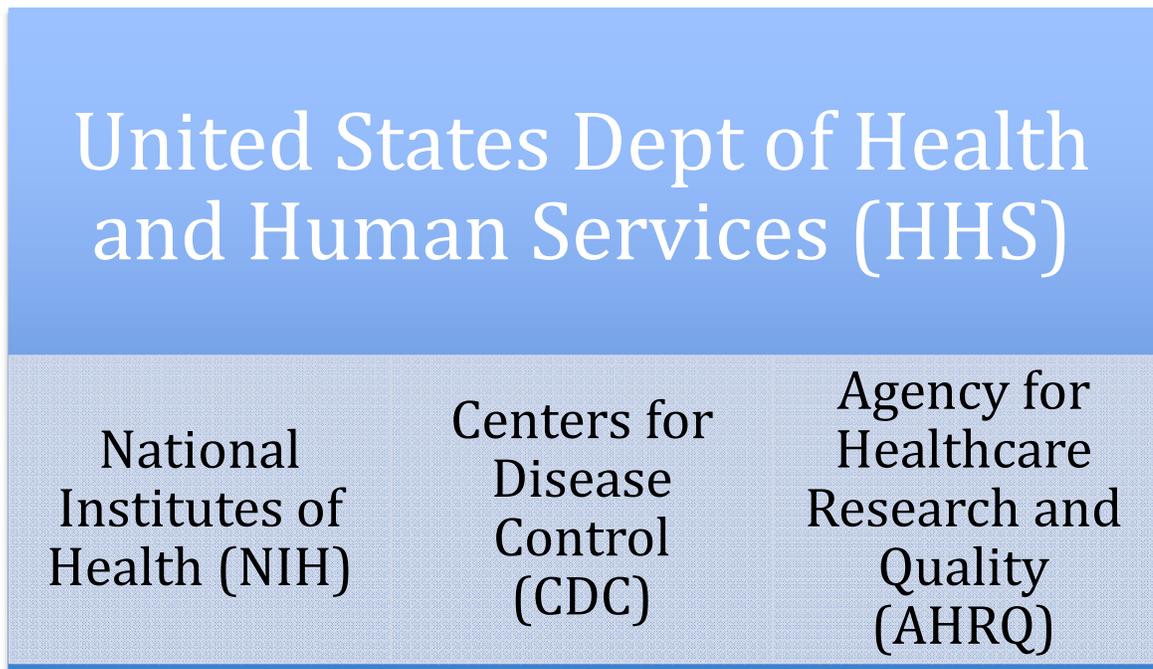
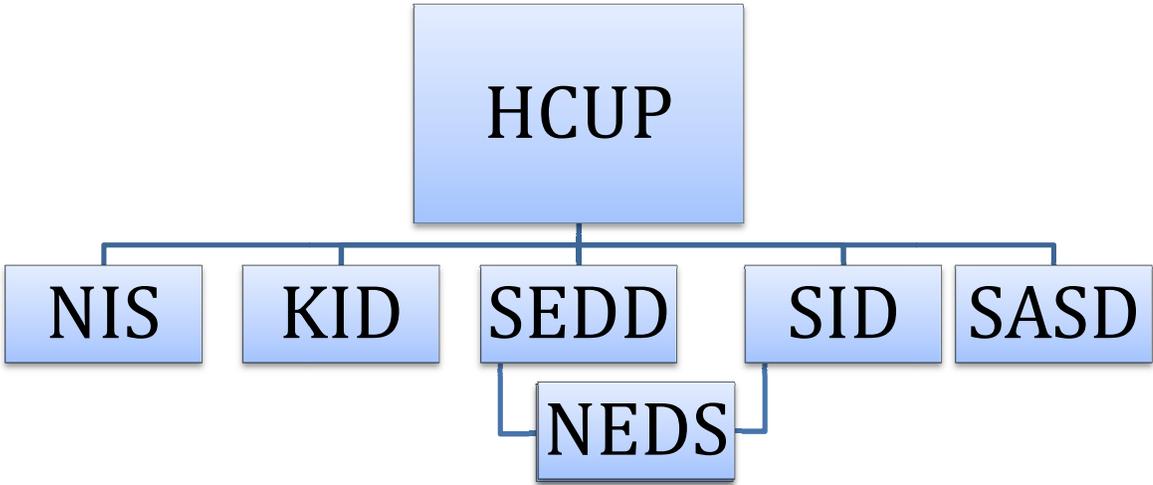


Figure 2- AHRQ's HCUP Database. Note: lines represent relationships between smaller databases



CHAPTER I

INTRODUCTION

Specific Aims

The practicum project is designed to address the following specific aims:

1. To examine the historical background and development of the AHRQ and the HCUP database
2. To conduct a systematic literature review to assess how HCUP data has been used in past research studies and identify categories of subsequent healthcare improvements
3. To demonstrate an understanding of clinical research management techniques while coordinating the preliminary stages of a current HCUP study

Organization of the Practicum Project

This practicum project begins by providing the history of the AHRQ and the subsequent development of the HCUP database. A systematic literature review of research articles that have utilized any of the HCUP sub-databases are discussed in detail. Categories of healthcare improvements were developed based on the specific areas of impact that were provided with each HCUP study. These categories provide insight into studies that have utilized the HCUP and analyze the impact this research has had on healthcare quality improvement.

Clinical Research Management techniques taught at the University of North Texas Health Science Center and reinforced in the Internship Practicum were used in the preliminary

development of a current HCUP study. The study entitled “assessing the association between hospital characteristics and mortality rates in acute myocardial infarction patients” is currently being conducted by the Epidemiology Department in the Institute of Health Care Research and Improvement within the Baylor Health Care System.

CHAPTER II

SIGNIFICANCE

Historical Healthcare Contributions of AHRQ and HCUP

The United States Department of Health and Human Services (HHS) is comprised of 12 agencies, but only three of these are classified as organizations. These organizations (Figure-1) include the National Institutes of Health (NIH), the Centers for Disease Control and Prevention (CDC) and the Agency for Healthcare Research and Quality (AHRQ)¹. The NIH funds and conducts research that is geared toward preventing, detecting, and diagnosing diseases that range from rare genetic disorders to the rhinovirus (common cold). The CDC focus is primarily on improving national health through development of methods for disease prevention and awareness. The CDC is responsible for the control of chronic diseases/disabilities, environmental health and bioterrorism threats. The AHRQ is an essential part of the HHS and its main focus is to conduct healthcare research that will serve as a guideline for improving clinical outcomes and inform government policy makers¹.

The AHRQ focuses on improving healthcare services for all Americans through sponsored research projects. The AHRQ mission¹ is to “improve the quality, safety, efficiency and effectiveness of health care for all Americans”. The goal of the AHRQ is to finance and support resources, such as HCUP, in order to have a positive impact on health policy and future research endeavors¹.

The AHRQ was formerly known as the Agency for Healthcare Policy and Research (AHCPR) and was created with the passage of the Omnibus Budget Reconciliation Act (OBRA) of 1989¹. The AHCPR was formed in response to growing concerns over the numerous types of medical treatment methods used and whether or not these treatments were even cost-effective and beneficial in the majority of cases. The goal of AHCPR was to establish a system of quality healthcare that is easily accessible and beneficial to patients². In order for health practitioners and administrators to meet these new guidelines and expectations, the AHCPR supported healthcare research. The AHCPR became the AHRQ after the passage of the Healthcare Research and Quality Act of 1999². Since the publication of *Crossing the Quality Chasm*³ (2001) by the Institute of Medicine, the AHRQ has shifted its primary aim toward improving patient safety via limiting medical error. This shift has resulted in overall quality improvement (QI) that has aided in the development of updated Clinical Practice Guidelines (CPGs)³. These common guidelines help establish expectations that must be met by everyone involved in healthcare practice and policy making. Physicians can use the CPGs as a tool to help identify and manage the treatment of various types of diseases in ways that are most efficient and cost effective. The healthcare industry can utilize CPGs as a way to monitor healthcare availability and quality improvement³.

The AHRQ, during the development of CPGs, decided to enlist the Institute of Medicine (IOM) for assistance in the technical jargon that would be used to define the attributes of good clinical practice. The IOM was responsible for the key words that would come to explain the most effective and most up-to-date medical treatment options utilized in clinical practices². The two guidelines that the IOM followed are: (1) explicit, rigorous and systematic methodology and (2) the use of the most recent medical evidence available. Therefore, the development of CPGs would be an evolving process dedicated to keeping up with the constant changes in medical science and research². Congress developed the Forum for Quality and Effectiveness in Healthcare in order to ensure that CPG guidelines would stay relevant and be continually updated. OBRA 1989 laid out these specific guidelines for CPG development:

1. Guidelines must be based on the best available research and professional judgment³
2. Guidelines must be presented in formats appropriate for use not only by physicians, but also by other healthcare practitioners, providers, medical educators, medical review organizations and consumers³
3. Guidelines must include treatment-specific information or contain specific recommendations for clinical treatments and conditions in forms appropriate for use in clinical practice, educational programs, and quality and appropriateness review³

Overall, CPGs must include translations of technical jargon that can be understood by any person working in a medically related field and any layperson receiving the medical treatment. The guidelines must involve current research only. CPGs must contain explicit

treatment options that can be utilized clinically, educationally, and for quality improvement review³. The AHRQ has been instrumental in the development of a common language used among healthcare professionals when determining the quality of care each patient will receive¹. The subsequent development of the HCUP databases allowed for secure storage of patient data from across the nation⁴.

The HCUP is a system of databases that was first developed in 1994 and sponsored by the newly renamed Agency for Healthcare Research and Quality (AHRQ)⁴. This family of interrelated HCUP databases contains inpatient, outpatient, and emergency department information that was first collected in 1988. The HCUP is compiled by patient data reported by state data organizations, hospital associations, private data organizations and the federal government. These combined efforts have made the HCUP into the largest collection of multi-year hospital care data in the United States⁴.

The pivotal role of HCUP in the development of national healthcare improvement efforts can be explained by a study “Harnessing the power of enhanced data for healthcare quality improvement: lessons from a Minnesota Hospital Association pilot project”. This study was conducted in response to the increased efforts of the United States government to standardize patient health data via the transfer of paper records into computerized databases⁵. The AHRQ led this effort by extending a 2-year contract to the Minnesota Hospital Association (MHA) to assess how the development of hybrid data sets can affect quality, cost and reliability of patient care⁵. Hybrid data sets are a compilation of both clinical patient data and hospital administrative data. Clinical patient data contain quantitative information such as laboratory values that can be used

to determine “Present-on-admission (POA)” status of a diagnosis and the overall severity of an illness. Administrative data contain limited clinical data that include diagnoses during the current hospital visit and the procedures that were performed during the stay⁵. Administrative data represent all patients that received care at the specific institution and contain easily accessible data at low cost to the institution. Despite administrative data advantages, pairing to a clinical data source will provide a more comprehensive view of the healthcare provided⁵. For example, if laboratory values can help distinguish between previous conditions and arising complications, then hospitals will be less likely to be penalized for patient illnesses that happened prior to admission⁵. Also, hybrid databases will allow for data linkage and analysis on a nationwide scale, instead of just analyzing patient data from a particular institution within one specific state.

The AHRQ recognized the need to establish the feasibility of introducing a hybrid database system into a hospital system⁵. The MHA study allowed for the ability to determine that hybrid databases such as HCUP increase the accuracy of quality measures and rankings, decrease the cost of quality reporting, and create a reliable data system within all of the participating hospitals⁵.

HCUP Impact on Health Policy

Healthcare Impact

Like CPGs, there are other methods used by hospital management and hospital practitioners that streamline the process of defining a patient’s illness in terms of specific diagnosis, treatment options and billing codes. The CPGs designate the most cost efficient and effective treatment that will be used. But the specific diagnosis given and the billing codes used for insurance purposes are determined by International Classification of Diseases (ICD) codes

and Diagnosis Related Group⁶ (DRG) codes, respectively. The HCUP database includes ICD codes in the inpatient information that it collects from hospitals nationwide.

Since the Affordable Care Act (ACA) was passed in the spring of 2010, all federally funded institutions have been required to collect and report race, ethnicity, and language data. These healthcare-reporting provisions will result in increased data availability and a broader understanding of the overall status of healthcare in the United States². This national effort will eventually lead to complete reporting of race and ethnicity data by all 50 states. As it is, every year shows an increase in the number of states participating in the HCUP database.

These nationwide improvements on race and ethnicity reporting efforts will have an impact on the quality of care received by minority populations. Nearly 33% of the United States population is comprised of people of color⁷. Despite this, this cohort represents 50% of the uninsured population. In response to the lower quality of care for ethnic minorities, the AHRQ developed the National Healthcare Disparities Report (NHDR)⁷. The goal of the NHDR is to improve upon the current healthcare system by decreasing avoidable costs and preventable injuries during hospital visits. In order to make the most profound impact, these improvements must be made at the State level⁷. An HCUP study, “State documentation of racial and ethnic health disparities to inform strategic action” identified 8 states that have already made strides to improve upon their level of disparity⁷. The states that were analyzed in the study include Colorado, Connecticut, Georgia, Maryland, New Jersey, New Mexico, Rhode Island and Utah. These states were chosen based upon their commitment to improve state health reform by efficient data reporting methods and preparation of subsequent action plans. These states also take advantage of a range of state departments to create an entire system of disparity prevention. The purpose of identifying these exemplary states is to provide a guideline for quality

improvement that can be emulated by the remaining states. Once all 50 states have developed disparity reporting methods and action plans, then HCUP can help illustrate how the quality of care for different ethnic groups differs nationwide⁷. This study will increase awareness of healthcare disparities in certain ethnic groups and increase funding opportunities for related studies. Overall, the goal of the study is to create a national partnership through individualized state action.

Sociological Impact

Mental and substance abuse disorders can have a profound impact not only on the patients, but also on their families, friends and co-workers. The National Institute of Mental Health projects that 1 in 4 Americans (over the age of 18 years) suffer from a mental disorder each year⁸. Mental disorders are also documented as the primary cause of disability among workers in Canada and the United States. Substance abuse is defined as the dependence or abuse of alcohol and/ or drugs (including prescription drugs). In 2007, the Institute of Addiction Medicine reported that 23.2 million Americans over the age of 12 received treatment for substance abuse⁸. The statistics prove that diagnosing patients with these types of disorders must involve careful instructions from the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)*⁸. DRG codes involving mental disorders are informed through the DSM-IV. Unfortunately, this type of DRG reporting for administrative purposes does not provide significant information on the functional status of the patient. If functional status (e.g., mental state) were documented upon admission and before discharge of the patient, then severity of the disorder can easily be classified by pairing data from the National Comorbidity Survey (NCS-R) to ICD 9 codes. Once severity of the mental or substance abuse disorder is established,

subsequent hospital utilization by the patient can be measured⁸. This data will provide insight into the extent of healthcare utilization by patients who suffer from mental and substance use disorders and at different levels of severity.

An HCUP data report entitled “A severity-of-illness classification for mental and substance-use disorders for use with hospital administrative data” used the SID and SEDD to measure the validity of severity classification⁸. The study showed a strong positive correlation between functional status and inpatient admission following a visit to the emergency department. Functional measures are considered to be strong predictors of mortality rates at 90 days post hospitalization⁸. These results, when applied to administrative data, will increase overall health policy and available analysis tools for these specific disorders.

CHAPTER III

BENEFITS

Nationwide Sampling/ Inpatient Sampling

Utilization of HCUP data has many benefits. HCUP data provides an opportunity to analyze the quality, cost, delivery, and disparities of healthcare provided on a national level, not just on a limited population with specific payment methods or age ranges. This enables researchers to get a more uniform data set that better represents the population⁴.

Quality Indicators

Jiang et al.⁹ and colleagues used the QIs established by HCUP in 1994 to analyze the quality of care in New York State hospitals and identify certain areas that are most in need of improvement. Another study by Johantgen, Elixhauser, Bali, et al.¹⁰ involved QI's and used HCUP data to address clinical performance of hospitals specifically, instead of using other factors such as patient satisfaction or staff efficiency¹⁰. The QI's were found to be helpful because they “produce rates that represent measures of outcomes (mortality and complications), utilization, and access.”¹⁰

Examination of Socioeconomic Issues

HCUP data has been used to examine socioeconomic issues, such as those reviewed in a study by Chevarley, Owens, Bardet, et al.¹¹ examining the effect of urban influence on the quality of health care received by children and youth in different counties in the United States. HCUP has also been used to examine issues that are difficult to quantify, such as the topic studied by Rudman¹² that focused on identifying domestic violence among inpatient samples. Demographic characteristics of victims, type, and cost of domestic violence were identified and used to assess which types of patients were more likely to be targeted and experience domestic violence in their relationships¹².

Administrative Data Linkage

Databases, such as the HCUP, provide a valuable data source to clinical researchers, because they allow an investigative team to start their research at the analytical stage of the data collection process. Alternatively, beginning a study with the primary data collection stage can be

extremely time consuming and costly. A study done by McClish, Penberthy, Whittemore, et al.¹³ proposed the benefits of using administrative databases when compared to research conducted from the primary data collection phase. This study influenced the development of databases, such as HCUP, in order to have readily available information on overall healthcare costs and the utilization of healthcare resources by different hospital types. Investigators in this study also successfully assessed individual patients by linking data sources from Medicare and cancer registries¹³. Similar studies at the time were focusing on the entire population level of patients and overall incidence rates were being analyzed. But, by combining the use of administrative databases and linking different data sources, this study was able to get more detailed results on individual patients without spending extra time gathering each data point.

CHAPTER IV

LIMITATIONS

Despite the major benefits that come from the use of the HCUP database, there are also studies that stress the need for careful consideration that must be used in order to prevent bias or underreporting of certain variables (e.g., rare diseases and underrepresented patient groups).

Limitations of the HCUP database include the following:

- Limited availability of clinical data
- Possible bias from coding inaccuracies

- Inability to show complete episode of care
- Lack of representation of all hospital types
- Lack of information on revenue or cost
- Varied data elements between different states

A study conducted by Penberthy, McClish, Pugh, et al.¹⁴ at the Virginia Commonwealth University and titled “Using Hospital Discharge Files to Enhance Cancer Surveillance” gives an example of limited availability of clinical data in the HCUP database. Statewide hospital discharge file (HDF) databases, such as the HCUP, are less likely to capture complete incidents of breast, cervical, colorectal, lung and prostate cancer. When statewide HDFs are paired with smaller hospital-based cancer registries, cancer surveillance is significantly enhanced. However, the conclusion discusses that this positive result is mostly shown in hospitals with “lower rates of reporting completeness”¹⁴ and hospitals with higher rates of completeness will be less likely to show any benefit.

Lezzoni, Foley, Daley, et al.¹⁵ conducted a study entitled “Comorbidities, complications, and coding bias: does the number of diagnosis codes matter in predicting in-hospital mortality?” This study did not include any of the HCUP databases in the data analysis, but still provides a discussion of the impact coding bias can have on healthcare databases and patient mortality. The study set out to examine the impact of the Medicare program decision to increase the number of diagnosis codes reported from five to nine. Investigators are confident that if diagnosis coding were complete and accurate, then administrative databases will be able to predict patient outcomes with accuracy. The results did not support the Medicare decision to add more coding spaces. Often, comorbid conditions were still not coded, despite the availability of up to 24

coding spaces in hospitals designated as “heavy coders.” Investigators also stressed the importance of this study for policymakers to understand that clinical assessments based only on ICD-9 coding will have considerable limitations.¹⁵

Souvignet, Frebourg and Baril¹⁶ conducted a study to identify patients with nosocomial infections due to *Staphylococcus aureus*. They also wanted to use HCUP to identify patients at risk for development of the same type of infection. In a letter to the editor of *Infection Control and Hospital Epidemiology*, the investigators discussed limitations of the HCUP database that prevented them from determining which procedures and medical devices were most likely responsible for subsequent nosocomial infections. They reported that HCUP had many gaps in the data that included hospital variables (hospital type, size) and did not report exact dates of procedures and diagnoses. These limitations did not allow the study to identify patient populations at risk of developing nosocomial *S. aureus* infections and patient populations that could benefit from a preventative vaccine.¹⁶

CHAPTER V

PRACTICUM PROJECT MANAGEMENT STRATEGIES

Effective Communication

Successful management techniques begin and end with improved methods of communication. The Epidemiology Department internship site showed effective communication between the Principal Investigator and the Project Manager, the Project Manager and the Interns

performing the data abstractions. Above all, it was a positive learning environment that enabled the CRM intern to interact with employees at every level of involvement in the research study and with various degrees of expertise/training.

Progress Meetings

Progress meetings at the internship site started with the first committee meeting which set a standard of professionalism and timeliness for the duration of the internship practicum. Monthly meetings with the Principal Investigator and the Project Manager allowed the CRM Intern to obtain proper instructions and feedback on previously completed work. All questions were answered in a constructive way that provided a mechanism for all opinions and suggestions to be taken into consideration.

Briefings on Expectations/ Rounding

Briefings were similar to progress meetings, but occurred less often and only for the purpose of providing new study personnel with instructions. Drs. Kudyakov and Ogola were each updated on the current aims of the HCUP MI study and were asked to contribute their expertise to the project. Dr. Kudyakov was in charge of using ICD9 codes to get the corresponding patient data from the HCUP database. Dr. Ogola assisted with the statistical analysis section of the IRB study protocol.

CHAPTER VI

PRACTICUM PROJECT MANAGEMENT DIFFICULTIES

Communication

Despite the progress meetings, briefings and general group cohesion at the Epidemiology Internship site, communication blocks occurred. Study aims, and even the project focus, were changed often, resulting in updated protocols. Each updated protocol posed a risk for possible errors in communication. These errors were quickly and easily rectified when discussed with the Principal Investigator, in order to meet the standards for the study.

Scheduling

One of the most difficult parts of the practicum project experience was managing the schedules of each of the committee members. It was easier to meet with each professor/mentor in person in order to get an immediate response or obtain signatures on important forms.

Bridging Specialties

Communication blocks can also occur when study personnel from different research backgrounds and with various specialties are required to explain their part of the study in a way

that can be easily interpreted by the most inexperienced team members. When the Principal Investigator is discussing common statistical techniques with the CRM intern, many questions may arise that can be answered through additional research in the subject or by seeking out other personnel within that field.

CHAPTER VII

SYSTEMATIC LITERATURE REVIEW

The Nationwide Inpatient Sample (NIS)

The Nationwide Inpatient Sample (NIS) is the largest database with the HCUP and provides inpatient information from over 1100 hospitals in the U.S.⁵ Utilization of this particular database allows researchers to compare HCUP inpatient data to other databases to provide a national representation of the current status of healthcare quality. Particular examples of this HCUP benefit will be discussed and supported with research utilizing the NIS database.

Gray, Deyo, Kreuter, et al.¹⁷ wanted to find a way to quantify the outpatient levels of ambulatory lumbar spine surgery and determine changing outpatient patterns when compared to inpatient data over time. Investigators developed a data analysis using the Nationwide Inpatient Sample (NIS) data compared with outpatient data collected from both the National Hospital Discharge Survey (NHDS) and the National Survey of Ambulatory Surgery (NSAS). The number of inpatient lumbar surgeries remained relatively stable compared to the outpatient data

that increased over time¹⁷. The authors concluded that the increase in the outpatient lumbar surgeries was due to the safety and effectiveness of the discectomy procedure. A discectomy is the surgical removal of a herniated disc¹⁷. It is imperative that future research be conducted on the possibility of decreased costs with the use of this expedient outpatient procedure. It is also important to determine whether or not the decreased cost would be offset by a possible increase in surgical complications. Increased research on this topic would also lead to the development of quality improvement methods¹⁷. Limitations in this study included the definition of “ambulatory” surgery and how it differed between outpatient databases (defined as less than one day length of stay) and inpatient databases (defined as a two day length of stay). Overall, these differences did not severely impact the data¹⁷. The journal article discussed the benefits of using the NIS data. In 2000, when the study was being conducted, the NIS database was comprised of 28 states that represented 77% of the US population. It is important to note that when the inpatient and outpatient data were combined, documented ambulatory surgery rates were 25% higher than the rates represented by the inpatient database only¹⁷. This is a useful example to show how well the HCUP database can represent the current state of healthcare in the United States.

Christine, Cheryl, Chunliu, et al.¹⁸ conducted a study that used NIS data to analyze the relationship between nurse staffing and the occurrence of post-surgical adverse events from 1990 to 1996. An Adverse Event (AE) is defined as the presence of any sign, symptom, or disease in a clinical research subject during the use of the investigational clinical medicine or product¹⁸. The AE may not be directly linked to the use of the clinical research product, but must be documented to ensure that a proper investigation may be conducted. AE data was gathered from the NIS database and was paired with nurse staffing data from the American Hospital Association (AHA). The NIS database Quality Indicators (QIs) were used to determine which

specific adverse events would be chosen for the study¹⁸. QIs are defined as hospital administrative database variables that can be used to measure healthcare quality by improving areas of quality concern, increasing investigations, and tracking progress over time. The QIs for this study included: venous thrombosis or pulmonary embolism after major surgery, pulmonary compromise after major surgery, urinary tract infection after major surgery, and pneumonia after major surgery¹⁸. The use of the NIS database combined with the AHA data allowed them to find an inverse relationship between the amount of nurse staffing and the incidence of pneumonia as an adverse event after major surgery. The results did not provide concrete evidence to assume that the relationship above would always be found between staffing and adverse events, but their research contains enough information to advocate a hard look at the effect administrative decisions can have on the patient population¹⁸. The investigators acknowledge the need for further study on this topic.

The Kids' Inpatient Database (KID)

The Kids' Inpatient Database (KID) focuses on child health data and is the only database in the United States that provides all-payer inpatient data for children. Like the NIS database, the KID has a large sample size that allows for the investigation of rare conditions. These include diseases, treatments and population characteristics⁵.

Catlin¹⁹ wanted to investigate further into the survival of newborns that experience extremely long hospital stays. The term "living on the unit" is used to describe how these children grow up in a hospital environment due to debilitating health problems. In order to establish whether or not these extended hospital stays can be considered proper scientific progress, Catlin¹⁹ decided to use a method triangulation that used both quantitative and

qualitative data. Quantitatively, the HCUP-KID was used to gain access to 86.5% of all pediatric discharges that take place in U.S. hospitals. A length of stay (LOS) greater than 179 days selected for a total of 680 pediatric patients for the study. These newborns were then divided by weight, diagnosis (respiratory distress, sepsis, jaundice, and necrotizing enterocolitis) and discharge status. Qualitative data was gathered through a survey entitled LONGTERM, which included descriptive questions on parental/physician/nurse responses to caring for the newborns. This study provided a new way to look at palliative care as a measure of the quality of life instead of the length of life¹⁹.

The Nationwide Emergency Department Sample (NEDS)/ State Emergency Department Database (SEDD)/ State Inpatient Database (SID)/ State Ambulatory Database (SASD)

The Nationwide Emergency Department Sample (NEDS) is the largest all-payer emergency department patient sample in the nation⁵. This database was comprised with data from the State Emergency Department Database (SEDD) and the State Inpatient database (SID). The SEDD is comprised from patient data from 27 states and concentrates on “treat and release” outpatients that leave the hospital soon after emergency treatment⁵. The SID has patient data from 46 states and focuses on patients that use the emergency department as a point of entry and are later transferred to other departments to become a part of the inpatient sample. The State Ambulatory Surgery Database (SASD) is comprised of patient data from 30 different states that focuses on same-day surgery and release⁵.

A study completed by Hellinger²⁰ used HCUP data from the 2000 SID to ascertain the hospital utilization and treatment costs associated with Human Immunodeficiency Virus (HIV)

patients. Hospital utilization was investigated by the use of patient data from hospitals in 8 different states that represent 52% of the population infected with HIV. Treatment costs were analyzed by using data from hospitals in 6 different states that represent 39% of the HIV population²⁰. The states that were included in the study were chosen to encompass high and low prevalence of HIV in various regions in the US. The SID allowed investigators to examine the significant differences among sampled states when treatment cost and length of stay (LOS) were used as the main variables. The Hellinger²⁰ study emphasizes how the increased availability and distribution of HIV medications is responsible for the increase in the overall number of people with HIV. At first glance, this result might seem counterintuitive, but the positive correlation is explained by the increased survival rates of patients with access to HIV medication. There is also a decrease in the frequency of hospitalization of those infected with HIV, which is also due to the availability of medications that deter the development of HIV into Acquired Immune Deficiency Syndrome (AIDS). Utilization of the SID allowed this research to determine that states with more restrictions on availability of HIV medications are the same states that have higher frequency of hospitalization of patients with HIV. This research can impact public health policies and influence the availability and affordability of these necessary drug therapies²⁰.

Brousseau, Owens, Mosso, et al.²¹ conducted a study that used the SEDD to gather data from 8 states representing 33% of the US population with sickle cell disease. The analysis divided the patient data among six age groups ranging from 1 year to 65 years and above. Investigators used the primary expected payer data divided into four categories: public insurance (Medicaid, Medicare), private insurance, unknown/other, and no insurance/no charge²¹. The results of this study can influence hospital treatment strategies for sickle cell patients in order to reduce emergency room utilization and lower the rates of return visits. The young adult

population suffering from sickle cell was found to benefit the most from this research involving the SEDD.

Bird, et al.²² examined the “National rates of birth defects among hospitalized newborns” with HCUP data to approximate birth defects that are most readily recognized, to establish whether the public health costs and overall efforts are benefiting this specific patient population, and to determine other methods and improvements to be made. This study concluded that although HCUP was initially only meant to provide information on hospitalized patients only, the database can be used to approximate disease trends for entire populations. The investigators found that HCUP rates were more comparable to the rates from the 12 state-based newborn surveillance systems that did not include elective terminations in their data analysis²². They also identified a few problem areas where HCUP coding systems (ICD-9 codes) and Center for Disease Control (CDC) coding systems did not overlap, due to instances where either system used more specific descriptions of various disease types. With proper statistical adjustments for known limitations and assumptions, the investigators believe that these coding inconsistencies will not inhibit future research with the HCUP database²².

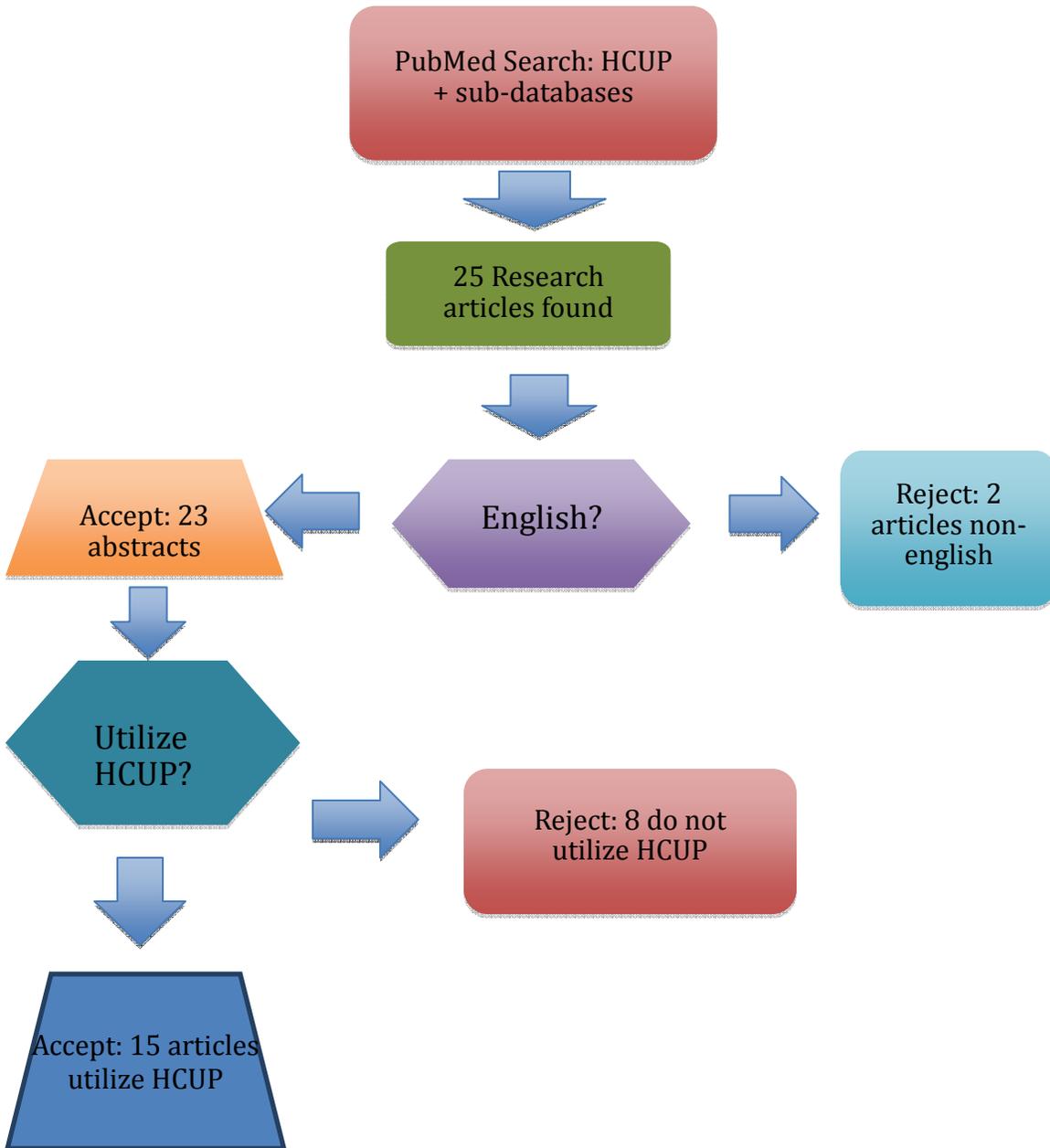
CHAPTER VIII

METHODOLOGY

Systematic Literature Review Process

A systematic literature search was conducted in September 2012 using PubMed. The literature search was for the following terms: HCUP or Healthcare Cost and Utilization Project or NIS or Nationwide Inpatient Sample or KID or Kids' Inpatient Database or NEDS or Nationwide Emergency Department Sample or SID or State Inpatient Databases or SASD or State Ambulatory Surgery Databases or SEDD or State Emergency Department Databases. The articles found were used to find historical background information on the development of the HCUP database and subsequent databases that include: NIS, KID, NEDS, SID, SASD and SEDD. The PubMed search was also used to compile a literature review of the utilization of HCUP in healthcare research. The search was limited to English language articles only. All abstracts were reviewed and full-text articles were reviewed only after they were found to be relevant to the research project. Of the 25 Studies that were reviewed, 15 were accepted for meeting the criteria of the practicum study.

Figure 4- PRISMA Chart: Literature Review Process



Development of HCUP Healthcare Improvement Categories

A healthcare impact chart (Table 1) used the articles included in the literature review and the benefit/limitations of HCUP to establish particular categories in healthcare⁶ that were significantly impacted by the involvement of the HCUP database. The categories included: Nationwide Healthcare Representation, Availability of Current and Effective Medical Techniques, Establishment of Concise Healthcare Guidelines, Explicit Clinical Treatment, Hospital Quality Improvement, Cost-efficient Treatment, and Hospital Administrative Improvement³.

Nationwide Healthcare Representation⁶ measures whether the HCUP data provided a current view of the status of healthcare on a nationwide spectrum. Specific medical conditions can be identified by their ICD9 codes included in the HCUP data from hospitals around the country. This allows for measurements of different patient populations that utilize different hospital types.

Availability of Current and Effective Medical Techniques⁶ measures whether or not the types of clinical methods and tools used on patients are up to date with current research findings. Also, it is important to determine if the current research is also the most effective method for specific types of patients.

Establishment of Concise Healthcare Guidelines⁶ measures the development and availability of healthcare guidelines that can be utilized by healthcare workers in any type of field. The guidelines must be easily understood, concise and informative.

Explicit Clinical Treatment⁶ measures the effect of the HCUP data had on the establishment of clinical treatment methods tailored specifically to different types of patient illnesses that may arise from neonatal birth defects, mental and substance abuse, and domestic violence. Each illness requires specific strategies starting with proper diagnosis and ending with

follow up treatment methods.

Hospital Quality Improvement⁶ measures how the HCUP data provided an opportunity to use Quality Indicators to establish progress reports in an effort to apply action strategies toward the ensuring equal quality of care for all patient types. This can range from patients with different ethnic backgrounds to patients in neonatal care.

Cost-efficient Treatment⁶ is similar to Availability of Current Medical Techniques because it focuses on the best treatment for the patient. Not only is current treatment important, but affordable treatment as well. The HCUP data can help determine how often patient populations suffering from a specific illness utilize emergency rooms and how often these patients return for hospital treatment. If ER visits can be minimalized, this will decrease treatment costs for both the patient and the hospital.

Hospital Administrative Improvement⁶ measures how the HCUP data can be used to improve and assess levels of staffing, degree of HCUP use and development within the hospital, and utilization of specific coding types for billing purposes (DRG codes).

The chart (Table-1) below shows each study included in the literature review, the Healthcare Improvement Categories that pertain to that particular study, and an explanation of the overall contribution to healthcare this study provided through the utilization of the HCUP database.

The Pie chart (Figure-5) shows the number of studies that serve as examples for each Healthcare Improvement Category. The Hospital Quality Improvement category contained 6 studies from the literature review, which made it the most represented category. Administrative Improvement (23%) was the second most represented category.

Table 1- Healthcare Improvement Categories

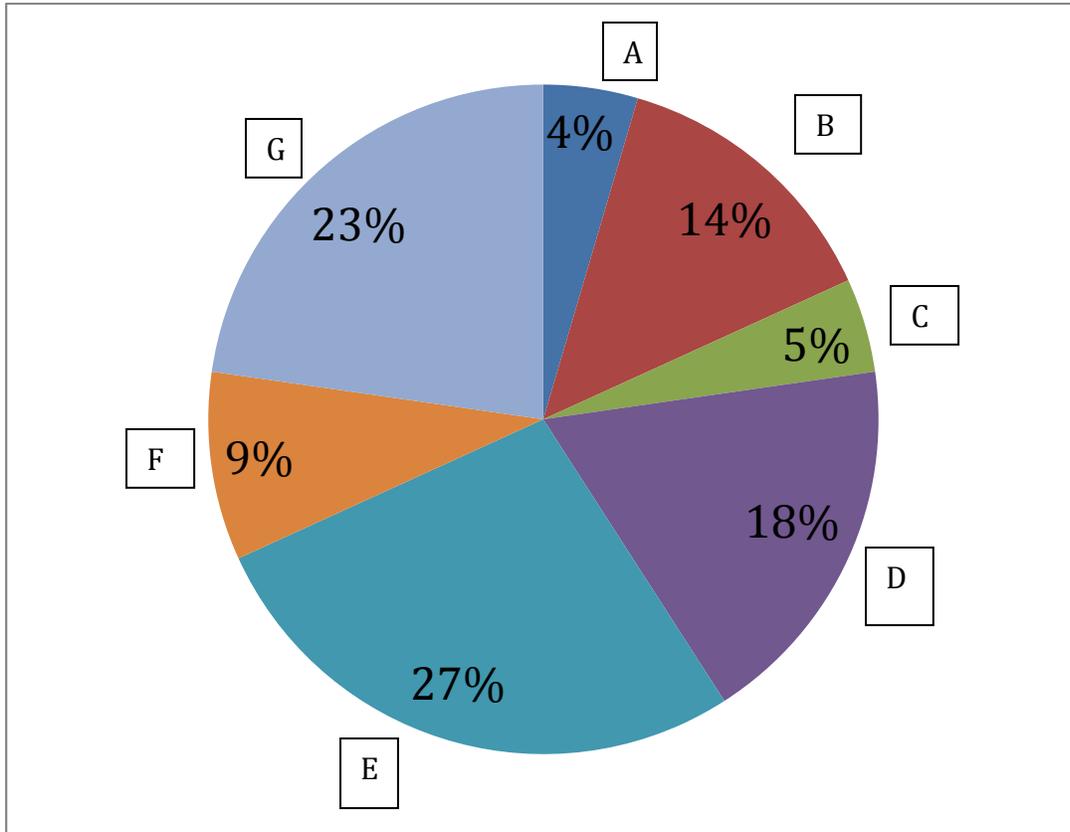
<i>Authors</i>	<i>Study Title</i>	<i>Healthcare Improvement Category</i>	<i>Explanation</i>	<i>Thesis Location (pg)</i>
Gray, Deyo, Kreuter, Mirza, Heagerty, Comstock, Chan	Population-based trends in volumes and rates of ambulatory lumbar spine surgery	1-Nationwide Healthcare Representation	NIS inpatient data was paired with outpatient data from NHDS and NSAS to provide a nationwide representation	Literature Review
Christine, Cheryl, Chunliu, Peter, Jayasree	Nurse staffing and post surgical adverse events: an analysis of administrative data from a sample of US hospitals	7-Administrative Improvement	Measured staffing effects on AE incidence and discussed the effects of administrative decisions on patient care	Literature Review
Catlin	Extremely long hospitalizations of newborns in the United States: data, descriptions, dilemmas	5-Hospital Quality Improvement	Qualitative data surveys were paired with Neonatal LOS data to measure quality of care	Literature Review
Hellinger	HIV patients in the HCUP database: A study of hospital utilization and costs	2-Availability of Current and Effective Medical Techniques	HIV medicine availability was determined to be a deciding factor in increased HIV prevalence and lower incidence of death	Literature Review
Brousseau, Owens, Mosso, Panepinto, Steiner	Acute care utilization and re hospitalizations for sickle cell disease	6-Cost-efficient Treatment	Sickle cell ER utilization by affected patient populations provided information on how to decrease utilization and save hospital resources and	Literature Review

			lower patient cost	
Bird, Hobbs, Cleves, Tilford, Robbins	National rates of birth defects among hospitalized newborns	4- Explicit Clinical Treatment 5-Hospital Quality Improvement	Birth defects can be readily identified through explicit clinical guidelines which improve quality of treatment and lower cost	Literature Review
Hanlon C, Rosenthal J, Hinkle L.	State documentation of racial and ethnic Health Disparities to inform strategic action	5- Hospital Quality Improvement	NHDR reporting on Race and Ethnic disparities informs states on how to improve upon quality of care for these specific population groups	Significance
Coffey R, Houchens R, Chu B, et al.	A severity-of-illness classification for mental and substance-use disorders for use with hospital administrative data	3- Established Concise Healthcare Guidelines 4- Explicit Clinical Treatment 7-Administrative Improvement 6-Cost efficient Treatment	HCUP reporting on Mental and substance abuse improve upon the established guidelines for diagnosis of these illness types and develops new clinical guidelines for administrative improvement based on more comprehensive coding methods	Significance
Jiang, Ciccone, Urlab, Boyd, Meeks, Horton	Adapting the HCUP QIs for hospital use: the experience in New York State	5- Hospital Quality Improvement	QIs help identify areas for quality improvement	Benefits
Johantgen, Elixhauser, Bali, Goldfarb, Harris	Quality indicators using hospital	4-Explicit Clinical Treatment	QIs used to identify explicit hospital clinical	Benefits

	discharge data: state and national applications	5- Hospital Quality Improvement	performance and increase quality improvement methods	
Chevarley, Owens, Zodet, Simpson, McCormick, Dougherty	Healthcare for children and youth in the United States: annual report on patterns of coverage, utilization, quality, and expenditures by a county level of urban influence	5- Hospital Quality Improvement	Urban quality of care was examined to improve quality of hospitals in these areas	Benefits
Rudman, Davey	Identifying domestic violence within inpatient hospital admissions using medical records	4- Explicit Clinical Treatment	Domestic violence victims can be easily identified through more comprehensive clinical guidelines and diagnosis methods	Benefits
McClish, Penberthy, Whittemore	Ability of Medicare claims data and cancer registries to identify cancer cases and treatment	7-Administrative Improvement	HCUP development and HCUP linkage to other data sources provides opportunities to expand current administrative databases	Benefits
Penberthy, McClish, Pugh, Smith, Manning, Retchin	Using hospital discharge files to enhance cancer surveillance	2- Availability of Current and Effective Medical Techniques 7-Administrative Improvement	Data pairing enables allows for enhanced cancer surveillance and effective medical techniques are immediately available, administrative database	Limitations

Souvignet, Frebourg, Baril	Identifying patients with severe hospital-acquired infections due to Staphylococcus aureus by using Healthcare Cost and Utilization Project (HCUP): Problems and pitfalls	2 Availability of Current and Effective Medical Techniques 7-Administrative Improvement	improvement Variable data group gaps within HCUP data provide areas of improvement to enhance availability of new techniques and improve administrative databases	Limitations
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Figure 5- Pie Chart: Healthcare Improvement Categories



- A- Nationwide Healthcare Representation
- B- Current and Effective Techniques
- C- Concise Healthcare Guidelines
- D- Explicit Clinical Treatment
- E- Hospital Quality Improvement**
- F- Cost-efficient Treatment
- G- Administrative Improvement

Coordination of Current Baylor MI Study

The Department of Epidemiology for the Institute of Health Care Research and Improvement (Baylor Health Care System) has started the preliminary stages of a study entitled “Assessing the association between hospital characteristics and in hospital mortality of acute myocardial infarction patients”. This study will be used to provide a specific example of a current study done using HCUP data. This section of the practicum project focuses on using clinical research management training to properly coordinate a study at the internship site. This involved completion of DUA training for all of the research team members, interacting with various levels of trained Baylor Employees, and the development of a research protocol for the Baylor IRB submission of the HCUP study.

Once the Baylor IRB approves the initial stage of the HCUP study, the Statistical Analysis System (SAS) will use the ICD9 codes involving Myocardial Infarction diagnoses (ICD 9- 410) to analyze the data and pair it with Geographical Information Systems (GIS) software to form a geographical representation of this disease outcome on a national scale.

Roles in HCUP Study/ Job Descriptions

Giovanni Filardo, Ph.D. - Dr. Filardo received his Ph.D. in Epidemiology from Yale University with a concentration in cardiovascular disease. Dr. Filardo is currently the Director of Epidemiology at Institute for Health Care Research (IHCRI) within Baylor Research Institute. Dr. Filardo is an NIH and AHRQ-funded principal investigator for a post-CABG Atrial Fibrillation study and an Abdominal Aortic Aneurysm study.

His lead role in the current Baylor HCUP MI study includes regular Principal Investigator (PI) duties such as maintaining the majority of the project responsibility, ensuring

the timely completion of the study and conducting the data analysis for the study. In addition to his role as PI, he was a mentor for the Clinical Research Management Intern while providing feedback on the project protocol and served as a Committee Member for the Thesis Defense.

Jessica Harbor, M.S. - Jessica Harbor received her Masters of Science degree in Clinical Research Management from the University of North Texas Health Science Center. As the Research Manager for the Department of Epidemiology, she has managed over 15 research studies. Throughout her years as both a Project Manager and an Intern in the Epidemiology Department, she has gained experience in patient enrollment, data abstraction, data collection, data management, and patient follow-up assessment.

Her role in the current Baylor HCUP MI study includes serving as lead mentor for the Clinical Research Management Intern on site. This responsibility included: providing access to all Epidemiology Department studies for reference, editing the protocol compiled by the Intern and providing the Intern with shadow opportunities within the Baylor Healthcare System.

Rustam Kudyakov, M.D., MPH - is the Manager of Clinical Research Informatics for Baylor Health Care System (BHCS). Dr. Kudyakov received his M.D. from Tashkent State Medical Institute in Uzbekistan and Masters in Public Health from the State University of New York in Albany. Dr. Kudyakov oversees clinical informatics components of health services research projects in the areas of health care improvement, clinical effectiveness, patient safety, and cost outcomes and collaborates directly with Principal Investigators to coordinate the clinical informatics aspects of research efforts such as identification of data sources, study design, data management, and analyses.

His role in the current Baylor HCUP MI study includes working with the Myocardial

Infarction ICD9 codes compiled by the Clinical Research Management Intern and using these to extract pertinent patient data from the HCUP database. The HCUP data was presented to the Project Manager and CRM Intern in coded form.

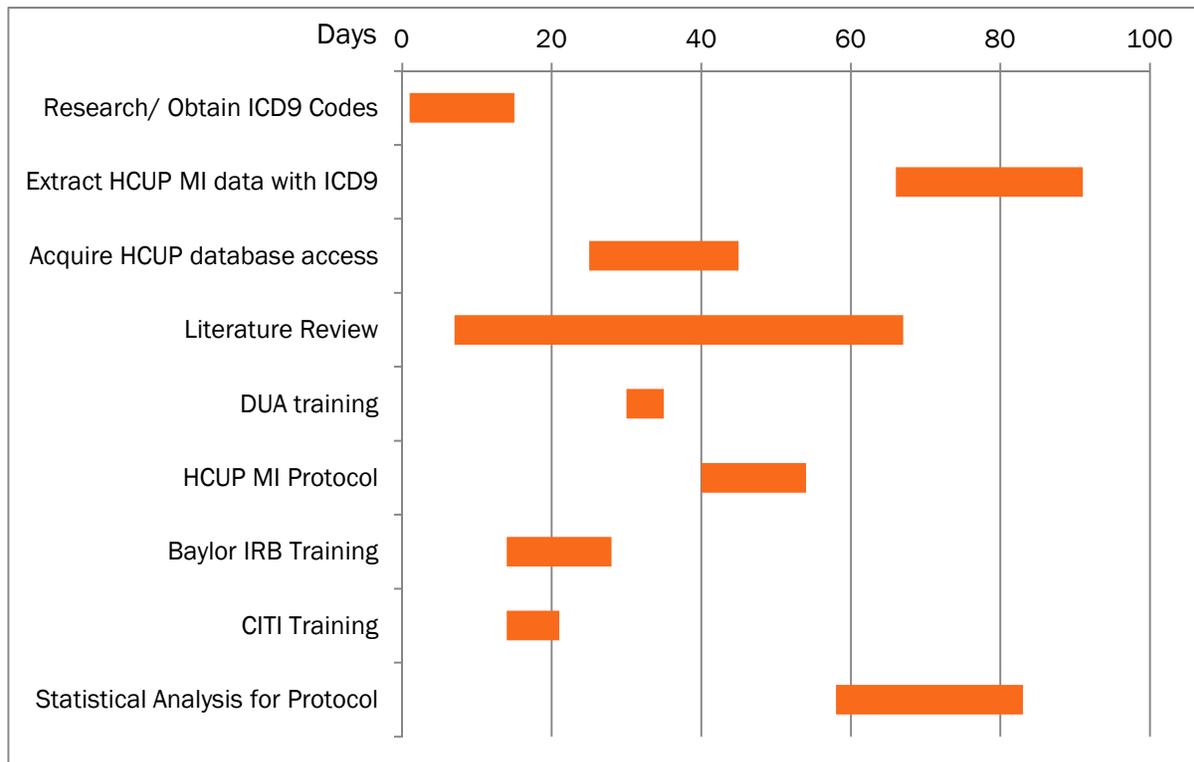
Gerald O. Ogola, Ph.D. - Dr. Ogola is a biostatistician at Baylor Health Care System (BHCS), where he provides statistical support to researchers across BHCS. He has been involved in a range of projects evaluating the impact of implementation programs in health care research. Key contributions include evaluation of impact of clinical preventive services in the ambulatory care setting and the impact of standardized order sets on health care cost, quality and efficiency.

His role in the current Baylor HCUP MI study included writing the statistical analysis section for the protocol and explaining the basic process to the CRM Intern.

In addition to the study personnel mentioned above, the Intern roles and responsibilities during the preparation of the preliminary stages of the Baylor HCUP study will be discussed in more detail within the remaining sub-sections in this chapter. The intern tasks included DUA training, research and compilation of ICD-9 codes for a myocardial infarction diagnosis, protocol writing and training in the Baylor IRB submission requirements.

The Gantt chart below (Figure- 3) displays the various tasks that were completed by the intern and the Baylor research personnel during the practicum project. Each activity is described and is plotted on the x-axis based on the number of days after the start date of the entire project (8/20/2012). The Gantt chart is a visual representation of the comparative amount of time each task required.

Figure 3- Gantt Chart: HCUP MI study development. Note: the horizontal axis contains # of days from the start date (08/20/12)



DUA Training and Certificate

In accordance with the HIPAA privacy rule, the HCUP databases include limited data sets that only provide patient data involving dates and geographic information⁵. To protect private patient information, 16 direct identifiers including names, social security numbers, addresses, and phone numbers are removed from the database. Public access to this data depends on the adherence of researchers to the Data Use Agreement (DUA) and the policies of the AHRQ⁵. Any researcher wanting access to the HCUP databases⁵ must complete DUA training.

Within the DUA training, the investigator is informed that any attempt to uncover the hidden identifiers to ascertain the identity of a patient is in violation of the agreement and access to the database will be immediately denied.

Once the DUA training is completed and each investigator has a signed certificate, access to all six of the HCUP databases is made available.

Use of ICD-9 Codes

The NIS contains discharge-level records, which allows individual patients with multiple hospitalizations to be represented in the sample multiple times. The patient records were selected from the HCUP according to the ICD-9 codes (Table-2) for myocardial infarction (410.0). The core records will be selected if any of these ICD-9 codes are recorded among 25 HCUP diagnosis codes. Records for other files (diagnosis group, severity of illness and hospital type) were selected using key or hospid variables. The CRM Intern researched hospital documentation of myocardial infarction and found the specific ICD-9 diagnosis codes that ranged from 410.0 to 410.9. Each code described the specific MI location with respect to the different walls of the heart (lateral, posterolateral, anterolateral). Rustam Kudyakov used these ICD9 codes to obtain pertinent data from the HCUP. The statistical analysis will be done on the data compiled from this effort.

Table 2- Myocardial Infarction Codes

ICD9 codes	Disease description
410.0	Acute myocardial infarction of anterolateral wall
410.1	Acute myocardial infarction of other anterior wall
410.2	Acute myocardial infarction of inferolateral wall
410.3	Acute myocardial infarction of inferoposterior wall
410.4	Acute myocardial infarction of other inferior wall
410.5	Acute myocardial infarction of other lateral wall
410.6	True posterior wall infarction
410.7	Subendocardial infarction
410.8	Acute myocardial infarction of other specified sites
410.9	Acute myocardial infarction of unspecified site

Categories of data that will be obtained through the database review:

- Age
- Admission month
- Admission type
- Died during hospitalization
- Hospital ZIP code from AHA survey
- Length of stay
- Patient location: NCHS Urban-Rural Code (v2006)
- Point of origin for admission
- Race
- Total charges
- Median household income national quartile (ZIP code)
- Chronic condition
- Procedure
- Bed size of hospital
- Location (urban/rural) of hospital
- Location/teaching status of hospital

Protocol and IRB Submission

The following paragraphs contain the protocol information that was submitted to the Baylor Institutional Review Board (IRB) for approval of an expedited study entitled “Assessing the association between hospital characteristics and in hospital mortality of acute myocardial infarction patients”.

The purpose of this project is to measure different hospital characteristics (location, size, type) and assess how these characteristics will impact the mortality of patients who have suffered from acute MI. The primary objectives include assessing in-hospital post-MI mortality variation, geographic mortality variation and type of in-hospital post-MI mortality variation (gender, race).

This is a cross-sectional study involving patient discharge data from January 2010 to December 2010. Data will be managed in compliance with HIPAA regulations and with the regulations specified within the HCUP Data Use Agreement (DUA) training and certificate signed by all members of the research team handling the data. Data will be stored safely in a secure environment, and maintenance for back-up purposes will be performed on a routine basis.

The statistical analysis aims include:

Aim 1: The overall variation in post-MI in-hospital mortality will be estimated using weighted variance formula for stratified two-stage cluster sample design. This accounts for the possibility of high correlation in post-MI mortality among patients discharged from the same hospital.

Aim 2: To assess mortality variation by geographic region, the same analysis approach as in Aim 1 will be used except that it will be performed for each region (i.e. Northwest, Midwest, West, and South). A 95% confidence interval (CI) will be obtained for each region for comparison purposes, and non-overlapping CI will be considered statistically significantly different.

Aim 3: To assess variation by type of post-MI mortality, a similar analysis approach as that used

in Aim 1 will be implemented for each of the types.

For the proposed study, nationwide patient discharge information has been requested from the NIS branch of the HCUP database. The NIS sampling frame is stratified by five hospital characteristics: geographic region (Northeast, Midwest, West, and South); location (urban vs. rural); teaching status (teaching and non-teaching); control (government nonfederal [public], private not-for-profit [voluntary], or private [investor-owned]); and bed size (small, medium, large). These characteristics have compiled data that approximate a 20% sample of community hospitals in the United States. Community hospitals are defined as non-federal, short-term, general and other specialty hospitals (AHA).

Access will be granted to study personnel after the completion of the DUA training and submission of the DUA certification for each individual. The DUA training ensures that the researchers cannot utilize any uniform patient identifier for a patient-level analysis within the NIS database.

The NIS contains discharge-level records, which allows individual patients with multiple hospitalizations to be represented in the sample multiple times. The records will be selected according to the MI ICD-9 codes (410.0) listed below and the core records will be selected if any of the codes listed above were recorded among 25 HCUP Diagnosis codes. Records for other files (diagnosis group, severity and hospital) will be selected using key or hospid variables.

CHAPTER IX

INTERNSHIP EXPERIENCE

Baylor Location

The Epidemiology Department is located about 10 minutes north of the Baylor University Medical Center (BUMC), on the North Central Expressway. Dr. Giovanni Filardo runs the Department and Jessica Harbor is the Research Manager. There are 10 other interns working in the department whose primary focus is on data abstractions for three current research projects that are also being abstracted at Emory University and the University of Virginia.

My main focus as an intern involved two research studies in addition to my practicum project involving HCUP research. These two research studies are the Blood Conservation Study at The Heart Hospital- Baylor Plano and the Congestive Heart Failure study.

Blood Conservation

I was a part of the blood conservation study from September 2011 through December 2012. During this time, I would drive to Plano to retrieve the blood conservation forms that contained the blood orders from surgeries from the previous day. I developed very critical connections with the director of blood laboratory, the head nurses on each floor, heart surgeons and hospital administrators. I took advantage of an opportunity to learn the strengths of all of these positions within the hospitals and the weaknesses as well. I learned more from the

weaknesses because those are what allowed all of the different doctors/nurses/administrators to rely on each other in order to ensure that their patients receive the best treatment available. I also got to see how Mrs. Harbor's job as the project manager called for patience and the ability to communicate effectively with all of the different people involved in the study to make sure they were all following the study guidelines and increasing overall compliance.

After getting back to the internship site with the blood conservation compliance forms, I would enter the data from the forms into the Blood Conservation Database. When the forms were incomplete or filled out incorrectly, I addressed each instance of non-compliance in a daily email to everyone in the study. The emails had separate tables for missing orders and orders with errors. The missing order sets occurred when I had an official blood order from the laboratory transcript that was not accompanied by a blood compliance form. The compliance forms that were incomplete or contained errors were documented with instructions on how to fill out the forms correctly. The location (hospital or operating room), ordering surgeon, Patient Medical Record number (MRN), date and time were included as well. The head nurses on each floor read these daily reports and used them to find out which employees needed additional compliance training. To aid with the compliance training, I made PowerPoint visual aids of scanned forms with every type of error possible and examples of forms that were filled out correctly.

I also attended monthly meetings at the Heart Hospital with Mrs. Harbor. During the meetings, Mrs. Harbor would address physicians, nurses, administrators and laboratory personnel with updates on compliance and non-compliance. She provided the group with scanned examples of common errors that occurred while completing the compliance forms and provided feedback concerning how to instruct new employees on filling out the forms appropriately. Overall compliance percentages were presented each meeting as well.

Congestive Heart Failure (CHF)

The data abstractions for this study are conducted to help determine whether the CHF diagnosis was accurate when compared to the laboratory data, x-rays, patient history and risk factors included in the patient charts. The database includes also includes information on Echocardiogram reports, Heart Catheterization reports, and medications administered (prior to admission, in hospital and discharge).

During training for this study, it was imperative to become acquainted with the most effective and less time-consuming method for completing the CHF data abstractions. It is prudent to methodically go through only the parts of the patient chart that directly pertain to the sections in the database. The first couple of days working on this study took extra time in order to make sure each data variable identified in the patient history was accounted for and accurately entered into the database.

Journal summary (refer to appendix for complete journal log)

My daily internship activities are completely outlined in my Internship Journal (see appendix). The first month of my internship consisted of getting acquainted with my site mentor Jessica Harbor, Dr. Giovanni Filardo and the other interns at the Baylor site. The hardest part of this month was probably becoming an official part of the Baylor system. Getting my email set up, my ID card, access to the building garage, access to the Baylor system and EMR all took a considerable amount of time. I also discussed ideas for my practicum project focus with Mrs. Harbor and Dr. Filardo during this time. The blood conservation study spanned the first and second parts of the internship.

The second part of my internship included my first meeting with the practicum committee and getting started on the actual research proposal. Getting final approval took some time to complete, but all of the feedback I received from the committee was very helpful and direct. Submitting my proposal to the UNTHSC IRB required the completion of the application for exempt status. Exempt status was granted for this practicum project on November 15, 2012 because the a systematic literature review does not require patient contact, risk to any patients and does not require the development of an informed consent document to protect the patients from harmful outcomes of the study. The patient protection that was covered in the IRB application for this project mainly focused on patient data protection. The HCUP DUA training ensures that patient identifiers are protected from any attempt to retrieve them.

The last part of my internship has been focused on completing my thesis, setting up my thesis defense date and preparing for graduation in May. Graduation preparations include submission of intent to graduate form and final practicum report to the Graduate School of Biomedical Sciences for approval. During this time, I have also worked on CHF data abstractions and submitting the HCUP Myocardial Infarction study protocol to the Baylor IRB for approval.

CHAPTER X

FINDINGS

Historical Contribution

The AHRQ main focus is to conduct healthcare research that will improve clinical practice and government policy. The AHRQ insures the quality of sponsored research through maintaining the mission to “improve the quality, safety, efficiency and effectiveness of health care for all Americans.” The AHRQ ensures patient safety by the limitation of preventable medical errors. This has contributed to quality improvement and the development of common guidelines (CPGs) to standardize treatment for efficiency and cost-effectiveness. The healthcare industry can utilize CPGs as a way to monitor healthcare availability and quality improvement.

The AHRQ was formed in response to the growing need of healthcare quality improvement in medical care and scientific research. The AHRQ was responsible for streamlining treatment, monitoring healthcare quality and limiting medical errors. The development of CPGs through partnering with IOM ensured that diagnosis and treatment decisions were made with by taking current research into account. CPGs also used language that could be interpreted by all levels of employees working in healthcare and by the patients (healthcare consumers) as well.

The family of interrelated HCUP databases was created as a means of reporting patient healthcare data to a trusted agency. The patient data is protected by laws and regulations covered

in the DUA training of research investigators. All 6 of the HCUP branches specialize in different data sources, which include nationwide hospitals, state hospitals and emergency departments.

The HCUP databases contain inpatient, outpatient and emergency department information that was first collected in 1988. The HCUP is compiled by patient data reported by state data organizations, hospital associations, private data organizations and the federal government. These combined efforts have made the HCUP into the largest collection of multi-year hospital care data in the United States⁴.

The pivotal role of HCUP in the development of national healthcare improvement efforts has been proven to increase the accuracy of quality measures and rankings, decrease the cost of quality reporting, and create a reliable data system for all participating hospital systems.

Healthcare Improvements

The HCUP has had a significant impact on healthcare in the United States. A study conducted by HCUP involving the disparities experienced by racial and ethnic groups provided information on how different states are measuring their respective disparity levels and how they plan to address and combat this issue in the future. HCUP compiled the data from the 8 significant states included in the study in order to provide examples for other states to follow. The final goal is to have all 50 states participating in the HCUP at the same level, in order to get a complete idea of the level of disparities within certain racial and ethnic groups across the nation.

The HCUP has had a significant sociological impact as well. An HCUP study involving the severity of mental and substance use disorders gave insight as to how these disorders can possibly be classified. Once these types of disorders are classified by severity-of-illness,

administrative data will have a more accurate prediction of future hospital utilization and patient mortality outcomes.

The categories of HCUP impact on healthcare were developed based on the systematic literature review of research articles involving HCUP utilization. Trends of healthcare improvements that were evident in the research utilizing HCUP data were quantified. The categories included: Nationwide Healthcare Representation, Availability of Current and Effective Medical Techniques, Establishment of Concise Healthcare Guidelines, Explicit Clinical Treatment, Hospital Quality Improvement, Cost-efficient Treatment, and Hospital Administrative Improvement. The Hospital Quality Improvement category was the most represented category among the articles in the literature review. Six articles were considered to have evidence of the impact HCUP database utilization has on quality improvement efforts. These 6 articles made up 27% of the overall frequency of the total 15 articles that were divided into separate categories. Each of the 15 articles included in the literature review could represent more than one Healthcare Improvement Category (Table 1).

The six articles under Hospital Quality Improvement can be further analyzed to determine their specific contributions to this category. The following table (Table 3) outlines the article, measures included in the study, and how it directly affected Hospital Quality Improvement efforts.

Table 3- Hospital Quality Improvement Analysis

Study Title	Quality Measures	Quality Improvement Impact
<p>Hanlon, C Rosenthal, J Hinkle L</p> <p>“State documentation of racial and ethnic health disparities to inform strategic action”</p>	<ul style="list-style-type: none"> • Data sources • Role of the Office of Minority Health • Public and private partners • Connection to out of state departments • Resulting action plans for future health 	<p>Disparity report- State Action plans to target areas of disparity and implementation of preventative programs (8 featured states for plan comparisons)</p>
<p>Bird, T Hobbs, C Cleves, M</p> <p>“National rates of birth defects among hospitalized newborns”</p>	<ul style="list-style-type: none"> • HCUP birth defect rates compared to state surveillance systems data • Ex: Central nervous system- Spina bifida HCUP: 3.15 Surveillance: 4.13 • Results: 20 of the HCUP rates were within 10% of surveillance rates (no elective terminations), only surgically repaired gastroschisis differed by >50% 	<p>Accurate identification of birth defects and causes, evaluation of prevention programs, influence resource allocation</p>
<p>Chevarley, F Owens, P Zodet, M</p> <p>“Health care for children and youth in the united states: annual report on patterns of coverage, utilization, quality, and expenditures by a county level of urban influence”</p>	<ul style="list-style-type: none"> • Use NIS data and metro/ non-metro geographical schema (2003 urban influence codes) • Ex: Prescription medicine use by child in “large metro” 48.6% with any visits and “noncore-rural” 64.4% with any visits • Ex: rates of ED use were larger in smaller metro areas than larger. Explained by ED substitute for ambulatory services in 	<p>Impact of place on child healthcare: 1) Examine preventable complications during hospitalization 2) Examine hospital admissions that can be avoided through high quality outpatient care</p>

	smaller areas without acute care centers	
Catlin, A “Extremely long hospitalizations of newborns in the united states”	<ul style="list-style-type: none"> Paired KID data on 680 infants (>179 day length of stay) with LONGTERM surveys from care-givers and parents of 422/680 inpatients Ex: KID data respiratory distress syndrome occurrence 383 (56%) and LONGTERM occurrence 214 (55%) 	<p>Quantitative and qualitative data on newborn defects and quality of care experience during extended length of stay</p> <p>Provides data on how to care for newborns in this situation and special cases provide info on un-necessary lengths of stay and how this can be prevented</p>
Jiang, H Ciccone, K Urlaub, C “Adapting the HCUP QIs for hospital use: the experience in New York State”	<ul style="list-style-type: none"> Quality indicators used to observe rates in hospitals with at least 30 discharges for each indicator Discussed sample report card data given to each hospital, includes hospital and state comparisons and regional comparisons 	<p>Annual comparison reports for New York hospitals provide data on utilization and access to care</p> <p>Development of community-based QI initiatives to influence patient decisions and provider quality performance</p>
Johantgen, M “Quality indicators using hospital discharge data: state and national applications”	<ul style="list-style-type: none"> 33 quality indicators used to address outcomes, access and utilization 	<p>Results at the individual hospital level are used to stimulate quality improvement programs</p> <p>Quality indicators used to Highlight areas of quality concern</p>

The Cost Efficient Treatment category contained quantified data in two papers used to compare the total Emergency Department (ED) visits, total number of patients that utilized the ED, and the overall rate of ED visits per patient. Figure 6 shows the comparison of ED visits and total patients from both the mental and substance abuse HCUP study⁸ and the sickle cell study²¹. This data is useful in the overall determination of treatment costs and ED utilization for different patient populations. Despite the larger magnitude of ED utilization among mental/ substance-use patients, sickle cell patients have a higher rate of ED visits per one patient. Figure 7 demonstrates the higher ED utilization among sickle cell patients and provides insight into preventable areas of additional cost to the patient and hospital. HCUP data has been used to determine that the average per patient ER visit cost was \$1349 in 2010⁸, the estimate of overall cost nationwide is approximately 2.3 million dollars annually for the number of ER visits in the mental/ substance-use study. Once cost data is identified, care providers can work toward developing programs to decrease the need for ED utilization through patient education, scheduled check-ups, proper and timely diagnosis and availability of the most efficient treatment options. Patients that suffer from either mental/substance-use disorders or sickle cell anemia benefit from HCUP data that quantifies these specific populations.

Figure 6- Cost Efficient Treatment Category. Note: compares number of ED visits and total patients included in both the mental/ substance-use disorder study and sickle cell study

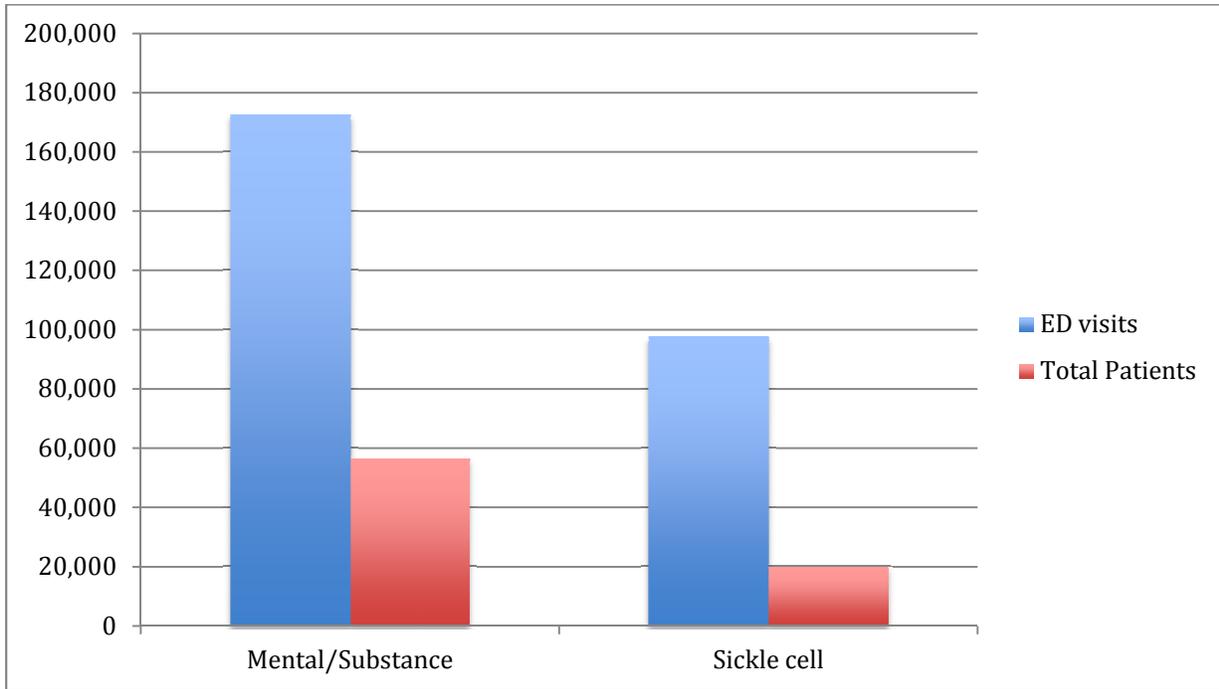
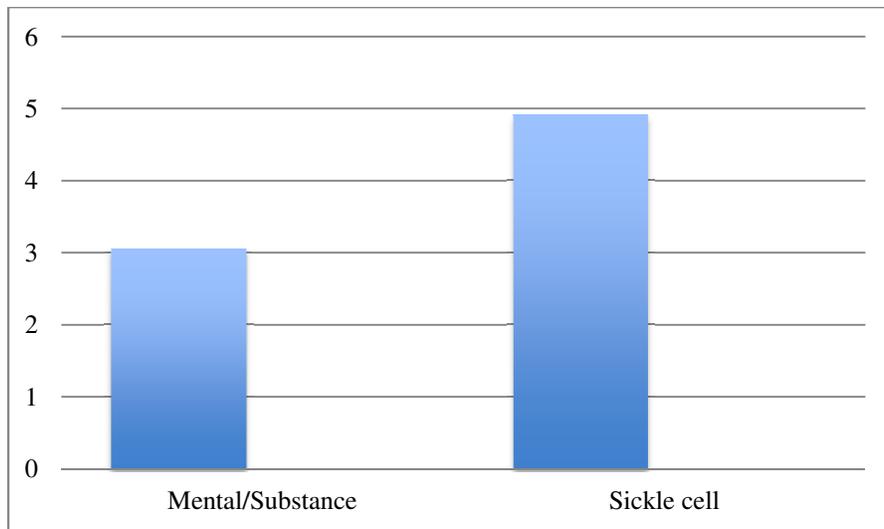


Figure 7- Cost Efficient Category rates. Note: rate comparison of ED visits per patient for mental/substance-use study and sickle cell study



IRB submission and Current Status of MI Study

The protocol for “assessing the association between hospital characteristics and mortality of acute myocardial infarction patients” has been finalized for an expedited submission to the Institutional Review Board (IRB) for the Baylor Healthcare System. The IRB application was submitted on March 15, 2013 and the approval is pending.

CHAPTER XI

DISCUSSION

This practicum project has discussed in detail the historical contributions of AHRQ and the HCUP databases, as well as the use of the HCUP data in past and current research projects. All of these aims have helped form an understanding of the impact that the use of HCUP in research has had on healthcare quality in hospitals across the nation. Healthcare Impact categories were developed and discussed in order to provide a focused approach to analyzing specific areas that have been improved. Future research with HCUP will benefit from this analysis.

Qualitative to Quantitative Data Analysis

The healthcare impact categories discussed in this practicum project provide qualitative data to support the utilization of HCUP data in healthcare research, but a quantitative data analysis would be beneficial as well. Quantitative data can be collected from the research articles

discussed in this practicum project literature review. Interview responses, patient questionnaires, cost analyses, quality reviews, and administrative patient data can be used in the attempt to construct graphical correlations between the healthcare impact categories mentioned. This will allow for observations of specific hospital or state trends that will help synthesize a comprehensive view of areas for improvement and areas of exceptional healthcare strides.

Proposed Studies

A proposed study for future HCUP data could include a look at whether increasing hospital spending on quality assurance programs will have a direct positive impact on the actual quality that is perceived by both patients and employees across hospitals nationwide. This will allow researchers to provide significant quality data to hospital administrators to determine where hospital spending would be most prudent in order to see a direct patient benefit in quality of care. Employees, as well, will benefit from research focused on improving hospital spending on resources needed in order to provide the best patient care.

APPENDIX A

INTERNSHIP JOURNAL

APPENDIX A:

Clinical Research Management Internship Journal

- ***Monday, August 20th, 2012:***

First day preparation included getting acquainted, receiving access to the building, and setting up personal computer and email access. The meeting about proposal ideas took place at 2:30 pm with Dr. Filardo and Jessica Blaylock. We discussed the possibility of doing a literature review/ data analysis using patient data from HCUP. ICD9 codes will be used to identify patients admitted with acute myocardial infarctions in rural and teaching hospitals. The number of beds will be used to determine the hospital size and the number of admissions by both types of hospitals will be compared. Mortality outcomes of post-MI patients will be measured and compared.

- ***Tuesday, August 21st, 2012:***

I have been familiarizing myself with the jargon that goes along with the ICD9 codes, the purpose behind them and how they are assigned to patients based on gender and primary procedure performed. I also used PubMed to access journal articles that will be helpful in the literature review.

- ***Wednesday, August 22nd, 2012:***

Working on my project proposal outline and researching the journal articles for the literature review.

- ***Thursday, August 23rd, 2012:***

I had an early morning today. I met up with Jessica at the office at 6:30am. We carpooled to a 7am meeting at the Plano office. The purpose of the meeting was to discuss recent updates happening with the Blood Conservation Study. Meeting ended at 10am. We headed back to the office to continue work on my proposal.

- ***Friday, August 24th, 2012:***

Today I worked on my proposal and researched journal articles that pertain to post-CABG Myocardial infarction studies on patients in rural areas. I went downtown to the main

Baylor health care office to get an official badge made. I spent the afternoon familiarizing myself with key Epidemiology terms that will be helpful this semester. I also researched on/off pump CABG procedures, bypass graft harvesting and cardiac tamponade.

- ***Monday, August 27th, 2012:***

I worked on my proposal this morning, preparing for a meeting with Jessica tomorrow so she can look at the progress I have made this past week. We had a meeting this morning about the atrial fibrillation “a-fib” study that the other interns are currently doing data abstractions for. I learned a lot about the purpose of the study and the different variables that Dr. Filardo wants them to focus on.

- ***Tuesday, August 28th, 2012:***

I discussed the first draft of my proposal with Jessica this morning and she found it to be quite acceptable and said that my sources and background research should be sufficient for the committee meeting next week.

- ***Wednesday, August 29th, 2012:***

Today I started training with Hallen Dao, an Intern that has been working at Baylor Epidemiology for almost two years and she is well versed in how things work around here. She walked me through the methods of data abstraction for the Blood Conservation study at the Heart Hospital in Plano.

- ***Thursday, August 30th, 2012:***

This morning Hallen Dao continued my training in the Blood Conservation data abstraction. She allowed me to do the abstraction solo, with minor corrections here and there. The process is fairly straightforward and helpful in making a smooth transition from data collection to analysis.

- ***Friday, August 31st, 2012:***

This was the third day of my Blood conservation training. I learned how to access patient records for information that is not included in the initial paperwork received. I also spent some time on the Baylor Learning Network in order to complete my training in IRB regulatory affairs, the Baylor Health care system requirements and other important topics related to research procedures and rules. This training is important as I await my IRB approval so I can begin official work on the Blood Conservation study. Once I am approved, I have been directed to go to Plano every morning to obtain the order paperwork from the hospital floor and the Operating room. I will make rounds with the nurses in order to fill in any blanks that may come up in the paperwork. Jessica also thinks that this experience will help me gain knowledge of the important interaction between clinicians and researchers.

- ***Monday, Sept. 3rd, 2012:***

Labor Day holiday (no work today)

- ***Tuesday, Sept. 4th, 2012:***

Today I sent out a reminder email to the committee members to remind them about our first meeting this coming Thursday. I trained for the Blood Conservation study again and I learned how to use the Eclipsys database to double check the reasons explained by the doctor for the transfusions (plasma, PRBCs- red blood cells, Cryoprecipitate, or platelets) and make sure the order forms correspond to the reasons in the database. We had a slight error with the system but clarified it when we called and spoke to the person in charge of training staff at the Heart Hospital in Plano.

- ***Wednesday, Sept. 5th, 2012:***

Today I had a brief meeting with Dr. Filardo and Jessica in order to touch base and make sure we were all on the same page for the Thursday committee meeting. Dr. Filardo decided to make my project more of a comprehensive overview of the importance of HCUP data in healthcare research and an explanation of how it can be used on a geographic study of MI patient mortality in particular, but can also be used on an array of different diseases and outcomes.

- ***Thursday, Sept. 6th, 2012:***

Today we had our first committee meeting where we discussed my practicum project and they signed my “designation of advisory committee” and “Masters of science degree plan” forms. Dr. Filardo explained how he wants me to become very familiar with the HCUP data so I will be able to write a report explaining the Utilization of HCUP data in Healthcare Research. He stressed the idea that we will be able to use this data to eventually have a countrywide picture of the status of our healthcare. We will start by focusing on MI patients in particular, but will then move on to other cardiovascular patients or entirely new diseases. This will be very beneficial to the patients and the healthcare system in general, especially in an election year. The HCUP data allows for comprehensive understanding of the country as a whole and allows for generalizable results (compared to Baylor system data only). We will discuss the implications this will have on research and policy.

We discussed the possibility of contrasting investigator-initiated projects vs. randomized clinical trials. The latter group deals more with changing philosophies and implementation. I will begin the process of writing my proposal, so it will be ready in 2 weeks for feedback and submission to the IRB. I was asked to re-write the objectives in the CRM and tailor them to my specific experience at Baylor.

- ***Friday, Sept. 7th, 2012:***

Today I continued training with Hallen with the data abstraction for the Blood Conservation study. Still waiting on the IRB approval form from the Plano site, so I can begin working over there. I also spent time researching the HCUP database.

- ***Monday, Sept. 10th, 2012:***

Today I continued training on the data abstraction for the blood conservation study. It took me quite a while to sort out which order sets matched up to the transfusion lists Hallen got from the Plano hospital.

The second half of the day, I assisted Hallen with a power point presentation for Jessica for a Blood Conservation meeting tomorrow morning. We decided on which “problem areas” to highlight within the data collecting process and we provided case samples for each.

- ***Tuesday, Sept. 11th, 2012:***

Today was another early morning. I met Jessica at the office at 7am am so we could carpool to the Plano site together. The pre-meeting with the Doctor in charge of the blood conservation study was at 7:30am and then the meeting with the nurses was at 8am. This was a very interesting experience for me because I was given the opportunity to witness the delicate interactions that must take place between the Researcher (Jessica), the Principal investigator (Dr. Smith) and all of the nurses that are crucial in the data collection process. Jessica did a wonderful job of reporting the facts and statistics in a way that would not offend or make certain people feel singled out. All in all, it was a success.

- ***Wednesday, Sept. 12th, 2012:***

This time was used to continue my research on the HCUP database. I completed training on their website to be able to have access to the data. I received a certificate and I signed a copy of their Data Use Agreement (DUA) contract to keep on file here at the office.

- ***Thursday, Sept. 13th, 2012:***

Today was a long and kind of frustrating day. In training, I had another data abstraction that was really long but I’m starting to get to the point where I am familiar with every possible type of situation that I will come across in the future. Missing data sets, errors in the data forms, differences between Eclipsys and data forms are all things that I have learned to handle.

I had a meeting with Dr. Filardo, Jessica and Rustam Kudyakov. Rustam works on the 5th floor and is accustomed to working with databases like HCUP. He will see to ordering the most current data for 2010-2011 and once Jessica and I get the ICD9 codes together, he will collect the data that we need in order to begin our project on MI mortality rates across the country.

- ***Friday, Sept. 14th, 2012:***

Today was a short day. I worked on the Expedited IRB application. I also worked on finding articles for my new proposal and soon I will work on the protocol for the data analysis that we will begin soon.

- ***Monday, Sept. 17th, 2012:***

Today I completed Blood conservation data abstraction training and researched articles for my proposal.

- ***Tuesday, Sept. 18th, 2012:***

I received the IRB approval for the blood conservation study and worked on the data abstractions. I will now be able to go to the Plano site and collect the Blood Conservation compliance forms.

- ***Wednesday, Sept. 19th, 2012:***

Sonia and Jim have agreed to meet with me on Friday to walk me through the Plano site and show me how to read the charts in order to locate any missing data sets. This will make my work on the blood conservation abstractions a lot easier and will give us access to the data in a timely manner. I have a meeting tomorrow with Jessica to discuss my progress on the proposal and I will also begin work on the protocol tomorrow.

- ***Thursday, Sept. 20th, 2012:***

This morning I drove straight to the Heart Hospital in Plano and I picked up the blood conservation compliance forms from yesterday (9/19). I did data abstractions for blood conservation after I got back to the office in Dallas. I had a meeting with Jessica Blaylock and we discussed what I have so far for my proposal. I am going to edit it tomorrow and add new background information.

- ***Friday, Sept. 21st, 2012:***

Today I had a meeting with Sonia Prashar and Jim Jennings at the Heart Hospital in Plano. I shadowed them, introduced myself to the nurses and they showed me how to navigate the chart system to find missing order sets. This will expedite the data abstraction and update process because we will not have to report as many missing sets and the Plano site won't have to go digging around for them.

- ***Monday, Sept. 24th, 2012:***

Today was my first day making chart rounds at the heart hospital in Plano. I am able to track down missing order sets that were filed away without a copy being made for our dept. This

is very beneficial because I am able to match the transfusion record with the previously missing order sets and put the information in the database.

- ***Tuesday, Sept. 25th, 2012:***

Today was a long day because it took me a while to track down missing forms at the hospital and most of the time I couldn't find anything. But on a positive note, when I was finished entering the order sets into the database, I was excited to see that the amount of errors on the order sets has significantly declined. There were still a lot of missing sets but these were mostly from the OR.

- ***Wednesday, Sept. 26th, 2012:***

Today I went to the hospital but I couldn't find any of the missing sets. When I got back to the office, I entered everything into the database and then worked on a power point about common errors on the order set forms. This power point will be used in Jessica's presentation to Dr. Smith and the nursing staff at the heart hospital tomorrow morning. The main purpose is to discuss possible areas for improvement and to highlight the fact that the error rate has been improved upon this week.

- ***Thursday, Sept. 27th, 2012:***

Today we had an early morning meeting at the heart hospital. When we got back to the office, I had a meeting with Jessica and she looked over the final draft of my proposal. She gave me feedback and I updated the proposal and emailed it to the rest of the committee. Hopefully it will be ready for IRB submission by next Tuesday.

- ***Friday, Sept. 28th, 2012:***

Today I emailed the committee members about feedback on my proposal, I have yet to hear back due to their busy teaching schedules. I worked on data abstraction for the blood conservation study the rest of the day.

- ***Monday, Oct. 1st, 2012:***

I had a rather large order set to contend with today. There were a lot of missing sets, but I tracked down the charts and I was able to find some of the missing sets. I am really impressed with the doctors and nurses, last week showed a significant improvement on number of missing order sets and errors on forms.

- ***Tuesday, Oct 2nd, 2012:***

I had another large set today and it took me a while to finish the data abstraction because for some of the order sets, I had to go back two or three days on eclipsys, which is really rare. Usually the order sets are behind by a day, at the most.

- ***Wednesday, Oct 3rd, 2012:***

I completed more data abstractions for the blood conservation study after I spent about an hour going through charts and looking for missing sets. I found some missing sets and another set that still had the yellow form attached to the white original form. I made copies of several original sets that were included in the pile I received from the lab, so I could re-file them in the charts for the nurses.

- ***Thursday, Oct 4th, 2012:***

I had a really small order set to work with today. There were no missing sets, which I am thrilled about. I am still waiting to hear back from my committee about revisions to my proposal. Hopefully I can receive the corrections by tomorrow or this weekend, finish the updates this weekend and then be ready to submit the final copy of the proposal to the grad office on Tuesday. I need to finish my expedited IRB application as well.

- ***Friday, Oct 5th, 2012:***

Today I familiarized myself with the requirements for online IRB submission via the Baylor Research Institute IRIS account. The required documents include IRB form 1 supplemental application for subject interaction, IRB form 15 supplemental application existing data/ specimen study, signature forms for the PI/ administrator/ scientific review, and new department request form.

- ***Monday, Oct 8th, 2012:***

Today I worked on blood conservation data abstractions. After that was completed, I emailed all of the people on the IRB for a Risk study asking them to sign a Form 14 that pretty much describes whether or not the researcher has any financial interest in regards to the study that could be considered a conflict of interest.

- ***Tuesday, Oct 9th, 2012:***

Today I received a lot of the signed form 14s and I scanned and saved them in our data files so Jessi can update the IRB for the risk study via an online submission process that she has taken me through for future reference purposes. When I was finished with all of the forms, I emailed them to the person that is the head of the Baylor IRB process.

- ***Wednesday, Oct 10th, 2012:***

Today I received more signed form 14s and I was sent a confirmation email regarding my invitation to attend the Baylor IRB meeting at the downtown medical center location next week. I am really excited to see how the process will work and to understand the steps that must be taken to approve an application within the actual IRB system.

- ***Thursday, Oct 11th, 2012:***

Today I worked on the blood conservation abstractions. Jessica called the Plano hospital site to follow up on the extra copies of order sets that we need to distribute quickly to prevent compliance from dropping. I made a power point and emailed it to the lead surgical nurses so they can use it for educational purposes for their staff. I took a couple of screen shots of an OR order set that had a specified reason for a Cryoprecipitate order but the corresponding data entry in the Eclipsys database only said “CALL ***** STAT” for the reason. If the staff were to put “SEE FORM” instead, then I would not have to mark that order set as having an error.

- ***Friday, Oct 12th, 2012:***

Other than minor errors such as the one mentioned above, compliance has gone up quite substantially in the last couple of weeks. Zero missing forms have marked the past three days alone, which is usually quite rare. It is exciting to see everyone come together and get these forms turned in correctly for the purpose of seeing this study through so the results can help the patients and even family members that may benefit from this research as well.

- ***Monday, Oct 15th, 2012:***

Today was my first day making chart rounds at the heart hospital in Plano. I am able to track down missing order sets that were filed away without a copy being made for our dept. This is very beneficial because I am able to match the transfusion record with the previously missing order sets and put the information in the database.

- ***Tuesday, Oct 16th, 2012:***

Didn't come into the office today. Car trouble prevented me from driving to the Dallas office.

- ***Wednesday, Oct 17th, 2012:***

Today I received the first comments/ edits on my proposal from Dr. Schetz. I wasn't able to begin the corrections today because I was working on a large set of compliance forms for the blood conservation study.

- ***Thursday, Oct 18th, 2012:***

Today I attended an IRB meeting at the Baylor University Medical Center (BUMC). It was a really educational experience. It was refreshing to hear all the terms I have studied about at UNT and to actually be able to follow the discussion. Actually seeing an IRB in person was very helpful in the overall CRM experience.

- ***Friday, Oct 19th, 2012:***

Today I worked on proposal edits and read journal articles that I will cite in my proposal. I also worked on blood conservation data abstraction the first part of the day.

- ***Monday, Oct 22nd, 2012:***

Today I worked on blood conservation data abstraction and I worked on the comments I received from Dr. Schetz, Dr. Gwartz and Dr. Rosales.

- ***Tuesday, Oct 23rd, 2012:***

Today I continued working on the proposal edits. I have re-structured the entire proposal and added at least five additional citations that will help me provide sufficient background and study significance information.

- ***Wednesday, Oct 24th, 2012:***

Today I completed the edits on my proposal and I emailed the committee members to receive their final input and corrections. I received a phone call from Dr. Schetz at the end of the day and he requested that I re-structure the way I documented the changes in “tracked changes” so he will have an easier time of making sure my corrections were properly taken care of.

- ***Thursday, Oct 25th, 2012:***

Today I worked on blood conservation and then I worked on the edits in the format that Dr. Schetz requested. I sent the final proposal draft and updated comments back to the committee members.

- ***Friday, Oct 26th, 2012:***

This morning I received Dr. Schetz’ final comments and edits on my proposal. There were a few minor changes that needed to be clarified. I sent the updated version back to the committee. This weekend I am going to look into using TURN IT IN on campus and I will also make sure that the in-text citations are correct. On Monday I want to send the final proposal to Jessi and Dr. Filardo for feedback. Once I get their signatures, I will email my professors to find out when they will be available to give their signatures.

Hopefully I can turn the final proposal in by next Wednesday and finish the IRB paperwork by Friday. I also need to turn in my “intent to graduate form” before it is due in January.

- ***Monday, Oct 29th, 2012:***

Today I got Jessica Blaylock and Dr. Filardo’s signatures on my proposal submission form. I printed out my intent to graduate form and signed it as well. I worked on Blood conservation and my exempt IRB submission application.

- ***Tuesday, Oct 30th, 2012:***

I worked on blood conservation and had Jessica look over my IRB application forms. Dr. Gwartz informed me that she could be listed as the PI on the form in place of Dr. Schetz because he has not completed his CITI training that is required of all key study personnel.

- ***Wednesday, Oct 31st, 2012:***

I worked on blood conservation today and made sure my CITI training was updated. All of my IRB forms are ready to be submitted once I get Dr. Gwartz' signature. I need to get Dr. Gwartz, Dr. Rosales and Dr. Schetz to sign my proposal submission form so I can turn it in to the graduate office.

- ***Thursday, Nov 1st, 2012:***

I went to campus today after I finished the blood conservation study and I got Dr. Rosales and Dr. Schetz to sign my proposal submission form. I missed Dr. Gwartz, so I left the proposal documents in her office folder for her to sign later. I also left her my intent to graduate form to sign and my IRB exempt application to look over and approve.

- ***Friday, Nov 2nd, 2012:***

I worked on blood conservation and attended a meeting with all the interns and Jessica. The meeting was an update that one of the members here likes to hold in order to get to know us all better and inquire on our future plans and needs.

- ***Monday, Nov 5th, 2012:***

I worked on blood conservation, which took me the entire day.
I stopped by the graduate office at UNTHSC to pick up the signed IRB application from Dr. Gwartz and I turned the two sets of copies into the IRB office. Dr. Gwartz submitted my proposal forms and the intent to graduate form for me on Friday.

- ***Tuesday, Nov 6th, 2012:***

Happy Election Day! I worked on blood conservation data abstractions for 11/05/2012 today.

- ***Wednesday, Nov 7th, 2012:***

I worked on blood conservation data abstraction and afterwards, I created a power point for the nurse in charge of the 5th floor patients at the Heart Hospital Baylor Plano (THHBP). The power point included order sets and their corresponding Eclipsys entries that contained various errors.

- ***Thursday, Nov 8th, 2012:***

I worked on the blood conservation compliance forms this morning. I watched Hallen work on the Afib project, in order to be able to have a better understanding of the process in the future.

- ***Friday, Nov 9th, 2012:***

This morning I went to a Thesis Defense at UNTHSC. Afterwards, I went to Plano to pick up the data order sets and I completed the blood conservation compliance form data abstractions back at the Dallas office in the afternoon.

- ***Monday, Nov 12th, 2012:***

Today I did not come into the Dallas office in order to attend a conference at the Texas Tech Health Science Center School of Medicine.

- ***Tuesday, Nov 13th, 2012:***

I caught up on the blood conservation compliance form data abstractions for 11/09/2012 thru 11/12/2012. It took me all day to finish the abstractions because of the volume of order sets turned in.

- ***Wednesday, Nov 14th, 2012:***

Blood conservation took a while today. Jessica looked through the updated missing order sets. This was at the end of September but the focus has recently been on these order sets because they happened after the last blood conservation update meeting at the Heart Hospital in Plano. Our next meeting is tomorrow morning at 7am.

I received feedback from the UNTHSC IRB office that included two questions that they wanted me to help clarify in order to speed up the review process and waiting time. I emailed them back with the clarifications and hopefully they were pretty straightforward and easy to follow. I don't know if they wanted me to send them an updated Exempt IRB application, or if they were just going to take the email into consideration while reviewing the current application. I will wait to hear back, and if they request any other updates, I will send them accordingly.

- ***Thursday, Nov 15th, 2012:***

I attended the blood conservation update meeting with the head nurses and Dr. Smith this morning at the Heart Hospital Baylor Plano (THHBP). We discussed ways to improve compliance.

- ***Friday, Nov 16th, 2012:***

Today I finished the blood conservation compliance form data abstractions early in order to go to Fort Worth for the remainder of the day. I went to UNTHSC to sit in on a Thesis Defense of a fellow CRM student. This was really helpful because I was able to determine what I need to focus on in order to be prepared to defend my own thesis in February.

- ***Monday, Nov 19th, 2012:***

I worked on the blood conservation forms from Friday and the weekend. I have the rest of the week off for Thanksgiving. I was going to come into the office on Friday in order to catch up on the Tuesday- Thursday order sets, but Hallen has offered to do them for me because she lives much closer the Heart Hospital.

- ***Tuesday, Nov 20th - Friday, Nov 23rd:***

I did not come into the remainder of this week, in preparation for the Thanksgiving holiday.

- ***Monday, Nov 26th, 2012:***

I worked on the blood conservation compliance forms from 11/23/2012 to 11/25/2012. I didn't have to work on the forms from the rest of last week because Hallen Dao offered to pick them up for me and enter them into the database during the holiday. I also updated my driving costs for driving from the heart hospital to the office every day. I will submit this to be reimbursed for my travel expenses that are work related.

- ***Tuesday, Nov 27th, 2012:***

I worked on blood conservation today and also watched Hallen complete abstractions for the AAA study (aortic aneurysm). I want to be familiar with the process so I can be up to date with how to do the abstractions in case I am place on this project after blood conservation finishes up on Dec 17th.

- ***Wednesday, Nov 28th, 2012:***

I worked on blood conservation today and shadowed Hallen during her abstractions once again.

- ***Thursday, Nov 29th, 2012:***

I worked on blood conservation today. I had to re arrange the binders and start a new 8th binder for the second phase of the blood conservation study.

- ***Friday, Nov 30th, 2012:***

Today was a short day. I worked on the blood conservation compliance forms for Nov 29th, which was a short list of patients. I also shadowed Hallen Dao as she did data abstractions for AAA.

- ***Monday, Dec 3rd, 2012:***

I worked on the blood conservation compliance forms for Nov 30 to Dec 02, 2012. There were no missing data sets for the last two days. I was relieved to see that the compliance on the turned in data sets was also very high. This is a great trend to see during the last remaining weeks left of the blood conservation study.

- ***Tuesday, Dec 4th, 2012:***

Today I worked on the blood conservation compliance forms for 12/3/2012. It was a complicated group of paperwork today because of some missing order sets.

Yesterday I emailed Giovanni Filardo and David Nicewander to try and get a date that we can all meet to talk about the next steps we need to take to analyze the HCUP data that Dr. Rustam put together for us based on the ICD9 codes for acute myocardial infarction episodes. I also finished my paperwork for reimbursement from Baylor for three weeks of driving to and from the heart hospital and my toll way fees were included as well. It is a relief to be paid back for the high gas costs.

- ***Wednesday, Dec 5th, 2012:***

Today I worked on the blood conservation compliance forms for 12/4/2012. I started working on the protocol for a new research project currently titled “Measuring mortality outcome of post-myocardial infarction patients in rural areas: a nationwide geographic study”. I am also working on the Iris application for the Baylor IRB approval of the new study.

- ***Thursday, Dec 6th, 2012:***

Today I finished up the protocol for the new proposed study and I also finished the first draft of the IRB application. Jessica will look everything over and make sure all has been entered correctly before our final submission. I am also waiting for Giovanni to include the statistical analysis methods in the protocol before that will be complete and ready for submission with the rest of the IRB application.

- ***Friday, Dec 7th, 2012:***

Today I worked on the blood conservation compliance forms for 12/06/2012.

Jessica gave me some feedback on the protocol draft I emailed her. I need to take out a possible data linkage to the STS database that was mentioned in one of our earlier meetings with Giovanni. I need to delete the paragraph listing research personnel because it is not required in

the Baylor IRB application protocol and can become very inconvenient if there is a change in personnel that needs to be updated several times in the course of the study. Also, she mentioned that when describing the patient type I must include an explanation like “all patients experiencing an MI between the HCUP date ranges within the HCUP public data file”.

- ***Monday, Dec 10th, 2012:***

Today I worked on blood conservation compliance form data collection. This is the last week to work on this, so Jessica and I discussed the possibility of working on additional database abstractions with the other interns.

- ***Tuesday, Dec 11th, 2012:***

Today I worked on blood conservation and the protocol for the HCUP Myocardial infarction study. I only need the statistical analysis section to be filled out by Giovanni or David Nicewander. I need to do some background HCUP research on SAS load data.

- ***Wednesday, Dec 12th, 2012:***

Jessica told me that I could begin studying atrial fibrillation and cardiovascular surgeries in order to be prepared to work on the AFIB database in the future. I have begun reading about six different handouts that have been prepared from medical schoolbooks.

- ***Thursday, Dec 13th and Friday, Dec 14th, 2012:***

I did not come into work on these days because of the stomach flu.

- ***Monday, Dec 17th, 2012:***

Today I worked on the protocol for the HCUP study Baylor IRB submission. Today was also the last day of the blood conservation data collection and compliance form reporting. It was a strange experience to say goodbye to the ladies that work in the blood lab. I'm used to seeing them every morning and it is going to take some getting used to. Also, not having to drive to Plano every day is a plus because I will be saving a ton on gas expenses, but I will still miss the drive because it was a constant part of my day.

- ***Tuesday, Dec 18th, 2012:***

Today I worked on the Baylor IRB protocol, reimbursement paperwork for driving to Plano every day and I studied Atrial fibrillation causes. I also studied all of the different kinds of medicines that patient admitted for atrial fibrillation could possibly be on. I have to know this in order to properly document medicines taken on admission, medicines taken while in the hospital/ during surgery, and medicines that are approved after discharge.

- ***Wednesday, Dec 19th, 2012:***

I finished the Baylor IRB protocol for the HCUP MI study. I emailed it to Giovanni and Jessica to get feedback on it. I also asked Giovanni to fill out the statistical analysis section. I provided him with a link to the HCUP database and the HCUP methods handbook that contains information on how to properly load the HCUP data into SAS, a program that Giovanni and Jessica often use.

- ***Thursday, Dec 20th - Friday, January 4th, 2013:***

Christmas Vacation

- ***Monday, January 7th, 2013:***

Today I edited the Baylor IRB protocol for the HCUP MI study that I got back from Giovanni today. I also started training for the atrial fibrillation study. The training for the rest of the week will mainly consist of watching Ashley Malveaux do the data abstractions and asking questions while I take detailed notes for each section covered.

- ***Tuesday, January 8th, 2013:***

I am learning a lot about the atrial fibrillation data abstractions. I have learned quick ways to skim the patient records in order to find pertinent data that matches the data elements. The data elements are numerous and very specific. There is a lot to remember but as frequently as it is done, it shouldn't take too long before this knowledge becomes second nature and I can enter the data efficiently.

- ***Wednesday, January 9th, 2013:***

Today I watched Atrial fibrillation data abstractions again. I am really learning the intricate process in general right now, and focusing on the general process. It is very helpful to watch the different approaches taken by each intern. Everyone has his or her own method that is useful to save time on each patient chart that is reviewed.

- ***Thursday, January 10th, 2013:***

Today I watched data abstractions for atrial fibrillation and I focused mainly on abstracting med lists from the anesthesia reports, the medical administration records and the medication reconciliation form.

- ***Friday, January 11th, 2013:***

Worked on thesis in Fort Worth

- ***Monday, January 14th, 2013:***

The anesthesia report is very difficult to read because the physician handwriting is often obscured by doses, oxygen levels, and monitoring all of the different machines. The medical Administration record includes all of the doses, routes of administration and times for each medication given to the patient while they were in the hospital. The medication reconciliation form lists all of the medications that the patient was on before admission into the hospital and there are check marks next to the medications that can be continued after discharge. There is an extra box at the bottom that includes additional medications that are added after discharge.

- ***Tuesday, January 15th, 2013:***

Today I started training for the atrial fibrillation charts with Kristen Abbott. She went through the patient charts while I took notes, but her methods and order of abstracting is very different from Ashley's. I think it is very important to adopt your own specific way of abstracting, one that makes sense to you.

- ***Wednesday, January 16th, 2013:***

Today Kristen went through an atrial fibrillation chart with me. I also entered all of the medications into the database. The medications are probably the most straightforward part of the abstraction for atrial fibrillation. The actual atrial fibrillation events are the most difficult part of the data abstractions.

- ***Thursday, January 17th, 2013:***

Today Kristen briefly went over how to enter atrial fibrillation events into the database. It is pretty complicated and will definitely take me some time to learn the process.

- ***Friday, January 18th, 2013:***

worked on thesis in Fort Worth

- ***Monday, January 21st, 2013:***

Happy Martin Luther King Day

- ***Tuesday, January 22nd, 2013:***

Today Jessica told me that it would make an easier transition into data abstracting if I were to start working on the Congestive Heart Failure study first. I printed out a copy of the

database and went through each data element to make sure I knew what to look for in the patient chart. I will start working on CHF tomorrow.

- ***Wednesday, January 23rd, 2013:***

Today I worked on two sample CHF patient charts and worked on paper because the database is not up and running yet. There are a few difficulties but Jessica said it should be ready by next week. For now I will work on paper and transfer the data later.

- ***Thursday, January 24th, 2013:***

Today Hallen looked over the trial CHF patient charts that I worked on yesterday and only found two errors that had to do with making sure that results from tests done on previous hospital visits (within 6 months before the CHF visit) were documented in the patient history.

- ***Friday, January 25th, 2013:***

Worked on thesis in Fort Worth

- ***Monday, January 28th, 2013:***

Today I started working on CHF by myself. Doing some practice trials with Hallen yesterday was really helpful. The only questions I had today pertained to the X-ray data abstraction and Hallen had the same questions, so she submitted them to the Principal Investigator of the study for clarification.

- ***Tuesday, January 29th, 2013:***

Today I worked on CHF at the office. I also emailed all of my committee members to set a date for my defense either at the end of February or early March. Once I complete this, I will be able to contact the room reserve person at UNTHSC in order to set aside the date, time and a room to conduct both my seminar to the public and my private defense.

- ***Wednesday, January 30th, 2013:***

Today I worked on CHF and I set a date for my defense. My defense will take place on March 7th at 2pm in CBH 230. I have a lot of work to do before then. I must complete my thesis, submit my intent to defend form a month before the defense, make slides for the seminar and practice my public speaking skills.

- ***Thursday, January 31st, 2013:***

Today Hallen heard back from the Principal Investigator of the CHF study about the X-ray data abstraction question we had earlier this week. It was clarified and I had to go back through the patients that I had marked as unfinished to edit the X-ray data.

- ***Friday, February 1st, 2013:***

Worked on thesis in Fort Worth

- ***Monday, February 4th, 2013:***

Today I worked on the CHF study. When I got back to Fort Worth, I worked on my thesis for about three hours. I have about three more sections to work on until I can submit it to my committee for corrections. Hopefully I can have it finished by this weekend. I need to get all of the signatures on my Intent to Defend form.

- ***Tuesday, February 5th, 2013:***

Today I worked on the CHF study and I filled out my reimbursement forms for the last part of driving to Plano for the blood conservation study.

- ***Wednesday, February 6th, 2013:***

Today I worked on the Congestive Heart Failure data abstractions. I have completed 64 patient records. Hallen agreed that we would have a pizza party after I reach 100 completed records. I also met Dr. Gwartz in order to get her signature on my Intent to Defend form. It is due exactly 30 days before my defense date on March 7th.

- ***Thursday, February 7th, 2013:***

Today I worked on Congestive heart failure data abstractions. I also met Dr. Schetz in the afternoon to discuss my thesis completion and how to create the slides for my seminar presentation in a proper format. He showed me examples from a few of his past presentations.

- ***Friday, February 8th - Wednesday, February 13th:***

I worked on my thesis in Fort Worth. Got Dr. Rosales to sign my intent to defend form and submitted it to the office of the graduate school.

- ***Thursday, February 14th, 2013:***

Happy Valentine's Day!

- ***Friday, February 15th, 2013:***

Yesterday and today, I worked on the CHF database half the day and then I worked on my practicum report and the HCUP IRB application for Baylor.

- ***Monday, February 18th, 2013:***

I worked on CHF and my thesis today. It is my last week of my official internship, so I am focusing on gathering all of the pertinent information that I will need in order to finish my thesis and the Baylor IRB application for the HCUP myocardial infarction study entitled “assessing the association between hospital characteristics and mortality of acute myocardial infarction patients”.

- ***Tuesday, February 19th, 2013:***

Today I worked on getting two department approval forms signed by the department head, Dr. Ballard. These forms outline the expected expenses and study personnel salaries for the HCUP MI study.

- ***Wednesday, February 20th, 2013:***

Today I worked on getting the Form 15 for the expedited HCUP MI study. It asked basic questions about whether or not there would be any patient interaction, which database would be used, and whether patient identifiers would be used in the study.

- ***Thursday, February 21st, 2013:***

Today I worked on CHF and spoke with Jessi about the possibility of continuing my stay in the Epidemiology Department after my internship has been completed. I really appreciate how supportive and helpful everyone in the department and the Baylor Healthcare System has been. I really feel like a valued member of the research team.

- ***Friday, February 22nd, 2013:***

Today was the last day of my internship experience. I have learned so much and I have had a wonderful opportunity to be a part of this fabulous group of people. I am very much looking forward to possibly working here at a later date. I have really enjoyed working on the CHF database and would like to be able to finish the data abstractions of the patient charts in the study.

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