

THE EFFECT OF HEALTH IT ADOPTION STAGE ON THE INPATIENT LENGTH
OF STAY FOR CHILDREN DIAGNOSED WITH ASTHMA

By

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The effect of Health IT adoption stage on the inpatient length
of stay for children diagnosed with asthma

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Abstract

With the push for national EHR adoption and the subsequent increase in meaningful use of HIT applications, the healthcare industry has sought to realize reduced cost, increased safety, and improved patient outcomes. In an effort to evaluate the goal of improved patient outcomes, this study examines the effect of HIT adoption stage on the length of stay (LOS) for children admitted with an asthma diagnosis. Asthma is a chronic disease affecting millions of children each year, and has significant health, monetary, and emotional costs. As asthma is in the top three of most common conditions requiring hospital admissions for children and that nearly 50% of inpatient pediatric patients are covered by Medicaid, improving quality outcomes for this condition has large implications across the healthcare delivery system.

Using comparisons from the KID 2009 and 2012 datasets, the differences between mean LOS for pediatric asthma patients between stages of adoption of Health IT as measured by the EMRAM scale are statistically significant at the $p < .05$ level, demonstrating that increased use of Health IT has lowered the mean length of stay for this population. Thus, the utilization of a medical best practice, here the adoption of Health IT, resulted in shorter hospital stays and thus cost savings, in this defined pediatric patient population. While further studies examining Health IT implementation in other patient populations are necessary, these results demonstrate that the implementation of Health IT can lead to both better standards of care and lower healthcare costs, which should be of significant interest to those charting the future course of healthcare and healthcare reimbursement in this country.

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Chapter I: INTRODUCTION

1.1 Background

Probably nothing has been debated, legislated, and invested in, more than information technology in healthcare for the past few decades. While computers have

been ubiquitous in homes, offices and even hospitals, their main use within healthcare has been as depositories of information; holders of mostly demographic and billing information. Some of the early examples of healthcare systems dealing with clinical information were the Massachusetts General Hospital Utility Multi-Programming System (MUMPS) and the Veterans Administration's variation of MUMPS, and Veterans Health Information Systems and Technology Architecture (VistA), begun in the 1980s. While these systems are often held up as examples of early health IT innovations, they were designed specifically for those individual institutions' needs and not easily replicated on a broad scale. Given the historical structure of the healthcare delivery system, one based on many individual providers seeing the same patient with very little sharing or communication and often, in fact, competing for that patient's "business", the task of creating a national information infrastructure would seem unfavorable at least, and in surmountable at best. While healthcare entities failed to share information, ideas, and innovation with each other, federal health agencies took note and published a stunning commentary on the dangers of the healthcare system with a report from the Institute of Medicine in 1999. (1)

The IOM continued to research and report on the progress of healthcare quality and in 2001, published *Crossing the Quality Chasm: A New Health System for the 21st Century* which provided the six commandments of quality care which exist to date: 1) safe, 2) effective, 3) patient-centered, 4) timely, 5) efficient, and 6) equitable.(2) In order to achieve these goals, the IOM also set forth recommendations on a national scale for education, using research-based evidence, aligning health reimbursement to quality improvements and to facilitate all of this, the "elimination of most handwritten data by

the end of the decade” (IOM, 2001, p5) through the widespread use of health information technology (HIT). It was believed that HIT could create efficiencies of scale, improve access to patient information, decrease medical errors and expense through unnecessary or duplicative procedures, and eventually improve patient outcomes through the use of advanced technologies.

Taking up the national call to action, President George W. Bush created the position of National Coordinator for Health Information Technology (ONC) via Executive Order in 2004 “to provide leadership for the development and nationwide implementation of an interoperable health information technology infrastructure to improve the quality and efficiency of health care” (3) The ONC position was cemented through legislation in 2009 via The Health Information Technology for Economic and Clinical Health (HITECH) Act, which, among other things, created a financial incentive for healthcare providers to implement HIT that would meet specific functionality at measurable stages, and penalties for those providers that chose not to participate. The incremental stages were meant to build the HIT infrastructure and begin collecting data collecting and sharing, then use that data for clinical processes such as decision making, and finally the third stage of improved patient outcomes. (4) These defined stages, with specific levels of data and system functionality meant to ensure that healthcare organizations were doing more than just “warehousing” data, were known collectively as Meaningful Use (MU). The available financial incentives would be awarded through the Medicare and Medicaid provider reimbursements and the Center of Medicare and Medicaid Services (CMS) who would share in the development of the MU measures with the Department of Health and Human Services (DHHS). (4)

1.2 Statement of the Problem

The supporters of this wide-scale initiative believed that enhanced HIT would provide safer, more effective, and less expensive healthcare across the spectrum. Proclaiming early promise, a Rand report estimated a potential savings of \$77 billion and 200,000 less patient deaths per year. (5) Given the hoped-for benefits of HIT adoption (though probably more due to the financial incentives provided by the government) healthcare organizations began to slowly adopt electronic health records (EHRs) as the first step towards MU. The first big adopters were the Larger health systems who had more money available, required the longest lead time to implement, and potentially the most to gain from all of the promised glory of HIT. While as of 2016, 96% of hospitals had adopted a certified EHR, there is little evidence to support all of the advantages hoped for thus far.(6) As these entities are in various stages of implementation and use of Health IT, it is difficult to get a clear picture of the true impact of these technologies on patient safety, improved outcomes, and cost on a national scale. The current body of knowledge is limited and sometimes contradictory, making it difficult to accurately gauge the effectiveness of this national, and expensive, HIT initiative.

In 2011, the IOM published the report, *Health IT and Patient Safety: Building Safer Systems for Better Care*, “to evaluate safety concerns and to identify actions that both government and the private sector can take to alleviate those actions”. (7) The investigators found that while there were some reports of negative impact from HIT use such as an increase in patient deaths in some cases, other reports found positive results

from HIT use, further confounding the ability to determine success or failure of HIT in general. Importantly, the IOM noted that many determinants affected overall positive outcomes of HIT besides the technology itself including implementation strategy, user training, and impact on clinical workflow; all human factors. (7) It follows that the difficulty in determining improved safety with advanced use of HIT would also make it challenging to determine improved health benefits. This lack of confirmatory evidence about the effects of HIT on patients is concerning and should prompt additional research.

1.3 The Need for the Study

While the literature is contradictory on patient safety, there is even less evidence one way or the other on improved health outcomes. Since length of stay (LOS) can be used as potential indicators of treatment outcome, this primary variable will be investigated against varying uses of HIT at hospitals across the United States. This research project hopes to quantify the impact of HIT for one specific type of healthcare encounter: inpatient admission stays for children with asthma. HIT adoption stage will be determined by a hospital's reported implementation and use of clinical systems, and compared with length of stay (LOS). These characteristics will be further divided by patient age group, gender, and primary payer status to see if any significant outcomes vary by these determinants.

1.4 Objectives and Research Questions

Objectives:

1. To assess quality indicators within each stage of HIT for each year of data provided.
2. To determine the effects of HIT implementation on hospital quality indicators.
3. To determine if HIT stage is a predictor of quality indicators for hospitals in the United States.
4. To determine if variations exist in quality outcomes for pediatric patients based on age group, sex, or primary payer status.

Outcomes:

1. Length of stay for inpatient pediatric asthma patients in a given year.
2. Additional determinants of pediatric patient demographics such as age group, sex, and primary payer status.
3. Hospital region, bed size, and teaching status in combination with HIT stage implementation.

This research seeks to answer the following questions:

1. What are the stages of HIT adoption for hospitals that admit pediatric asthma cases?
2. Does the HIT stage adopted at a hospital have an effect on health outcomes, measured by LOS?
3. Are there differences in health outcomes for pediatric asthma patients based on age group, sex, or primary payer status?

1.5 Hypothesis

Null Hypothesis H_0 : The adoption stage of health information technology in US hospitals does not have a statistically significant impact on LOS for inpatient pediatric asthma cases.

Alternate Hypothesis H_1 : The adoption stage of health information technology in US hospitals does have a statistically significant impact on LOS for inpatient pediatric asthma cases.

Chapter II: REVIEW OF RELATED LITERATURE

2.1 Overview

Asthma is defined by the National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health (NIH) as a “common chronic disorder of the airways that is complex and characterized by variable and recurring symptoms, airflow obstruction, bronchial hyper-responsiveness, and an underlying inflammation.” (8) (page 12) Those that suffer from asthma can experience prolonged coughing, wheezing, bronchospasms, restriction of airway, hypersecretion of mucus and potentially edema. The central pathophysiology of asthma is the inflammatory response that with repeated attacks can actually affect the body on a cellular level in addition to bronchial scarring, making an already difficult condition worse.(9) There is currently no cure for asthma and the precipitating events, or triggers, that can exacerbate an asthma “attack” (wheezing, coughing, further bronchoconstriction, etc.) can vary widely from patient to patient. Some attacks are induced from exercise, irritants in the air (such as cigarette smoke, pollution, perfume, or pet dander), stress, or respiratory illness. In children, one of the most common asthma triggers is second-hand smoke.

Treatment

Treatment for asthma consists of quick-relief or “rescue” bronchodilators typically delivered through an inhaled aerosol, long-term inhalers for regular use, and occasionally steroids. (10) Patients benefit from having a long-term asthma management plan, rescue medicine and equipment at home, and regular visits with a specialist to manage their care. Oftentimes children are brought to the emergency room for asthma attacks by frightened parents faced with a child struggling to breathe; partly because management of a chronic disease is difficult for children.

Prevalence

As of 2014, nearly 6.3 million children in the United States under the age of 18 have asthma, which is 8.6% of the population. Out of all groups of children, the 5-11 years group has the highest prevalence at a little over 3 million, which is 10.6% of all groups between 0-18 years with asthma. (11) Children in the 5-11 years age group also represent the highest population of any person with asthma (between age groups 0-65+ years), at 10.3%. While males overall have less prevalence of asthma, almost 9.7 million compared to over 14 million for females, boys under 18 make up more cases than girls under 18, 3.8 million versus 2.5 million. (11)

Impact

The impact of childhood asthma during vulnerable childhood years is felt not only in the obvious physical attributes of the disease but also across daily activities, school, family life, and can have severe financial consequences. It is estimated that 24% of children between the ages of 5-17 have some limited activity due to asthma. (12) It is the number one reason for missed school days amongst children with chronic conditions, causing 15 million missed school days per year. (12) When a child has to miss a day of school because of asthma, it is often required that a working parent also miss a day of work, possibly straining their employability. The first study to examine both direct and indirect costs due to childhood asthma estimated the total economic impact to be \$1996.3 million or \$791 per child out of 2.52 million children treated that year (1996). (13) Given

that the costs of all healthcare has nearly tripled from 1996 to 2014 (\$1074.4 billion to \$3031.3 billion), it is likely that the economic impact of asthma has followed suit. (14)

2.2 Health Information Technology

Since the groundbreaking IOM reports of 1999 and 2001, the United States has had a national impetus to improve healthcare quality through improved safety, reduced costs, and better patient outcomes. (1, 2) Through government regulations, healthcare providers (hospitals and physicians) have been urged through both carrot and stick to adopt EHRs and other HIT systems within a structured framework of increasing Meaningful Use. (4) The carrot was increased Medicare and Medicaid reimbursements for several years, and the stick is financial penalties for non-compliance. Because of this, most hospitals in the United States have adopted at least some form of HIT though it is not at all clear that the fullest extent of training and use are being implemented within. In fact, the most recent report from the IOM highlighted that many concerns about patient safety and HIT are confounded by the human factors, and are likely to contribute to limitations for much of the research in this area.

While the term health information technology (HIT) is used across the healthcare continuum, it can mean many different things to different stakeholders. Defined in the broadest sense, it could mean any sort of computerized or technical equipment used in healthcare though this is not the definition for this project. The Office of the National Coordinator for Health Information Technology has defined HIT as “The application of information processing involving both computer hardware and software, that deals with the storage, retrieval, sharing, and use of health care information, data, and knowledge for

communication and decision making”. (15) Of course, this covers a wide range of systems and devices, with the foundational application consisting of the electronic health (or electronic medical) record (EHR). For the purposes of this study, the stage of EHR adoption will be the primary determinant, as this is the most widely used HIT application in the United States. The Center for Medicare and Medical Services (CMS) defines an EHR as:

...an electronic version of a patient's medical history, that is maintained by the provider over time, and may include all of the key administrative clinical data relevant to that person's care under a particular provider, including demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data and radiology reports. The EHR automates access to information and has the potential to streamline the clinician's workflow. The EHR also has the ability to support other care-related activities directly or indirectly through various interfaces, including evidence-based decision support, quality management, and outcomes reporting.(16)

EHRs form the backbone of the HIT structure within any healthcare organization and because of the Meaningful Use staggered implementation stages, functionality at each phase is measurable. The EHR is the primary source of patient information for most hospitals in today's digital environment though the implementation for pediatric hospitals has lagged behind the national trend in others for advanced stage adoption because of various factors, including the lack of pediatric-specific adaptations of HIT products.(17) While hospitals that serve both adults and pediatrics measured at higher percentages of advanced EHR use, free-standing pediatric hospitals demonstrated a “digital divide” where the promotion from one stage to another was at the lowest end of the spectrum.(17) Given the challenges of pediatric-specific processes within the EHR, one might wonder if the hospitals that also serve adults are actually using advanced HIT within the pediatric

populations, or only for the adult sector, thus skewing the actual level of HIT adoption. Given the significant lack of investigation, it is difficult to know the true extent of HIT use for inpatient pediatric care at general hospitals.

2.3 HIT and Asthma

Most of literature on the use of HIT and inpatient pediatric asthma is non-existent, with the bulk of research focusing on education and treatment planning for long-term management of this chronic disease. A literature review was conducted as part of this research to investigate the use of HIT systems and applications for childhood asthma hospitalizations using the following criteria in a CINAHL search:

- Limited to publication within the last 10 years
- Limited to English language
- Limited to the geographic United States

A variety of search terms (see Appendix C for a complete list) in Boolean phrases were used to find over 1200 articles which were further narrowed down to specifically inpatient asthma cases, yielding a small number of 25 articles. There were several more that have been included as references that peripherally support the use of HIT in other instances, such as outpatient asthma cases. The literature search further demonstrates the need for research in this area, as the evidence is woefully inadequate.

One recent review of the incidence of pediatric asthma inpatient records determined that the actual population of children treated for asthma-related conditions increased by nearly 55% when a listed discharge diagnosis of “asthma” was compared to the actual treatment protocols administered. (18) The researchers investigated the administrative

data (coded discharge diagnoses) in the top 5 reported diagnosis for pediatric cases that included asthma in at least one position and reviewed the medical records. When the analysis determined that the patient received standard treatment regimens for asthma, that patient was included in the population. This deviates greatly from the current population reporting methods of the National Hospital Discharge Survey and the Agency for Healthcare Research and Quality (AHRQ), who rely upon the first or principle diagnosis only. (18) Since asthma can be triggered by many contagions or illnesses, it should be no surprise that children admitted for serious respiratory illness such as pneumonia, are also encumbered by asthma reaction. While this may be difficult to ascertain from a statistical standpoint, it is worth noting that respiratory illness is often exacerbated by an asthmatic reaction and children are more likely to need hospitalization with this comorbidity. By examining only first-listed or principal diagnosis of asthma, it is likely that the true impact of asthma on length of stay and cost will be underestimated.

As indicated earlier, there is paltry literature on the use of HIT for management of pediatric asthma cases and what does exist focuses on the outpatient setting. There is some strong support for the use of HIT, particularly for clinical decision support systems (CDSS) to improve documentation (19), (20), and improve the impact of an asthma action plan. (21) While some CDSS can seem to enhance adherence to clinical guidelines (22), others have only performed adequately for assessment but not accurate for treatment. (23) Additional studies have found that for subspecialists who treat childhood asthma, pediatric pulmonologists have embraced the documentation functions of EHRs but have failed to implement the use of clinical guidelines suggested through CDSS (23) and (20). The reasons reported echo concerns from other physicians that the

workflow in the EHR is time-consuming and limits patient facetime, as well as the specialists own personal opinion about appropriate treatment differing from the CDSS.

(20)

Since much of asthma management relies on long-term monitoring, it is cost-effective and medically appropriate that much of the focus is on outpatient management and there are some promising early studies on how HIT can improve those outcomes. Inpatient asthma cases though represent the most serious and life-threatening situations, with possible long-term implications of scarring or impairment of lung function. Given the potential for the true effect of asthma on other, related respiratory admissions for children, it is imperative to expand research into the effectiveness of HIT adoption on pediatric asthma admissions.

Chapter III. METHODS

3.1 Data Sources

The data sources for this study include the Kids' Inpatient Database (KID) and the HIMSS Analytics Database from the Dorenfest Institute for H.I.T. Research and Education Database.

3.1.1 Kids' Inpatient Database (KID)

The KID is a database developed as part of the Healthcare Cost and Utilization Project (HCUP) through a partnership with the U.S. Agency for Healthcare Research and Quality (AHRQ) and state-run agencies. (24) The KID database contains inpatient hospital data for children only (under age 21 in 2000) and is available every three years since 1997. (25) To access the KID database from HCUP, users must register for an account, complete an online Data User Agreement Training, and sign the Data User Agreement form (see Appendix D). For a small purchase price, each database is available via download with accompanying instructions for uploading to appropriate statistical software.

The KID sample includes stratified and randomly selected 10% of uncomplicated in-hospital births, and 80% of other pediatric cases from each population hospital. (24) Using six characteristics from the 2003 American Hospital Association (AHA) Annual Survey, hospitals are delineated based region (Northeast, Midwest, South, and West), location/teaching status (rural, urban teaching, and urban non-teaching), bed size category (Small, Medium, and Large), and whether the facility is a freestanding children's hospital. (24)

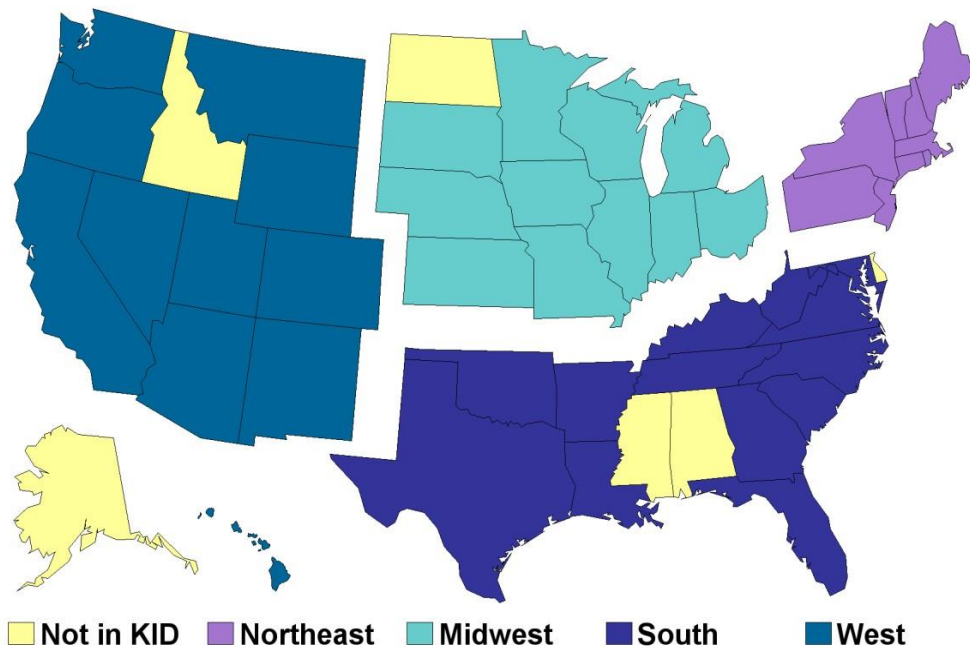
For this study, data from 2009 and 2012 were purchased from the website www.hcup-us.ahrq.gov and downloaded using IBM SPSS. The zipped downloads

included four ASCII files per year: Inpatient Core File, Hospital File, Disease Severity Measure Files, and Diagnosis and Procedure Groups File. Appendices D and E contain the detailed Data Elements File for both 2009 and 2012 datasets. Previous to 2012, hospital identifiers were available that could provide linkage between the KID and HIMSS data, but now these are no longer available. Therefore, population characteristics were used as comparison groups with the following parameters: Pediatric Hospitals only, Region (Northeast, Midwest, South, West), Size (Small, Medium, Large) and Teaching Status (Teaching, and Non-Teaching). Since the study interest population were children admitted for asthma, cases were limited to those assigned the Clinical Classification Software category of 128, Asthma in the first diagnosis position. While there is some research that shows cases might be adequately categorized as “asthma” by treatment protocols, even with that diagnosis in subsequent positions, first position cases were chosen to maintain consistency with the current AHRQ methods. Length of stay (LOS) was the key dependent variable and was further categorized by demographic information such as sex, age, and primary expected payer.

For each year of the KID, data can vary by state and participating hospital. Some states that provided data in previous years, may opt-out or not make the cut-off date to submit data. Additionally, each state has their own rules about what data they choose to include. For example, some institutions do not collect and/or report race as part of their dataset. For this reason, KID does not recommend using race as a reliable variable for national estimates. For 2009 and 2012, KID contained the same number of states (44) but with some slight variation. States that were included in 2009, but not in 2012, were Maine and New Hampshire, and states that were newly added to 2012 (and not in 2009)

were Arkansas and North Dakota. See Figures A and B for detailed state information for each year, and Table # for a comparison of all states included in the KID since 1997.

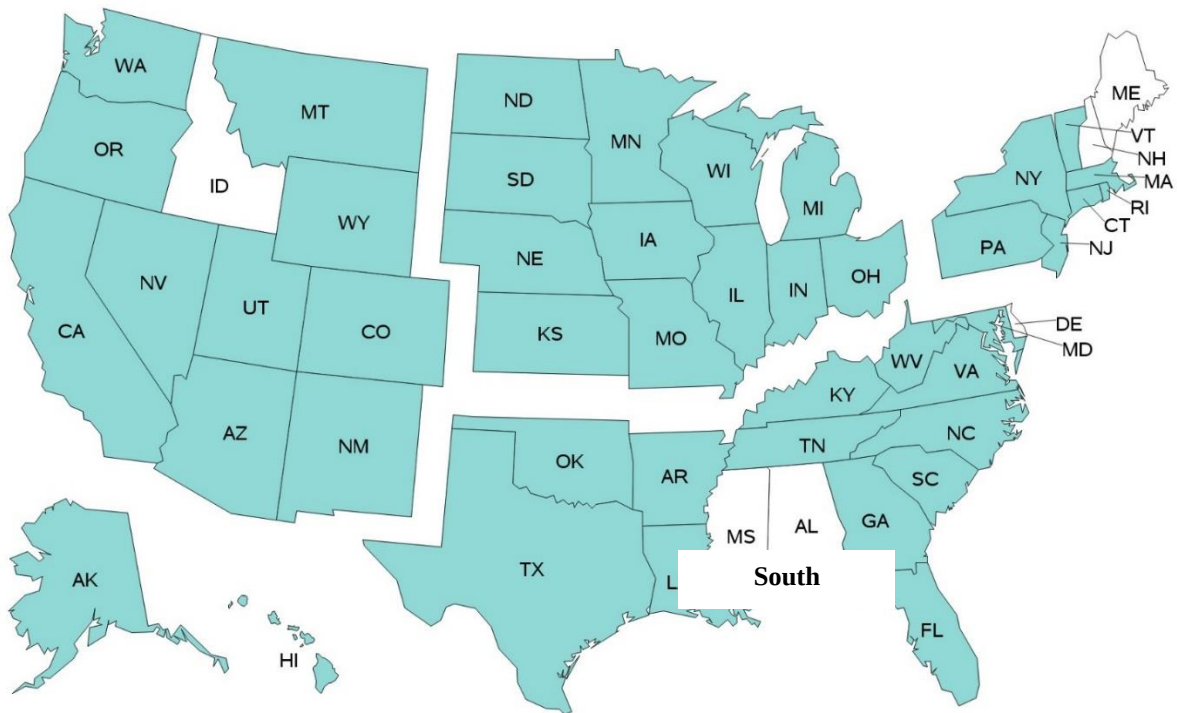
Figure A. KID States, by Region, 2009



All States, by Region

Region	States
1: Northeast	Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont.
2: Midwest	Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin.
3: South	Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia.
4: West	Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming.

Figure B. KID States, by Region, 2012¹¹



All States, by Region¹²

Region	States
1: Northeast	Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont.
2: Midwest	Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin.
3: South	<i>Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia.</i>
4: West	Alaska, Arizona, California, Colorado, Hawaii, <i>Idaho</i> , Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming.

¹¹ New Hampshire, Maine, and Mississippi participate in HCUP, but did not provide data in time for the 2012 KID.

¹² States and areas in italics do not participate in HCUP.

Table 1. Summary of KID States, Hospitals, and Inpatient Stays, 1997-2012

		2012	2009 1997	2006	2003	2000	
Number of States		44 22	44	38	36	27	
Data sources					AZ CA CO		
	AK AR AZ CA CO CT FL GA HI IA IL IN KS KY LA MA MD MI MN MO MT NC ND NE NJ NM NV NY OH OK OR PA RI SC SD TN TX UT VA VT WA WI WV WY (Added AK, ND. ME and NH are not included)	AR AZ CA CO CT FL GA HI IA IL IN KS KY LA MA ME MD MI MN MO MT NC NE NH NM NJ NV NY OH OK OR PA RI SC SD TN TX UT VA VT WA WI WV WY (Added LA, ME, MT, NM, PA and WY)	AR AZ CA CO CT FL GA HI IA IL IN KS KY MA MD MI MN MO NC NE NH NJ NV NY OH OK OR RI SC SD TN TX UT VA VT WA WI WV (Added AR and OK. ME and PA are not included)	CT FL GA HI IA IL IN KS KY MD MA MI MN MO NC NE NH NJ NV NY OH OR RI SC SD TN TX UT VA VT WA WI WV (Added IL, IN, MI, MN, NE, NH, NV, OH, RI, SD, VT. ME and PA are not included)	AZ CA CO CT FL GA HI IA KS KY MD MA ME MO NC NJ NY OR PA SC TN TX UT VA WA WI WV (Added KY, ME, NC, TX, VA, WV. IL is not included)	AZ CA CO CT FL GA HI IL IA KS MD MA MO NJ NY OR PA SC TN UT WA WI	
Number of hospitals with pediatric discharges		4,179	4,121	3,739	3,438	2,784	2,521
Number of pediatric discharges (weighted)		6,675,222	7,370,203	7,558,812	7,409,162	7,291,032	6,657,326

3.1.2 HIMSS Analytics

The HIMSS Analytics Database from the Dorenfest Institute for H.I.T. Research and Education (HIMSS) is accessible through the HIMSS Foundation website (<https://apps.himss.org/foundation/histdata.asp>) and free to all researchers for a six-month access period who register and follow the user agreement (See Appendix E). In addition, all researchers are required to insert the following at the bottom of each page where the data is used: *Data Source: The Dorenfest Institute for H.I.T. Research and Education, HIMSS Foundation, Chicago, Illinois, 2010.*

The HIMSS includes demographics and IT information for nearly 40,000 facilities, of which over 5000 are hospitals (in 2012), and provides data about the health IT capabilities of US hospitals. Along with each Access database download, an Excel spreadsheet is included that contains the data dictionary and metadata. A copy of the Table Descriptions and Element List for 2009 are attached as Appendix F and G for reference. The depth of data provided for each facility will be used to determine the classification of HIT stage as it aligns with the HIMSS US Electronic Medical Record Adoption Model (EMRAM). (See Figure C) The EMRAM adoption model uses an 8-stage scale to identify a hospital's progress towards achieving 100% paperless system, and achieve the current goal of Stage 7. A more detailed description of the EMRAM stages can be found in Appendix J. Because HIMSS does not calculate the EMRAM stage (with the exception of certified Stage 7 facilities beginning in 2012), a review of the available data from the *HAEntityApplication* and *AutoIdentification* tables was conducted to determine a hospital's functional stage.

Figure C HIMSS Analytics EMRAM

STAGE	HIMSS Analytics EMRAM EMR Adoption Model Cumulative Capabilities
7	Complete EMR, Data Analytics to improve care
6	Physician Documentation (templates), Full CDSS, Closed Loop Medication Administration
5	Full R-PACS
4	CPOE; Clinical Decision Support (clinical protocols)
3	Clinical Documentation, CDSS (error checking)
2	CDR, Controlled Medical Vocabulary, CDS, HIE Capable
1	All Three Ancillaries Installed — Lab, Rad, Pharmacy
0	All Three Ancillaries Not Installed

(26)

Data elements were used in combination to determine the applicable EMRAM stage and are identified in Table 2 below. For a facility to be qualified for a particular stage, it must have achieved each successive stage below it. For example, to qualify as stage 4 EMRAM, a hospital must meet all of the requirements for stage 0, 1, 2, and 3 in full. But hospitals are in various stages of growth and adaption of applications, and as such were found to be somewhere along a continuum of the stages. Most facilities could

be categorized at one stage and also be using applications from another, higher stage. As such, the EMRAM stages were considered an interval scale for purposes of analysis.

Table 2. Determination of Health IT Stages

Stage	Label	Table	Variables	Code	Code Description
0	N/A	N/A	None	N/A	N/A
1	Ancillaries	HAEntityApplication	Application Id	71	Laboratory Information System
				78	Pharmacy Management System
				19	Radiology Information System
2	Clinical Data Repository	HAEntityApplication	Application Id	31	Clinical Data Repository
3	Electronic Medication Administration Record	HAEntityApplication	Application Id	79	Electronic Medication Administration Record
4	Computerized Practitioner Order Entry	HAEntityApplication	Application Id	34	Computerized Practitioner Order Entry
5	Medication Administration	AutoIdentification	InUseFlag	1	Bar Coding, RFID or Bar Coding/RFID
6	Structured Templates	HAEntityApplication	Application Id	38	Physician Documentation
7	Full EMR	HAEntityApplication	Application Id	100	Case Mix Management
				101	Data Warehousing/Minimizing-Clinical

				102	Outcomes and Quality Management
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Using the HAEntity table, hospitals were identified by *HAEntityType* as “hospital” and *Type* as “pediatric” for both 2009 and 2012. Additional subcategories were determined by Region (Northeast, Midwest, South, West), Bed Size (Small, Medium, Large), and Teaching Status (teaching, non-teaching). The total number of pediatric hospitals in the HIMSS 2009 universe was 83, and 94 in 2012.

3.2 Procedures

Both the KID and HIMSS databases are available to the public for use in research though there are specific procedures required to get access to them. Both required data user agreements, financial payment and access to specific database software. The procedures to obtain these databases are outlined below.

3.2.1. KID

The first step was to review the AHRQ website to determine the scope and value of the KID to this project with a review of the data resources and tools offered by this federally funded website (<http://www.ahrq.gov/research/data/hcup/index.html>). The link to the Kids Inpatient Database (KID) (<https://www.hcup-us.ahrq.gov/kidoverview.jsp>) provides detailed about the KID including the data elements, typical research done using this resource, and how to purchase the KID. All intended users of the KID must complete the HCUP Data User Agreement (DUA) Training, which includes signing a DUA, prior to purchasing a database from the HCUP Central Distributor. The user must

supply the DUA certification code in order to purchase the item online using a credit card, which will then be delivered via email as a download link. A student price of \$50 for each year 2009 and 2012 was available with proof of good academic standing from the Biomedical Informatics Program Chair.

The KID webpage includes download directions and syntax for common statistical software, and also provides a contact for technological assistance. This webpage is very robust with information on the data elements, how the database was developed, its common uses, and guidelines for statistical analysis.

3.2.2 HIMSS Analytics

The HIMSS Analytics Database from the Dorenfest Institute for H.I.T. Research and Education (HIMSS) is accessible through the HIMSS Foundation website (<https://apps.himss.org/foundation/histdata.asp>) and free to all recognized researchers who register and follow the user agreement (See Appendix E). In addition, all researchers are required to insert the following at the bottom of each page where the data is used: *Data Source: The Dorenfest Institute for H.I.T. Research and Education, HIMSS Foundation, Chicago, Illinois, 2010.*

Users are required to submit an online application that determines their legitimacy as a researcher, reviewed and then accepted. Once accepted, an email was received with a link to access the databases digitally. Each user is given a unique logon and password, and as part of the user agreement, certifies that they will not share this information. The user is given 6 months access to the webpage before it is disabled. The database downloads also include the data elements list and descriptions.

3.3 Data Extraction

Each database required different software to extract, manipulate and conduct analysis and these processes are described below.

3.3.1. KID

The purchased KID databases for 2009 and 2012 included ASCII files for the following files for each year: Hospital, Core, Diagnosis, Procedure Groups, and Severity. An introduction in Word and a Quick Start Guide in PDF were also included as part of the downloads. The data was then uploaded into IBM SPSS Statistics 24 software using the load files supplied by HCUP (<https://www.hcup-us.ahrq.gov/db/nation/spssloadprog.jsp>). Once uploaded, each Hospital dataset was modified to include pediatric facilities only; for KID 20009 selected by NACHTYPE = 1 Children's General Hospital and 2 Children's Specialty Hospital. Beginning in 2012, the NACHTYPE is no longer used to identify pediatric hospitals; instead KID_STRATUM = 9999 is the indicator used.

The KID_Core dataset for both 2009 and 2012 was modified by selecting only cases with the Diagnosis Clinical Classification Software position 1 (DXCCS1) = 128, asthma. As previously mentioned, although choosing only the asthma diagnosis in 1st claim position is likely to underestimate the actual number of cases treated for asthma, this was done to remain consistent with the ARHQ standard.

Once the asthma cases were selected and the pediatric hospitals were identified, the Core and Hospital datasets were merged for each year using the following variables: 2009 HOSPID and 2012 HOSP_KID.

3.3.2. HIMSS

The HIMSS databases for 2009 and 2012 were each downloaded as a Microsoft Access database with Excel files provided as the data dictionaries. The specific datasets HAEntityApplication and AutoIdentification were extracted into Excel for ease of manipulation. Entities were selected by HAEntityType = 1 (Hospital) and Type = Pediatric. Then each entity was coded with their EMRAM adoption stage as identified by the achievement of IT application (previously identified in Table 2):

Stage	Label	Table	Variables	Code	Code Description
0	N/A	N/A	None	N/A	N/A
1	Ancillaries	HAEntityApplication	Application Id	71	Laboratory Information System
				78	Pharmacy Management System
				19	Radiology Information System
2	Clinical Data Repository	HAEntityApplication	Application Id	31	Clinical Data Repository
3	Electronic Medication Administration Record	HAEntityApplication	Application Id	79	Electronic Medication Administration Record
4	Computerized Practitioner Order Entry	HAEntityApplication	Application Id	34	Computerized Practitioner Order Entry
5	Medication Administration	AutoIdentification	InUseFlag	1	Bar Coding, RFID or Bar Coding/RFID

6	Structured Templates	HAEntityApplication	Application Id	38	Physician Documentation
7	Full EMR	HAEntityApplication	Application Id	100	Case Mix Management
				101	Data Warehousing/Minimizing-Clinical
				102	Outcomes and Quality Management

Facilities that did not report adapting all applications required for a specific stage were assigned the highest stage where all competencies were indicated. For example, if a facility indicated only 2 out of the 3 applications required for stage 1, they were assigned stage 0. Facilities that did not report any data for application adoption were excluded from the dataset.

3.3.3. Merging Databases

Because KID stopped providing identifying information for hospitals in 2012, it was not possible to compare facilities from 2009 to 2012. Instead, identified pediatric hospitals from both HIMSS and KID were categorized by Region (Northeast, Midwest, South, West), and Size (Small, Medium, Large). Teaching status is considered in assigning Size as follows (Table 3):

Table 3. Bed Size Categories, by Region, Location, and Teaching Status

Hospital Bed Size			
Small	Medium	Large	
NORTH EAST			
Rural		1-49	50-99
100+ Urban, non-teaching		1-124	125-199
200+ Urban, teaching		1-249	250-424
425+			
MID WEST			
Rural		1-29	30-49
50+ Urban, non-teaching		1-74	75-174
175+ Urban, teaching		1-249	250-374
375+			
SOUTH			
Rural		1-39	40-74 75+
Urban, non-teaching		1-99	100-199 200+
Urban, teaching		1-249	250-449 450+
WEST			
Rural		1-24	25-44 45+
Urban, non-teaching		1-99	100-174 175+

(25)

Based upon the average healthcare IT applications adapted, each category of Size and Region were assigned an EMRAM stage score, which was the mean of all facilities in the HIIMSS surveys. Then these scores were added to the SPSS databases for each respective year, 2009 and 2012, matched by Size and Region to determine relationships, if any, to the asthma cases.

Chapter IV. Descriptive Analysis

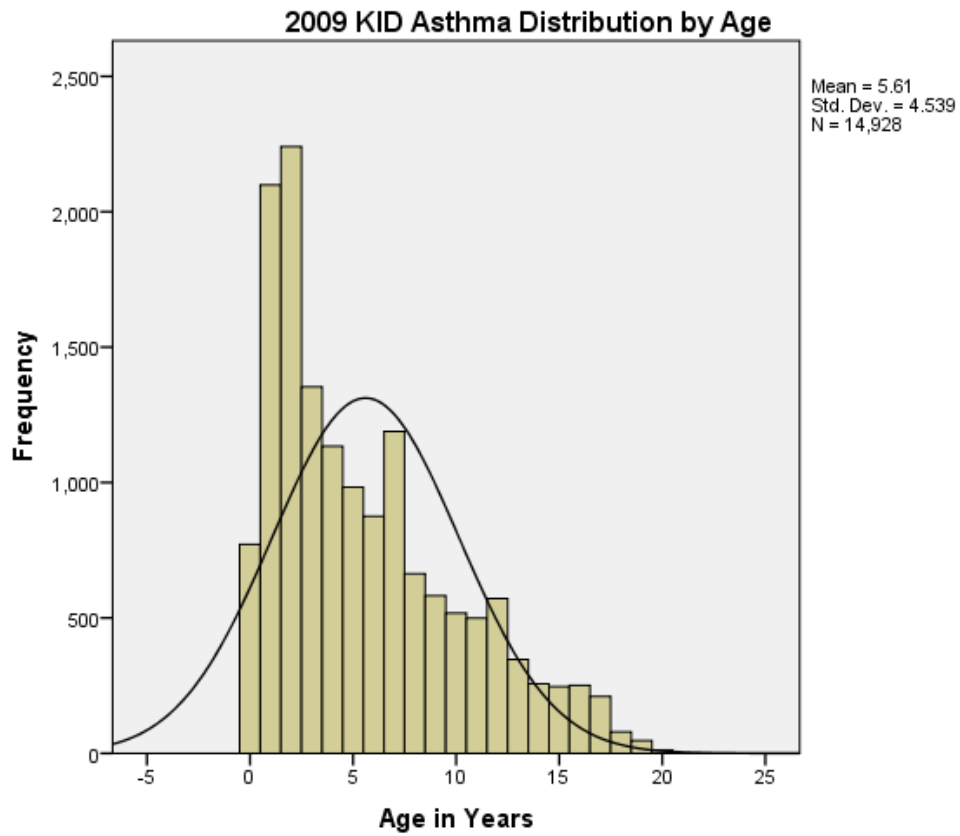
4.1 KID Descriptions

Descriptive statistics were performed to analyze each data set year, and compare them. All statistical analysis was done using SPSS.

4.1.1 2009 KID Descriptions

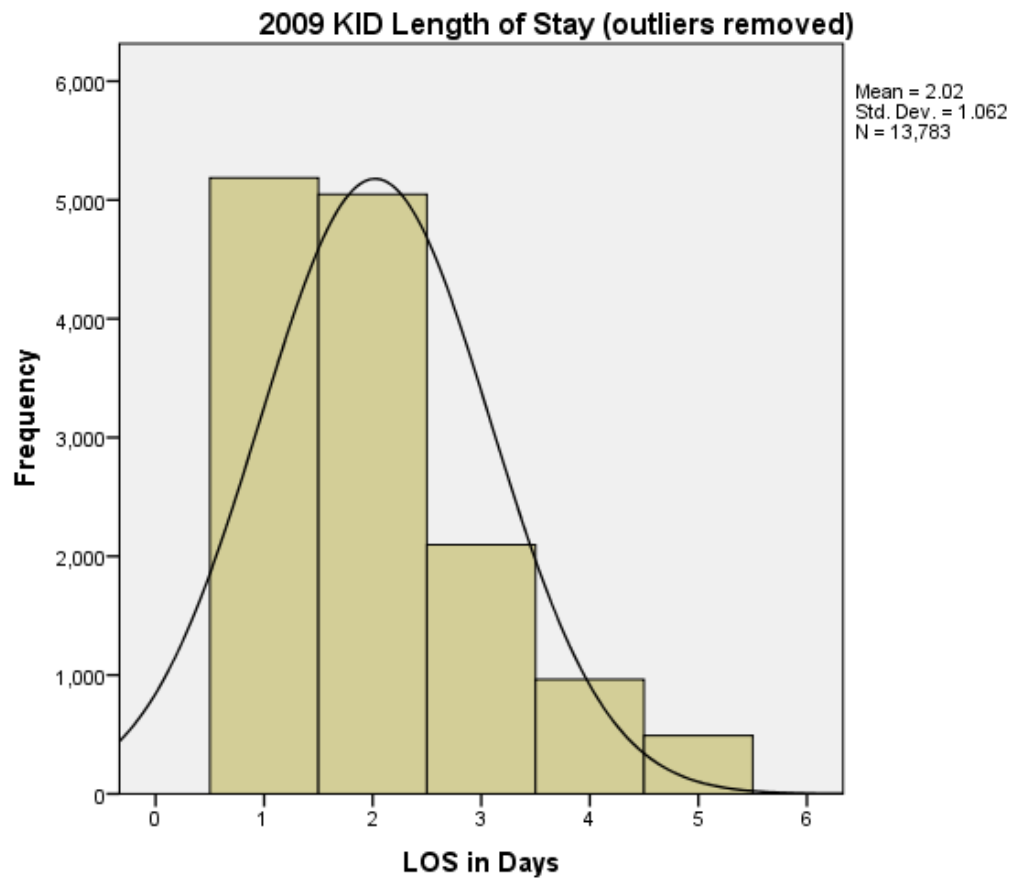
The KID 2009 dataset was filtered for asthma cases only using DXCCS1 = 128 (Diagnosis Clinical Classification Software, position 1) to obtain 15185 cases. From these, cases were eliminated where variable elements were missing or invalid, and further sorted to obtain pediatric hospital cases only where NACHTYPE = 1 (Children's General Hospital) and 2 (Children's Specialty Hospital), yielding 14928 cases. Cases with LOS means outside of the 5th and 95th percentile (LOS less than 1, and greater than 5) were considered outliers and removed, reducing the population to n = 13783. Demographics of this population were 9274 males and 5654 females, with age distributions from zero to 20 years, with a mean of 5.61, and standard deviation of 4.539 years.

Figure D. 2009 KID Asthma Cases Age Distribution in Years



The mean LOS was 2.02 days, with median 2.00, and standard deviation of 1.062 (Figure F).

Figure E. 2009 KID Length of Stay Statistics



From the descriptive statistics, there is little difference in the mean LOS for pediatric asthma patients when compared across regions in 2009 (Table 4) and when comparing Bedsize (Table 5).

Table 4. 2009 KID Mean LOS for Pediatric Asthma Patients by Region

**2009 KID Mean LOS by
Region**

Mean

HOSP_REGION	LOS
1	2.00
2	2.04
3	2.08
4	2.01
Total	2.02

1= Northeast

2 = Midwest

3 = South

4 = West

Table 5. 2009 KID Mean LOS for Pediatric Asthma Patients by Bedsize

**2009 KID Mean LOS by
Bedsize**

Mean

HOSP_BEDSIZE	LOS
1	2.00
2	1.95
3	2.14
Total	2.02

1 = Small

2 = Medium

3 = Large

When examining the mean LOS for the patients by income and payer, it is noted that while there is no significant difference in the means by income quartile (Table 6), those patients with Medicaid have a higher mean LOS than patients with other types of

insurance, 2.05 versus 1.97 (Table 7). This variance is worth investigating since the portion of services paid by Medicaid has continually risen over the past decade.

Table 6. 2009 KID Mean LOS for Pediatric Asthma Patients by Zip Income Quartile

**Figure X. 2009 KID
Mean LOS by Zip
Income Quartile**

Mean

ZIPINC_QRTL	LOS
1	2.03
2	2.06
3	2.00
4	1.98
Total	2.02

Table 7. 2009 KID Mean LOS for Pediatric Asthma Patients by Payer

**2009 KID Mean
LOS by Payer**

Mean

PAY1	LOS
-9	1.86
2	2.05
3	1.97
4	1.98
5	2.20
6	2.15
Total	2.02

-9 = unknown

2 = Medicaid

3 = Private including HMO

4 = Self-pay

5 = No Charge

6 = Other

The mean LOS pediatric asthma patients tends to decrease as the EMRAM stage increases (Table 8) and further demonstrated through a small Pearson's negative correlation of $-.029$ ($p < .01$) (Table 9). This result lends support to the claim that increasing use of health IT will decrease costs (through shorter lengths of hospital stay).

Table 8. 2009 KID Mean LOS of Asthma Patients by EMRAM Stage

2009 KID Mean LOS by EMRAM Stage	
Mean	
Stage X	LOS
2.80	2.03
3.43	2.28
3.67	2.00
4.60	2.02
4.80	2.05
4.88	2.19
5.30	2.07
5.80	1.92
6.00	1.97
Total	2.02

Table 9. 2009 KID Correlation of Mean LOS and EMRAM Stage

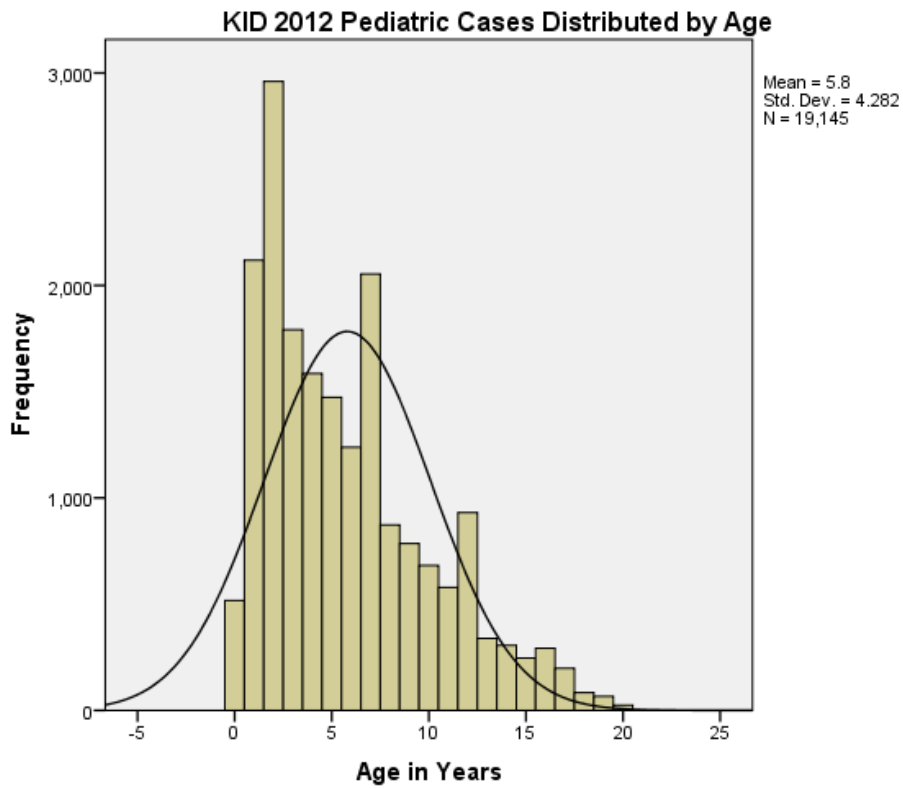
2009 KID Correlation of Mean LOS and EMRAM Stage			
		LOS	Stage_X
LOS	Pearson Correlation	1	-.029**
	Sig. (2-tailed)		.001
	N	13783	13783
Stage_X	Pearson Correlation	-.029**	1
	Sig. (2-tailed)	.001	
	N	13783	13783

** . Correlation is significant at the 0.01 level (2-tailed).

4.1.2 2012 KID Descriptions

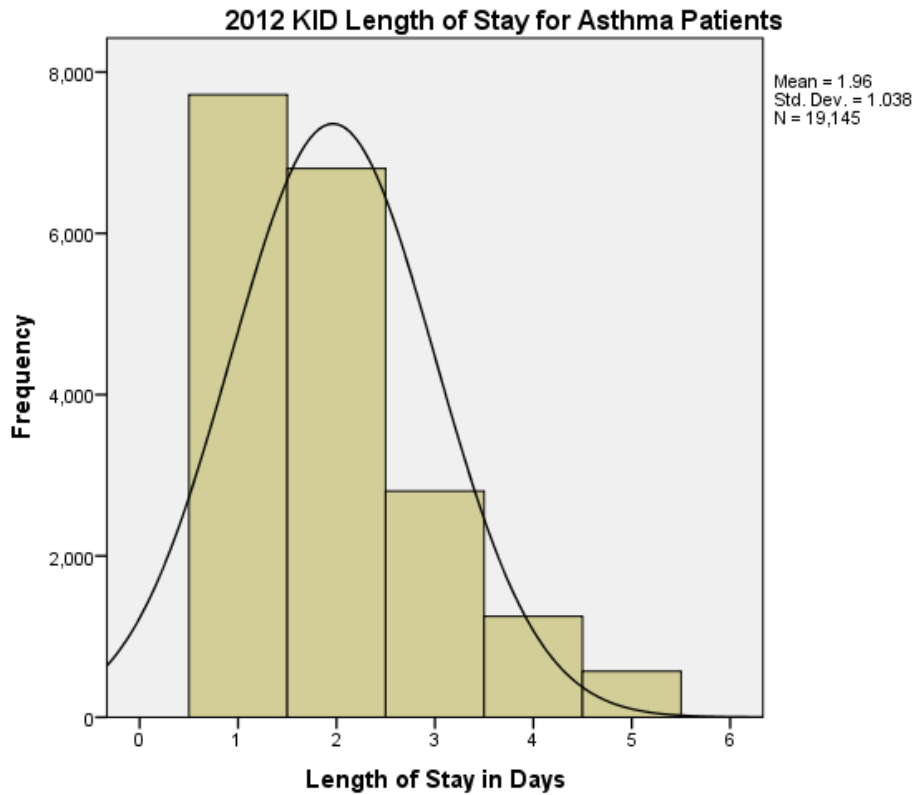
The KID 2012 dataset was filtered for asthma cases only using DXCCS1 = 128 (Diagnosis Clinical Classification Software, position 1) to obtain 90462 cases. From these, cases were eliminated where variable elements were missing or invalid, and further sorted to obtain pediatric hospital cases only Kid_Stratum = 9999, reducing n to 20731. Cases with LOS outside of the 5th and 95th percentile (LOS less than 1, and greater than 5) were considered outliers and removed, reducing the cases to n = 19145. This process resulted in 12530 males and 7491 females with age distributions from zero to 20, with a mean age of 5.80, and standard deviation of 4.28.

Figure F. 2012 KID Age Distribution of Pediatric Asthma Patients



The mean LOS was 1.96 days, with median of 2.00, and standard deviation of 1.038 (Figure G).

Figure G. 2012 KID Length of Stay Statistics



In 2012, the data is similar to 2009, in that the mean LOS for patients is not significantly different by Region or Bedsize (Table 10 and Table 11).

Table 10. 2012 KID Mean LOS for Pediatric Asthma Patients by Region

**2012 KID Mean LOS
by Region**

Mean

HOSP	REGION	LOS
1		1.81
2		1.91
3		2.15
4		1.92
Total		1.96

1 = Northeast

2 = Midwest

3 = South

4 = West

Table 11. 2012 KID Mean LOS for Pediatric Asthma Patients by Bedsize

**2012 KID Mean LOS by
Bedsize**

Mean

HOSP	BEDSIZE	LOS
1		1.78
2		2.04
3		2.03
Total		1.96

Table 12. 2012 KID Mean LOS for Pediatric Asthma Patients by Zip Income Quartile

**2012 KID Mean LOS
by Zip Income
Quartile**

Mean

ZIPINC_QRTL	LOS
1	1.95
2	1.99
3	1.98
4	1.94
Total	1.96

1 = \$1 - 38,999
 2 = \$39,000 – 47,999
 3 = \$48,000 – 62,999
 4 = \$63,000 +

Just as in the 2009 data set, the mean LOS for pediatric asthma patients are not significantly different when compared by income quartile or payer (Table 12 and Table 13), when two outliers are removed from the payer data. Payer 1 signifies Medicare, which is a rare source of healthcare payment for children and in this dataset, were the payment source for only 4 children. In addition, 2 children were “no charge” and had much longer stays than the overall mean of 1.96, 3 and 4 days respectively.

Table 13. 2012 KID Mean LOS for Pediatric Asthma Patients by Payer

**2012 KID Mean
LOS by Payer**

Mean

PAY1	LOS
1	2.75
2	1.98
3	1.93
4	1.91

5	3.50
6	2.10
Total	1.96

1 = Medicare (4 patients with this payer)
 2 = Medicaid
 3 = Private, including HMO
 4 = Self-pay
 5 = No charge (2 patients with this payer)
 6 = Other

Somewhat paradoxically, the Mean LOS for patients did not decrease as the EMRAM stage increased for the overall 2012 (Table 14), and the correlation was positive at .050 ($p < .01$) (Table 15). When these trends are examined by category, i.e. Region and Bedsizes, the variations are much easier to identify.

Table 14. 2012 KID Mean LOS for Pediatric Asthma Patients by EMRAM Stage

**2012 KID Mean LOS
by EMRAM Stage**

Mean

Stage_X	LOS
4.33	1.83
4.43	1.90
4.60	1.60
5.07	2.05
5.09	2.34
5.14	1.95
5.15	1.96
5.56	1.95
5.75	1.54
6.50	2.06
6.67	2.10
Total	1.96

Table 15. 2012 KID Correlation of Mean LOS and EMRAM Stage

2012 KID Correlation of Mean LOS and EMRAM Stage			
		LOS	Stage_X
LOS	Pearson Correlation	1	.050**
	Sig. (2-tailed)		.000
	N	19145	19145
Stage_X	Pearson Correlation	.050**	1
	Sig. (2-tailed)	.000	
	N	19145	19145

** . Correlation is significant at the 0.01 level (2-tailed).

4.2 HIMSS Descriptions

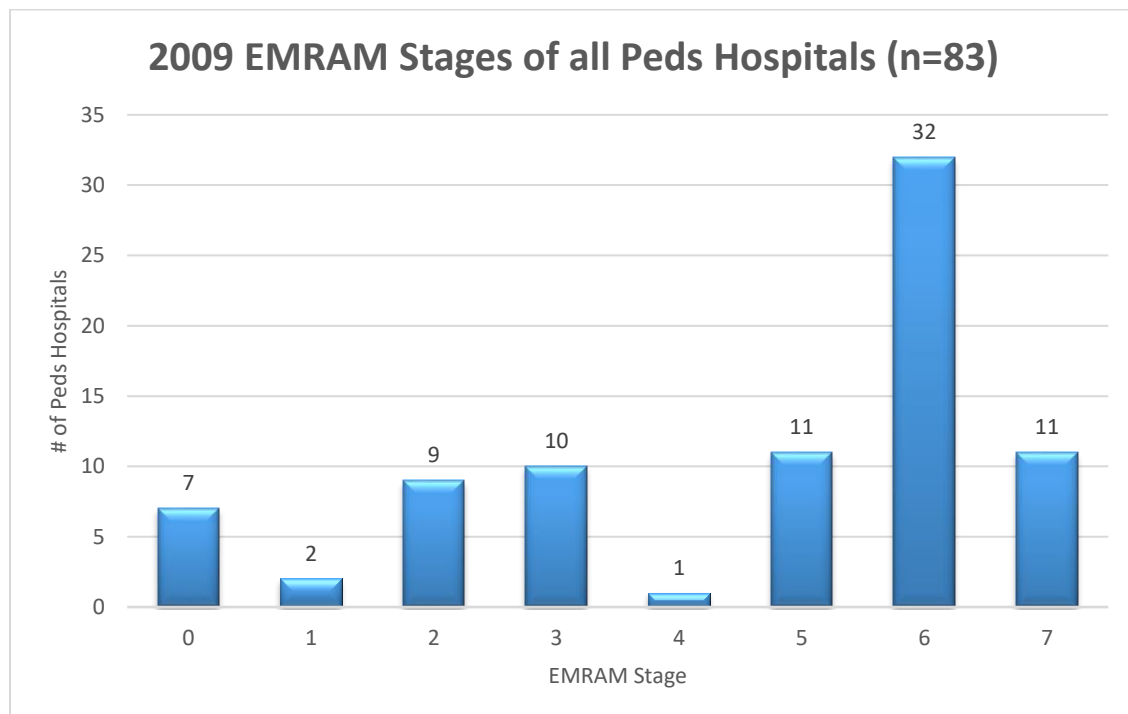
The HAEntity Table provided the entity location, bed count, and teaching status, which was recoded into Region and Size for each year. For 2009 and 2012, n = 87 and 98 pediatric hospitals were identified, respectively. Three were deleted from each dataset for being outside the KID case area (Canada and Puerto Rico), and one from each because of incomplete information, resulting in n = 83 and n = 94, respectively. Each one of those facilities was individually categorized using the Determination of Health IT Stages (Table 2, page 26).

4.2.1. HIMSS 2009 Dataset Description

In 2009, 83 pediatric hospitals were examined and assigned an EMRAM Stage based upon the reported adoption of HIT applications as described in Table X and the results are represented in Figure D below. While 65.06% of the hospitals were at Stage 5

and above (54 out of 83), there was notably 7 (8.43%) in the population that were at Stage 0, with no reported HIT adoption.

Figure H. 2009 EMRAM Stages of all Pediatric Hospitals (n=83)



In the Northeast, 27.27% of the hospitals were classified as Large, 27.27% as Medium, and 45.45% as Small (3, 3, and 5, respectively from 11 total) in BedSize (Figure I). Out of the Large sized hospitals, 2 of them were EMRAM 7, and 1 was stage 4. Out of the Medium sized hospitals, there was one each at EMRAM stage 0, 5, and 6. Out of the Small sized hospitals, 80% (n=4) were at EMRAM stage 6 and one was stage

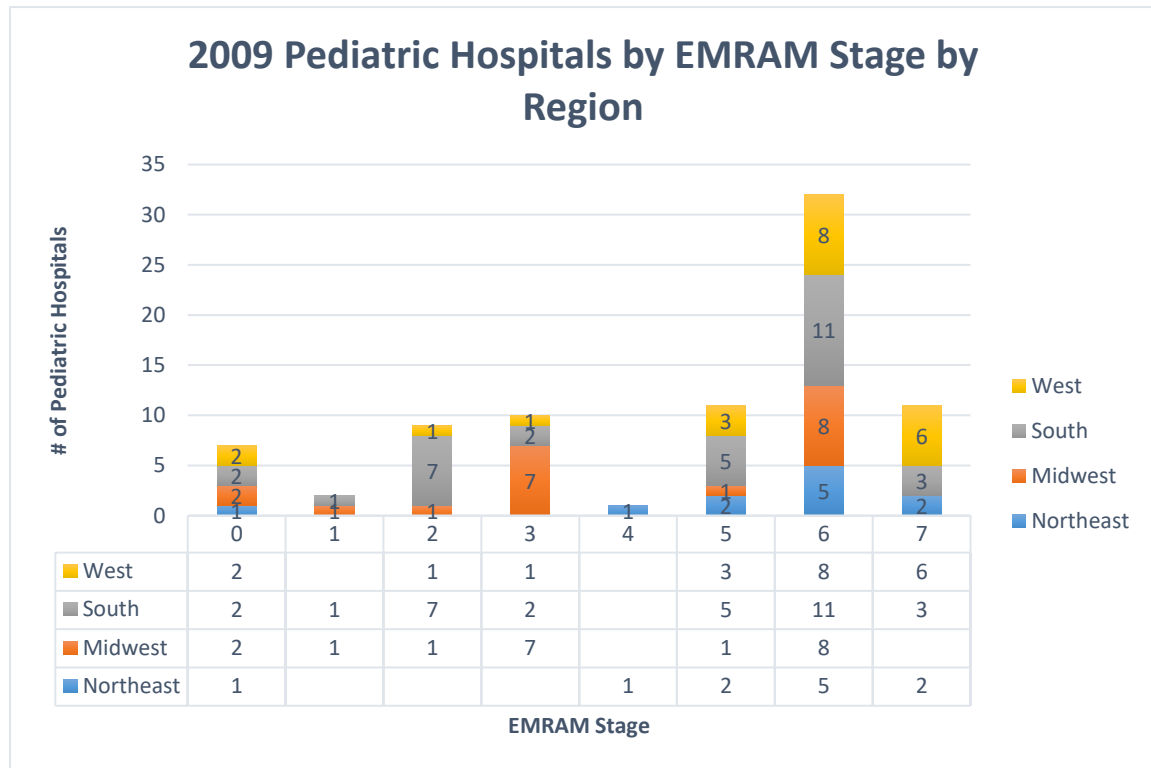
5. Of note, the only hospitals at stage 0 in the Midwest were Large size. In addition, 75% of stage 6 facilities in the Midwest were categorized as Small.

In the Midwest, there were 20 hospitals and 30.00% were classified as Large, 20.00% as Medium, and 50.00% as Small (6, 4, and 10 out of 20, respectively). In the Large group, the 6 facilities were spread across the EMRAM spectrum, with 1 at stage 6, 1 at stage 5, 2 at stage 3, and 2 at stage 0.

In the South, 45.17% of the hospitals were classified as Large, 22.58% as Medium, and 32.26% as Small (14, 7, and 10 out of 31, respectively). Of note, all of the stage 7 facilities in the South, were Large size, though 64% of the Stage 6 Large facilities were Small size and this group made up 21.88% (7 out of 32) of the total hospital population.

In the West, 38.10% were Large, 14.29% were Medium, and 47.62% were Small (8, 3, and 10 out of 21, respectively). Of note, is that 66.67% (4 out of 6) of the EMRAM stage 7 facilities in the West were classified as Large, and 75% (6 out of 8) of the stage 6 facilities were classified as Small. Paradoxically, 28.57% (2 out of 7) of all stage 0 facilities were also found in the Western Region, Large size. Another 25.57% of stage 0 facilities were also in Large hospitals but only in the Midwest.

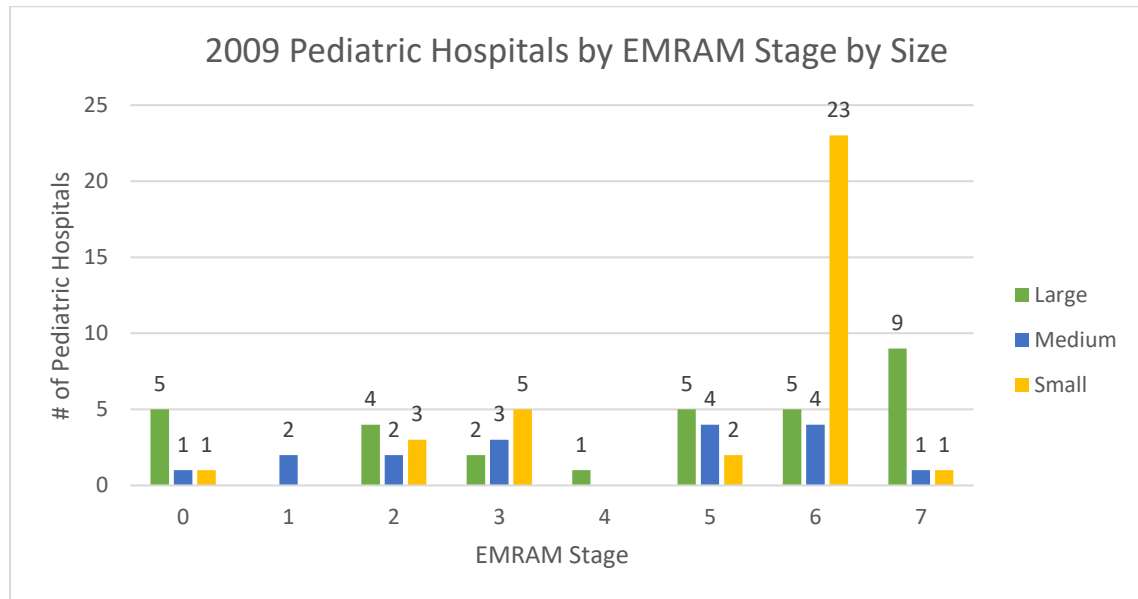
Figure I. 2009 Pediatric Hospitals by EMRAM Stage by Region



When looking at the size comparison (Figure J), most hospitals again fall into Stage 5 or higher, but significantly more Small hospitals are at Stage 6, 23 out of 32 (71.88%). In fact, all of the Small hospitals tend to have higher EMRAM Stages, 74.29% (26 out of 35) of them are at Stage 5 and higher compared to Large hospitals at 61.29% (19 out of 31), and Medium hospitals at 47.06% (8 out of 17).

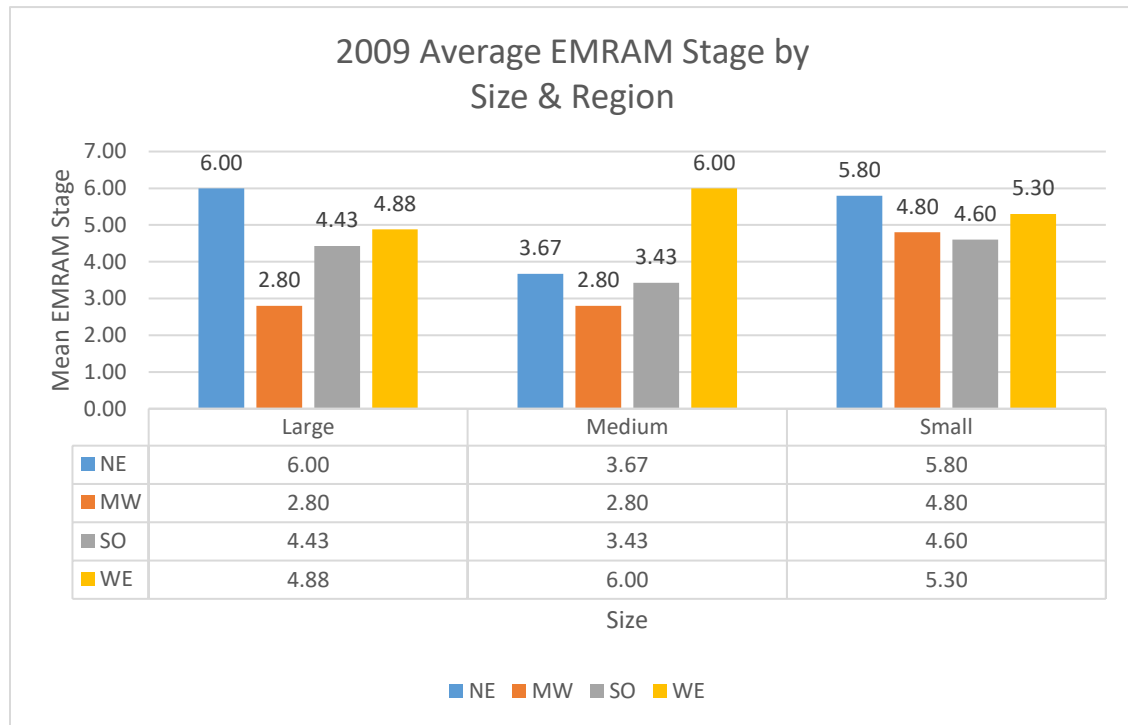
At first glance, this might appear counterintuitive considering that Larger hospitals are assumed to have been the early adopters of HIT, and typically have more resources to support continued expansion. However, most of the teaching hospitals in this sample (6 out of 8) are categorized as Small using the Table 2 (page 32). Thus, one might expect a teaching hospital to be adapting the higher stages of HIT.

Figure J. 2009 Pediatric Hospitals by EMRAM Stage by Size



While EMRAM stage is intended to be a categorical variable that is distinct for each stage, it was first important to create a comparison group. Since individual facilities can no longer be matched from year to year, it is necessary to create an average based on the category of region and bedsize for comparison purposes. For 2009, the mean EMRAM Stage for pediatric hospitals in the Northeast were 6.00, 3.67, and 5.80; in the Midwest 2.80, 2.80, and 4.80; in the South 4.43, 3.43, and 4.60; in the West 4.88, 6.00, and 5.30 for Large, Medium, and Small sized facilities, respectively (Figure K).

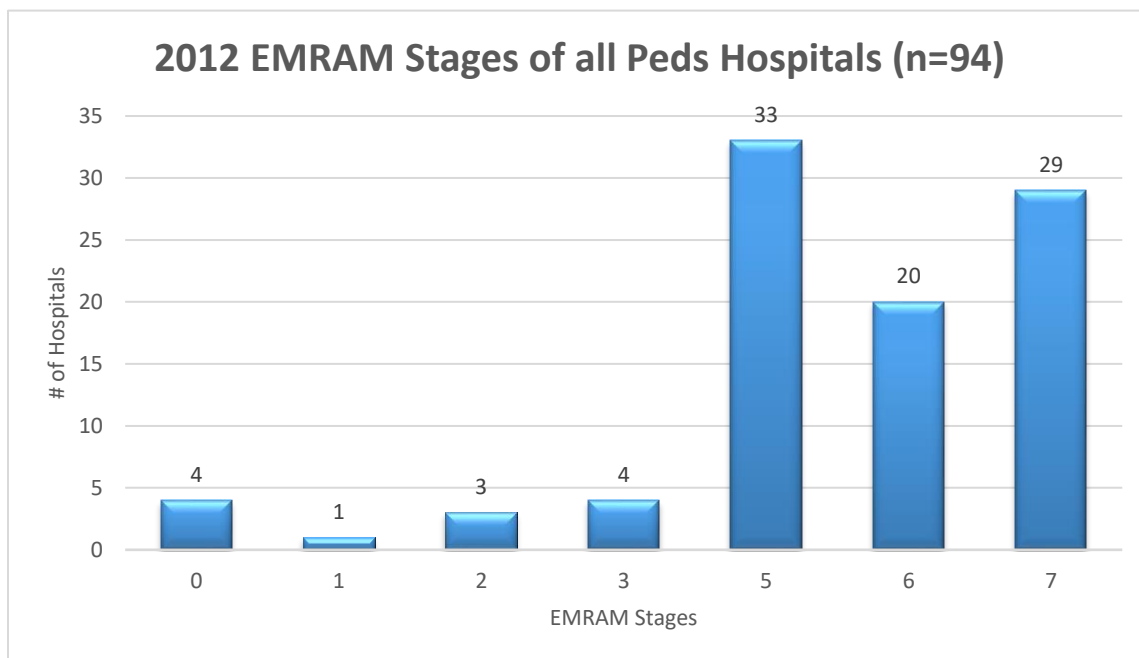
Figure K. 2009 Average EMRAM Stage of Pediatric Hospitals by Size and Region



4.2.2. HIMSS 2012 Dataset Description

In 2012, 94 pediatric hospitals were examined and assigned EMRAM Stage classification based upon the reported use of HIT applications as defined in Table X, and the results are represented in Figure H below. Eight-two out of the 94 hospitals in the population were at Stage 5 and above, or 87.23%, and only 4 were at Stage 0, or 4.26%.

Figure L. 2012 EMRAM Stages of all Pediatric Hospitals (n=94)



From the HIMSS 2012 dataset, 27.27% of the hospitals were classified as Large, 27.27% as Medium, and 45.45% as Small (3, 3, and 5 out of 11, respectively) (Figure M). All 3 of the Large hospitals were Stage 6 or 7 while the 3 Medium hospitals were Stage 1, 5 and 7. The majority of Small hospitals were Stage 5 or 6 (4 out of the 5), and one was Stage 2.

In the Midwest, 29.63% of the hospitals were classified as Large, 25.93% as Medium, and 44.44% as Small (8, 7, and 12 out of 27, respectively). The majority of Large hospitals were a Stage 7 (5 out of 8), two were Stage 6, and one was Stage 5. The Medium hospitals were distributed almost equally among Stage 3, 5, 6, and 7 (2, 1, 2, and 2, respectively). Eleven out of 12 Small hospitals were Stage 5, 6, and 7 (4, 3, and 4, respectively), with one hospital at Stage 3.

In the South, 34.21% of the hospitals were classified as Large, 28.95% as Medium, and 36.84% as Small (13, 11, and 14 out of 38, respectively). Seven of the Large hospitals were at Stage 7 which represented 70% of the Stage 7 hospitals in the South region. The majority of the Medium hospitals in the South were Stage 5, 6 and 7 (5, 2, and 2 out of 11, respectively). This was also reflective of the distribution of Small hospitals in the South with 13 out of 14 hospitals at Stage 5 and above.

In the West, 50% of hospitals were classified as Large, 11.11% as Medium, and 38.89% as Small (9, 2, and 7 out of 18, respectively). All hospitals in the West were at Stage 5 and above, with the lone exception of a Large facility at Stage 0 (Figure M).

Figure M. 2012 Pediatric Hospitals by EMRAM Stage by Region

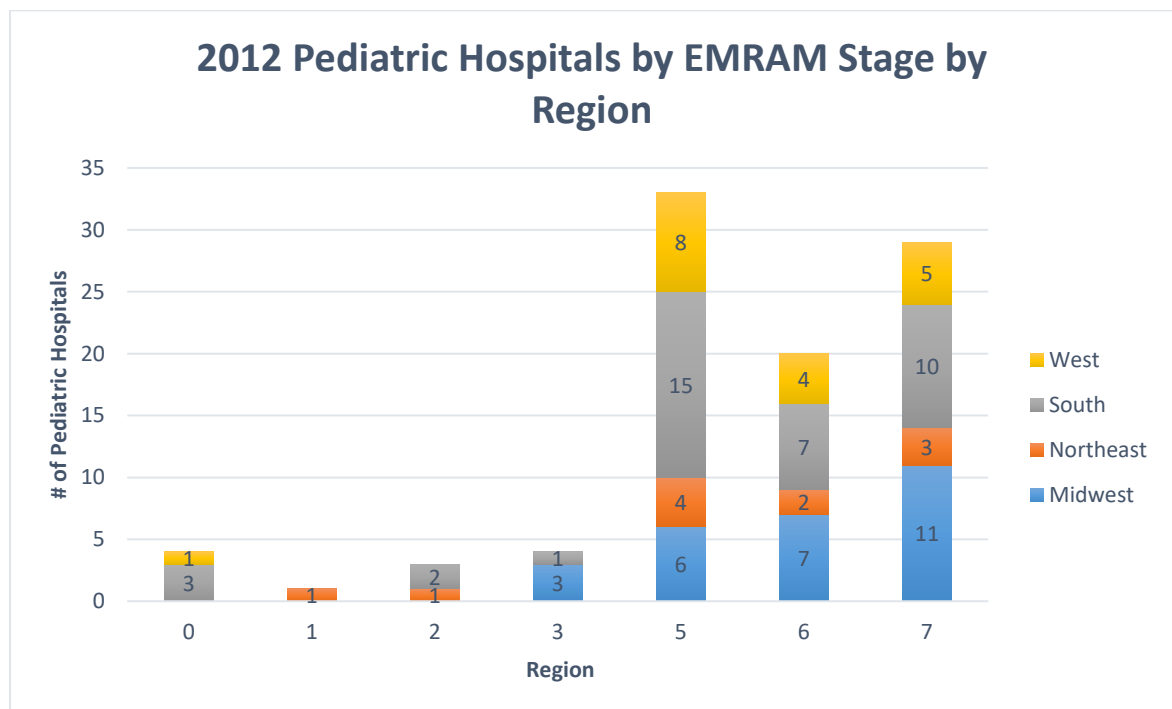
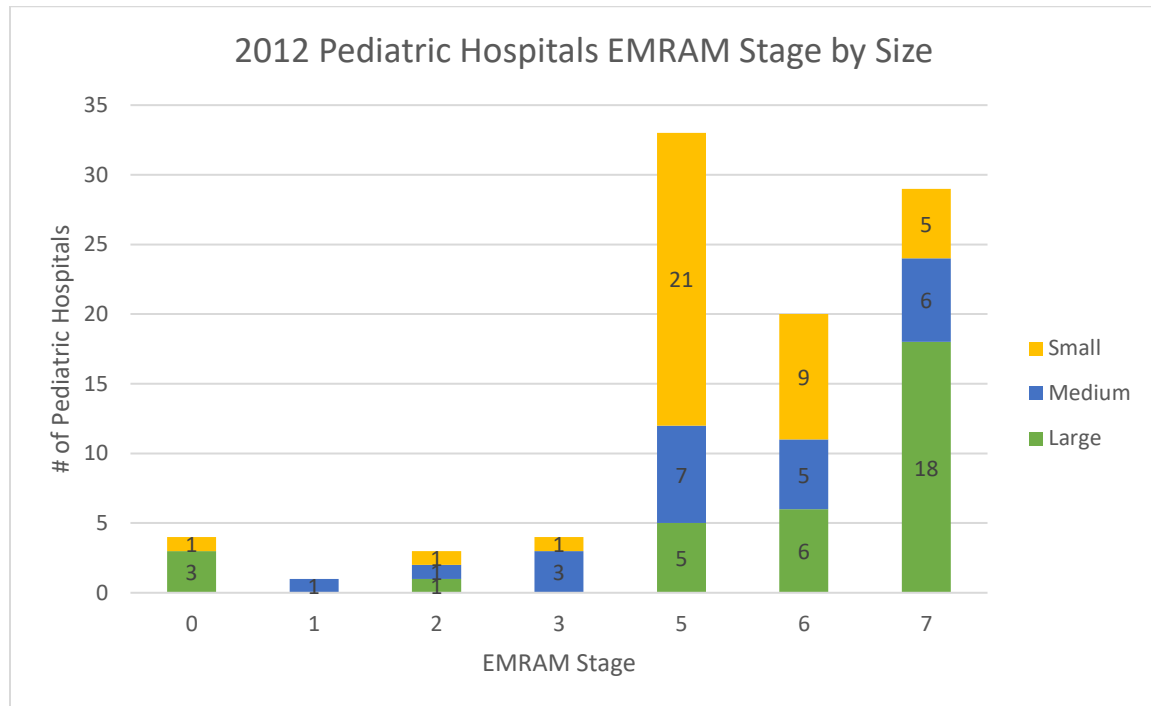


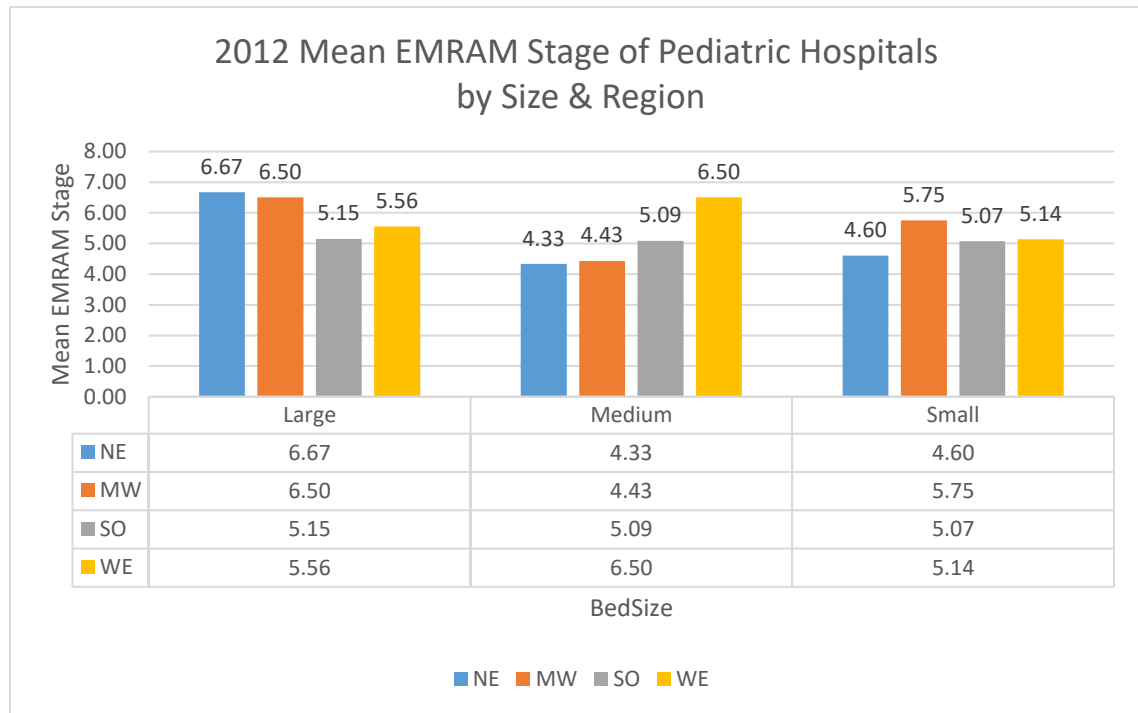
Figure N. 2012 Pediatric Hospitals EMRAM Stage by Size



The comparisons of hospitals by Bedsize (Figure N) also reflects the pattern found in 2009, 35 out of 38 Small hospitals (92.11%), 18 out of 23 Medium hospitals (78.26%), and 29 out of 33 Large hospitals (87.88%) were Stage 5 and above.

In 2012, the mean HIT Stages in the Northeast were 6.67, 4.33, and 4.60; in the Midwest, 6.50, 4.43, and 5.75; in the South, 5.15, 5.09, and 5.07; in the West, 5.56, 6.50, and 5.14, for Large, Medium and Small hospitals, respectively (Figure O).

Figure O. 2012 Mean EMRAM Stage of Pediatric Hospitals by Size and Region

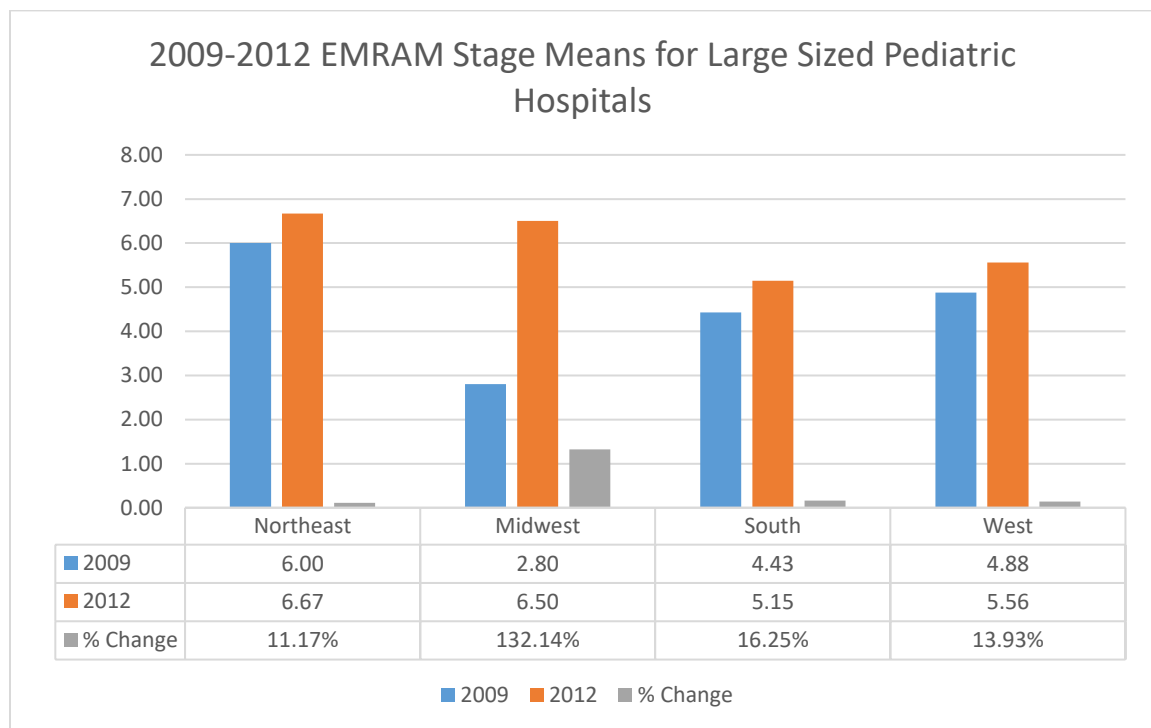


4.2.3. Comparisons

When the average EMRAM Stage adoption for pediatric hospitals are compared from 2009 to 2012 (Figure P), the data shows an overall increase of 16% (from 4.64 to 5.39). Significantly, there has been a strong increase in facilities performing at Stage 5 and above, from 65.06% of all facilities in 2009 (54 out of 83) to 87.23% in 2012 (82 out of 94). This is somewhat expected and hoped for, as HIT acceptance and increased applications have spread throughout the country. The largest gains in adoption levels has been in the Midwest, where the mean has increased 132.14% in Large hospitals (from 2.80 to 6.50), 58.21% in the Medium hospitals (from 2.80 to 4.43), and 19.79% (from

4.80 to 5.75 in the Small hospitals. In the Northeast, both the Large and Medium hospitals have recorded gains (11.17% and 17.98%, respectively), the Small hospitals have actually seen a decrease of 20.69% (from 5.80 to 4.60). In the South, all hospitals recorded gains (16.25%, 48.40%, and 10.22%) for Large, Medium, and Small facilities, respectively. In the West, the gains were modest with 13.93% for Large facilities and 8.33% for Medium, with a decrease for Small facilities of 3.02%.

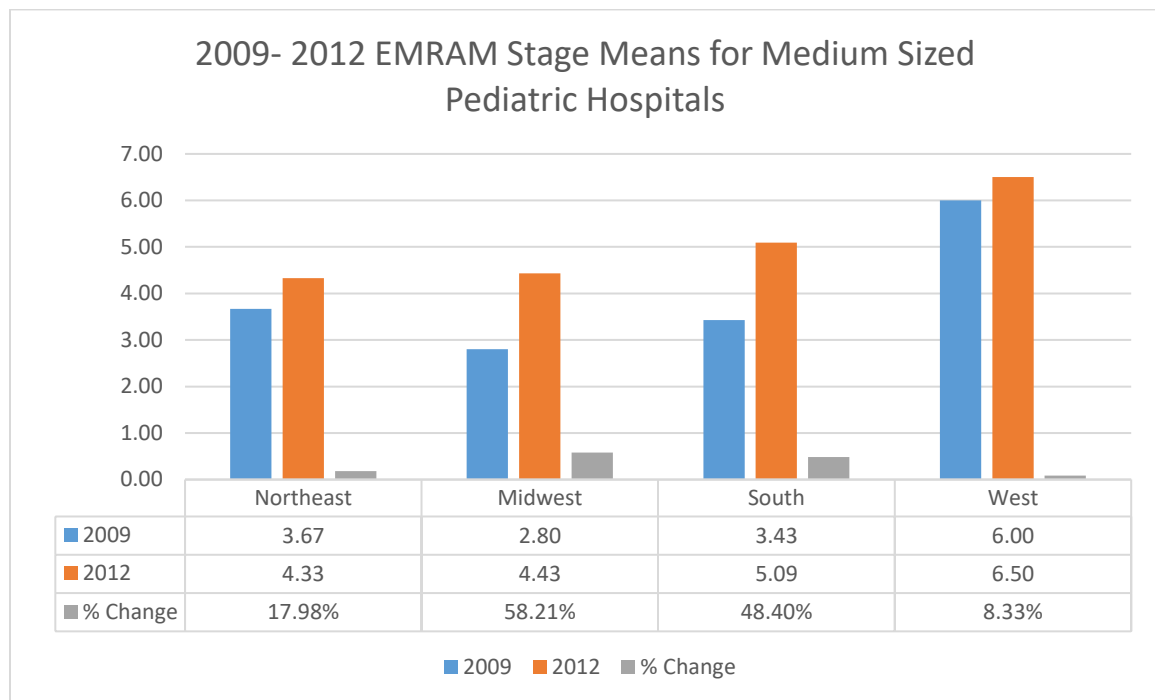
Figure P. 2009-2012 EMRAM Stage Means Comparison for Large Sized Pediatric Hospitals



Comparing stage means by size, it is evident that the Midwest saw the largest gains in Large facilities (Figure Q), moving from 2.80 to 6.50, or increasing by 132.14%, while all others increased at more modest but positive rates between 11.17 and 16.25%.

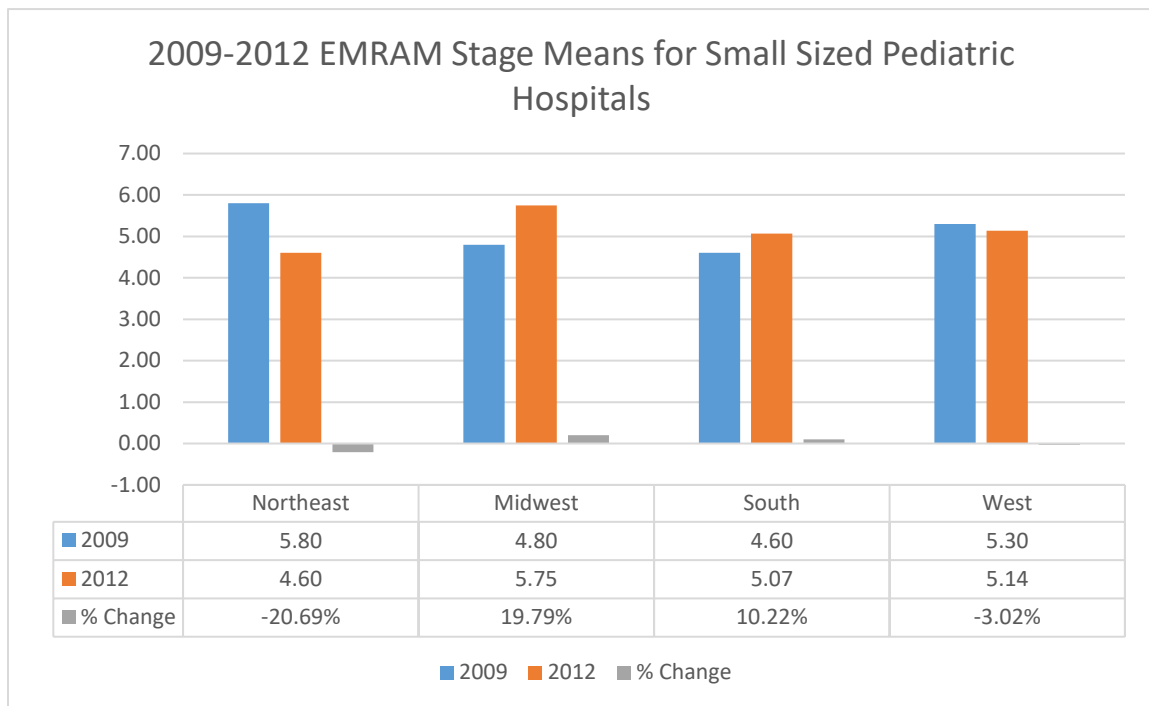
For Medium hospitals (Figure N), the Midwest again saw the highest gains, moving from 2.80 to 4.43, or increasing by 58.21%, while the South also increased nearly by half (48.40%), and the Northeast and West rose by 17.98% and 8.33%, respectively.

Figure Q. 2009-2012 EMRAM Stage Comparison for Medium Pediatric Hospitals



Small hospitals experienced the lowest overall increase (Figure R), from 5.03 in 2009 to 5.25 in 2012, or 4.37%, with both the Northeast and West seeing declines in Stage means of 20.69% and 3.02%, respectively. These decreases are not readily given that the Stage 6 facilities in 2009 (4 in the Northeast, and 6 in the West) are not represented in either Stage 6 or Stage 7 in 2012. Possible explanations are that these specific hospitals did not report in 2012, or possibly corrected their reporting HIT adoptions to represent a lower Stage. It is also possible that hospitals categorized at one size in 2009 has been recategorized in a new size for 2012.

Figure R. 2009-2012 EMRAM Stage Comparison for Small Pediatric Hospitals



Chapter V. Results

5.1 Analysis of Variance (ANOVA)

The first step in determining the appropriate hypothesis testing, is to examine the data's characteristics. The following are true or assumed for this data:

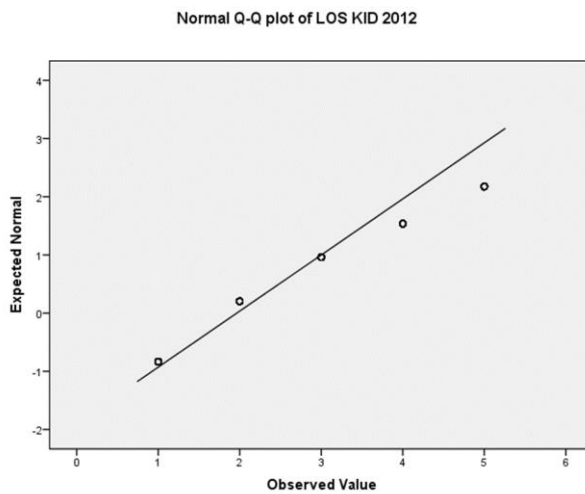
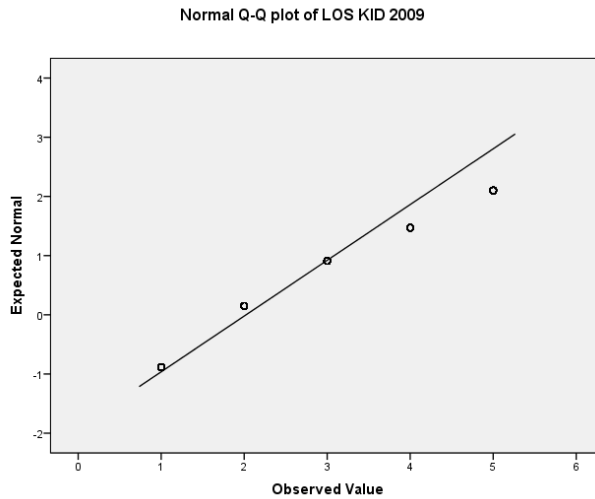
1. The samples are independent of each other and none of the cases could be included in both.
2. The dependent variable, length of stay (LOS) is continuous.
3. The independent variable, HIT stage (Stage_X) has 3 or more groups, and they are categorical.
4. Outliers have been removed
5. Variances are homogenous, $p < .001$

Test of Homogeneity of Variances

LOS

Levene Statistic	df1	df2	Sig.
9.859	18	32909	.000

It was determined that the samples follow a normal distribution, as illustrated in the Q-Q plots:



An Analysis of Variance (ANOVA) test was chosen versus a t-test because for each Region and BedSize, an HIT stage was assigned as a category, creating 12 “populations” to examine. A one-way ANOVA tests for differences within groups in proportion to the differences between groups. Differences between groups is calculated by comparing the mean of each group within the overall mean of the data. The test statistic for ANOVA is F, with k groups where:

SSR = the regression sum of squares

SSE = the error sum of squares

SST = the total sum of squares ($SST = SSR + SSE$)

df_r = the model degrees of freedom (equal to $df_r = k - 1$)

df_e = the error degrees of freedom (equal to $df_e = n - k - 1$)

k = the total number of groups (levels of the independent variable)

n = the total number of valid observations

df_T = the total degrees of freedom (equal to $df_T = df_r + df_e = n - 1$)

$MSR = SSR/df_r$ = the regression mean square

$MSE = SSE/df_e$ = the mean square error

Then the F statistic itself is computed as

$$F = \frac{MSR}{MSE}$$

If the ANOVA is statistically significant, additional testing must be performed to analyze which specific groups are demonstrating a difference. The Fisher Least Significant Difference (LSD) calculates the smallest significant means between two groups and is calculated as:

$$LSD = t \sqrt{2MSE / n^*}$$

where t is the critical, tabled value of the t -distribution with the df associated with MSE, the denominator of the F statistic and n^* is the number of scores used to calculate the means of critical interest.

5.1.1. Analysis of Variance for 2009

ANOVA LOS KID 2009 by EMRAM Stage

LOS

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	89.627	8	11.203	9.989	.000
Within Groups	15448.535	13774	1.122		
Total	15538.162	13782			

Since the ANOVA demonstrates statistically significant differences in the 2009 sample ($p < .001$), we proceed with the post-hoc testing with Fisher's LSD. The following is the summary with all significant ($p < .001$) differences highlighted in yellow:

Table 16. Fisher's LSD for KID 2009

2.80		BedSize		
Region		1	2	3
	NE	5.80	3.67	6.00
	MW	4.80	2.80	2.80
	SO	4.60	3.43	4.43
	WE	5.30	6.00	4.88

3.43		BedSize		
Region		1	2	3
	NE	5.80	3.67	6.00
	MW	4.80	2.80	2.80
	SO	4.60	3.43	4.43
	WE	5.30	6.00	4.88

3.67		BedSize		
Region		1	2	3
	NE	5.80	3.67	6.00
	MW	4.80	2.80	2.80
	SO	4.60	3.43	4.43
	WE	5.30	6.00	4.88

4.60		BedSize		
Region		1	2	3
	NE	5.80	3.67	6.00
	MW	4.80	2.80	2.80
	SO	4.60	3.43	4.43
	WE	5.30	6.00	4.88

5.80		BedSize		
Region		1	2	3
	NE	5.80	3.67	6.00
	MW	4.80	2.80	2.80
	SO	4.60	3.43	4.43
	WE	5.30	6.00	4.88

4.80		BedSize		
Region		1	2	3
	NE	5.80	3.67	6.00
	MW	4.80	2.80	2.80
	SO	4.60	3.43	4.43
	WE	5.30	6.00	4.88

4.88		BedSize		
Region		1	2	3
	NE	5.80	3.67	6.00
	MW	4.80	2.80	2.80
	SO	4.60	3.43	4.43
	WE	5.30	6.00	4.88

5.30	BedSize
------	---------

Region	1	2	3
NE	5.80	3.67	6.00
MW	4.80	2.80	2.80
SO	4.60	3.43	4.43
WE	5.30	6.00	4.88

6.00		BedSize		
Region		1	2	3
NE		5.80	3.67	6.00
MW		4.80	2.80	2.80
SO		4.60	3.43	4.43
WE		5.30	6.00	4.88

The Fisher's LSD test shows statistically significant differences ($P < .05$) amongst many categories, with the large hospitals in the West region (mean stage 4.88) demonstrating differences with the most categories.

5.1.2. Analysis of Variance for 2012

2012 KID ANOVA LOS by EMRAM Stage

LOS

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	871.292	10	87.129	84.417	.000
Within Groups	19748.673	19134	1.032		
Total	20619.965	19144			

Since the ANOVA demonstrates statistically significant differences in the 2012 sample ($p < .001$), we proceed with the post-hoc testing with Fisher's LSD. The following is the summary with all significant ($p < .001$) differences highlighted in yellow:

Table 17. Fisher's LSD for 2012

4.33		BedSize		
Region		1	2	3
	NE	4.60	4.33	6.67
	MW	5.75	4.43	6.50
	SO	5.07	5.09	5.15
	WE	5.14	6.50	5.56

4.43		BedSize		
Region		1	2	3
	NE	4.60	4.33	6.67
	MW	5.75	4.43	6.50
	SO	5.07	5.09	5.15
	WE	5.14	6.50	5.56

4.60		BedSize		
Region		1	2	3
	NE	4.60	4.33	6.67
	MW	5.75	4.43	6.50
	SO	5.07	5.09	5.15
	WE	5.14	6.50	5.56

5.07		BedSize		
Region		1	2	3
	NE	4.60	4.33	6.67
	MW	5.75	4.43	6.50
	SO	5.07	5.09	5.15
	WE	5.14	6.50	5.56

5.09		BedSize		
Region		1	2	3
	NE	4.60	4.33	6.67
	MW	5.75	4.43	6.50
	SO	5.07	5.09	5.15
	WE	5.14	6.50	5.56

5.14		BedSize		
Region		1	2	3
	NE	4.60	4.33	6.67
	MW	5.75	4.43	6.50
	SO	5.07	5.09	5.15
	WE	5.14	6.50	5.56

5.15		BedSize		
Region		1	2	3
	NE	4.60	4.33	6.67
	MW	5.75	4.43	6.50
	SO	5.07	5.09	5.15
	WE	5.14	6.50	5.56

5.56		BedSize		
Region		1	2	3
	NE	4.60	4.33	6.67
	MW	5.75	4.43	6.50
	SO	5.07	5.09	5.15
	WE	5.14	6.50	5.56

5.75		BedSize		
Region		1	2	3
	NE	4.60	4.33	6.67
	MW	5.75	4.43	6.50
	SO	5.07	5.09	5.15
	WE	5.14	6.50	5.56

6.50		BedSize		
Region		1	2	3
	NE	4.60	4.33	6.67
	MW	5.75	4.43	6.50
	SO	5.07	5.09	5.15
	WE	5.14	6.50	5.56

6.67		BedSize		
Region		1	2	3
	NE	4.60	4.33	6.67
	MW	5.75	4.43	6.50
	SO	5.07	5.09	5.15
	WE	5.14	6.50	5.56

5.1.3. Analysis of Variance between 2009 and 212

The purpose of this study was to determine if the HIT adoption state had a statistically significant impact on LOS for inpatient asthma patients.

Null Hypothesis H_0 : The adoption stage of health information technology in US hospitals does not have a statistically significant impact on LOS for inpatient pediatric asthma cases.

Alternate Hypothesis H_1 : The adoption stage of health information technology in US hospitals does have a statistically significant impact on LOS for inpatient pediatric asthma cases.

ANOVA testing for both 2009 and 2012 individual datasets have demonstrated statistically significant differences in mean LOS for pediatric inpatient asthma patients based on EMRAM stage adoption. To measure those differences over time, the data from 2009 is compared to 2012.

ANOVA LOS for all EMRAM Stages 2009-2012

LOS

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	866.500	18	48.139	44.853	.000

Within Groups	35319.665	32909	1.073		
Total	36186.165	32927			

Because ANOVA only tests for statistical evidence that the population means are different, a post-hoc test is required to confirm which groups demonstrate differences. Since the ANOVA shows $p < .05$ and we can reject the null hypothesis, the Fisher Least Significant Difference analysis is used to determine which HIT Stage demonstrates the highest degree of change. The summary of that analysis is below in Table 19 (see Appendix K for the full details):

Table 18. Fisher's LSD for KID LOS 2009-2012

Fisher's Least Significance Difference (LSD) HIT Stages 2009-2012				
Dependent Variable: Mean LOS				
Region	BedSize	2009 Stage	2012 Stage	p value
1	1	5.80	4.60	<.05
1	2	3.67	4.33	<.05
1	3	6.00	6.67	<.05
2	1	4.80	5.75	<.05
2	2	2.80	4.43	<.05
2	3	2.80	6.50	>.05
3	1	4.60	5.07	<.05
3	2	3.43	5.09	>.05
3	3	4.43	5.15	>.05
4	1	5.30	5.14	<.05
4	2	6.00	6.50	<.05
4	3	4.88	5.56	<.05

There are statistically significant differences in mean LOS for asthma patients admitted into pediatric facilities from the 2009 to 2012 cases represented in the Kids Inpatient Database. The four regions and 3 bed sizes created 12 categories, and 9 of those had statistically different mean LOS from 2009 to 2012 with $p < .05$. This proves the Alternate Hypothesis H_1 is correct: *The adoption stage of health information technology in US hospitals does have a statistically significant impact on LOS for inpatient pediatric asthma cases.*

Chapter VI. SUMMARY

6.1 Discussion

With the push for national EHR adoption and the subsequent increase in meaningful use of HIT applications, the healthcare industry has sought to realize reduced cost, increased safety, and improved patient outcomes. This research hopes to add to the current paucity of data to demonstrate the latter. Using comparisons from the KID 2009 and 2012 datasets, the differences between mean LOS for pediatric asthma patients between stages of adoption of Health IT as measured by the EMRAM scale are statistically significant at the $p < .05$ level, demonstrating that increased use of Health IT has lowered the mean length of stay for this population.

6.2 Limitations

The limitations of this study reflect the current lack of data in discovering the overall increase of healthcare quality with the burgeoning uses of Health IT. This is the only study known to the researcher specifically examining the effects of Health IT adoption on inpatient admissions for children, which weakens any findings until additional research is completed. Additional limitations concern potential confounding

factors such as actual Health IT use (versus the availability of technology), clinician trust and acceptance of such technologies, and variations in application on specific patients and/or by specific providers. Because hospital identifiers were removed from the KID beginning in 2012, it is no longer possible to compare results from specific facilities across a span of time. This limitation prevents a longitudinal view of the effects of Health IT at identified institutions, where results might have been helpful in determining key variables that improve health quality.

6.3 Implications for Future Study

The results of this study, while limited, are encouraging to the expansion of knowledge about the positive effects of health information technology. Additional study should expand on this data by measuring similar effects of HIT stage for other populations, particularly those that affect large numbers, are chronic, and carry high cost burdens on the healthcare system. In addition, research should be done on what specific elements of HIT are the most beneficial to reducing LOS, i.e., is it simply the higher adoption of advanced technology, a specific application, or perhaps a more accepting and well-trained staff implementing said technology that generate the best healthcare outcomes?

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Appendices

- A Institutional Review Board Statement
- B 2014 National Health Interview Survey (NHIS) Data
- C Literature Review Search Terms
- D Dorenfest Institute Usage Agreement
- E KID Data Elements 2009
- F HIMSS Analytics 2009
- G HIMSS Analytics 2012
- H HIMSS EMRAM Detail
- I ANOVA with LSD post-hoc detailed analysis

Appendix A Institutional Review Board Statement

Because the data used for this study was retrospective de-identified data, no IRB approval was required.

Appendix B 2014 National Health Interview Survey (NHIS) Data

Table 3-1
Current Asthma Population Estimates -- in thousands
by Age, United States: National Health Interview Survey, 2014

				Age (years)							
						15-34					
Characteristic†	All ages Total	Children Age <18	Adults Age 18+	0 - 4	5 - 14	15 - 34	15 - 19	20 - 24	25 - 34	35 - 64	65 +
Total:	24,009	6,292	17,717	849	4,244	6,936	1,912	1,890	3,133	8,897	3,084
Male	9,659	3,770	5,889	519	2,536	2,851	989	769	1,094	2,906	846
Female	14,350	2,522	11,828	330	1,708	4,084	923	1,121	2,039	5,991	2,237
White Non-Hispanic:	14,852	2,910	11,942	278	2,073	4,203	918	1,164	2,121	6,028	2,270
Male	5,803	1,705	4,098	189	1,202	1,671	499	455	717	2,108	633

Table 3-1
Current Asthma Population Estimates -- in thousands
by Age, United States: National Health Interview Survey, 2014

				Age (years)							
						15-34					
Characteri stic†	All age s Tot al	Chil dren Age <18	Ad ults Age 18+	0 - 4	5 - 14	15 - 34	15 - 19	20 - 24	25 - 34	35 - 64	65 +
Female	9,049	1,205	7,844	89*	871	2,532	419	709	1,404	3,920	1,637
Black Non-Hispanic:	3,760	1,332	2,428	305	790	1,142	443	287	412	1,234	290
Male	1,520	849	671	177	526	530	206	152	172	253	34*
Female	2,240	483	1,757	128	264	612	238	135	240	981	256
Other Non-Hispanic:	1,746	533	1,213	63*	375	384	128	102*	154	650	274

Table 3-1
Current Asthma Population Estimates -- in thousands
by Age, United States: National Health Interview Survey, 2014

				Age (years)							
						15-34					
Characteri stic†	All age s Tot al	Chil dren Age <18	Ad ults Age 18+	0 - 4	5 - 14	15 - 34	15 - 19	20 - 24	25 - 34	35 - 64	65 +
Male	744	323	421	31 *	22 7	149	65*	33*	51*	234	10 3*
Female	1,0 02	211	792	33 *	14 7	234	63*	**	104	416	17 2
Hispanic:	3,6 51	1,51 6	2,1 35	20 3	1,0 06	1,20 7	423	337	446	985	25 0
Male	1,5 92	892	700	12 2	58 1	501	219	128	154	311	77
Female	2,0 59	624	1,4 35	81 *	42 5	706	204	209	293	674	17 3

Table 3-1
Current Asthma Population Estimates -- in thousands
by Age, United States: National Health Interview Survey, 2014

				Age (years)							
						15-34					
Characteri stic†	All age s Tot al	Chil dren Age <18	Ad ults Age 18+	0 - 4	5 - 14	15 - 34	15 - 19	20 - 24	25 - 34	35 - 64	65 +
Puerto Rican: ^a	817	365	452	69 *	23 7	204	60	**	101	240	68 *
Male	328	180	148 *	**	10 7*	129	47*	**	62*	46*	**
Femal e	489	185	304	**	12 9	75*	**	**	39*	193	49 *
Mexican/ Mexican- American: ^a	1,9 52	857	1,0 95	10 2	55 6	754	299	253	202	454	87
Male	825	497	328	70 *	30 7	260	134	73*	53*	152 *	35 *

Table 3-1
Current Asthma Population Estimates -- in thousands
by Age, United States: National Health Interview Survey, 2014

				Age (years)							
						15-34					
Characteristic†	All ages Total	Children Age <18	Adults Age 18+	0 - 4	5 - 14	15 - 34	15 - 19	20 - 24	25 - 34	35 - 64	65 +
Female	1,127	360	768	32*	249	494	165	180*	149	301	52
Region:											
Northeast	4,385	1,182	3,204	148	844	1,186	288	402	496	1,604	603
Midwest	5,603	1,394	4,209	241	922	1,607	341	502	764	2,112	721
South	8,838	2,492	6,346	273	1,701	2,687	815	673	1,199	3,106	1,070
West	5,183	1,224	3,958	187	777	1,456	468	313	674	2,074	689

Table 3-1
Current Asthma Population Estimates -- in thousands
by Age, United States: National Health Interview Survey, 2014

				Age (years)							
						15-34					
Characteri stic ^a	All age s Tot al	Chil dren Age <18	Ad ults Age 18+	0 - 4	5 - 14	15 - 34	15 - 19	20 - 24	25 - 34	35 - 64	65 +
Ratio of Family Income to											
Poverty Threshold: ^b											
0-0.99	5,180	1,736	3,444	291	1,148	1,666	558	535	572	1,721	354
1.00-2.49	6,746	1,851	4,895	274	1,287	2,069	576	568	925	2,031	1,085
2.50-4.49	6,237	1,542	4,695	177	1,027	1,801	399	475	927	2,316	915

Table 3-1
Current Asthma Population Estimates -- in thousands
by Age, United States: National Health Interview Survey, 2014

				Age (years)							
				15-34							
Characteri stic [†]	All age s Tot al	Chil dren Age <18	Ad ults Age 18+	0 - 4	5 - 14	15 - 34	15 - 19	20 - 24	25 - 34	35 - 64	65 +
4.50 and above	5,8 46	1,16 3	4,6 82	10 6*	78 1	1,39 9	378	311	709	2,83 0	73 0

Notes: Source: National Health Interview Survey, National Center for Health Statistics, CDCCompiled 01/21/2016

All relative standard errors are <30% unless otherwise indicated.

* Relative standard error of the estimate is 30%-50%; the estimate is unreliable.

** Relative standard error of the estimate exceeds 50%.

† Numbers within selected characteristics may not sum to total due to rounding.

^a As a subset of Hispanic.

^b Missing responses imputed.

[Previous Table](#) | [Next Table](#)

- Page last reviewed: March 1, 2016
- Page last updated: March 1, 2016
- Content source: [National Center for Environmental Health](#)

Appendix C CINAHL search terms

Peer-reviewed

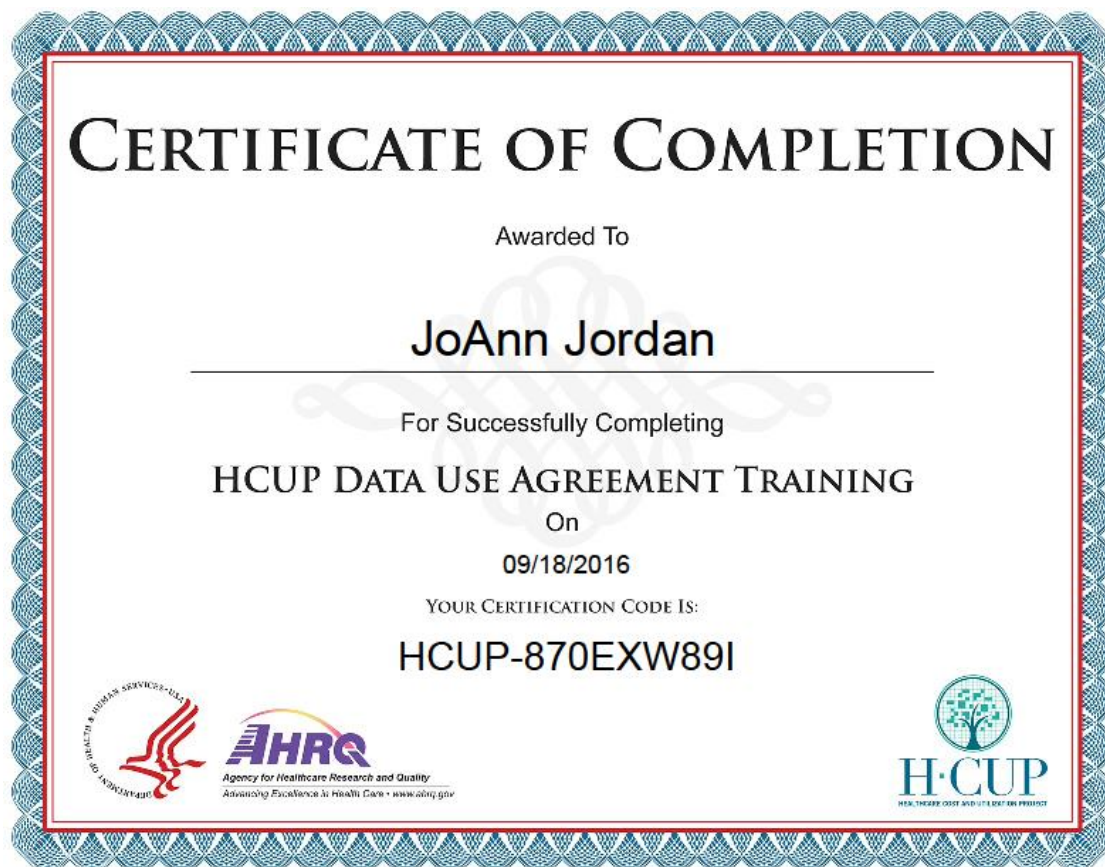
2006-2016

English

USA

Childhood and asthma and inpatient	606
Pediatric and asthma and inpatient	1238
Decision support and asthma and pediatric	22
CPOE and asthma and pediatric	0
Health IT and asthma and pediatric	1
Electronic health records and asthma and pediatric	9
Electronic health records and asthma and childhood	5
Health IT and adoption and pediatric	1
Health IT stage and pediatric and asthma	8
Health IT and adoption and USA	30
Electronic health records and adoption and USA	133
Cost of asthma	11
Childhood asthma and hospital	0

Appendix D HCUP Data User Agreement Training Certificate



**Usage Agreement and Application for the
Dorenfest Institute for H.I.T. Research and Education Database**

<http://apps.himss.org/DorenfestInstitute/UsageAgreement.aspx>

1. The Database

The Dorenfest Institute for H.I.T. Research and Education Database includes a variety of detailed historical data about information technology (IT) use in hospitals and integrated delivery networks. This data includes the entire library of Dorenfest 3000+Databases™ and Dorenfest Integrated Healthcare Delivery System Databases™ for the period 1986 through 2002 (hereinafter referred to as the ‘Database’).

Access to and use of this Database at no charge is restricted to universities, students under university license, and U.S. federal, state, and local governments. Potential users (‘Licensees’) to this Database must read this Usage Agreement and complete and submit the Application for Access to the Dorenfest Institute for H.I.T. Research and Education Database included within this Usage Agreement.

The Database will be available to the Licensee via a secured Web site.

2. Term of License

Authorized Licensees will receive access to the Database for a period of six (6) months from the time the application is approved.

3. Nature of License

- ☐ The Licensee acknowledges and agrees that: (i) the Licensed Data is proprietary to and the confidential property of the Licensor and constitutes valuable information in which the Licensor holds all trade secret rights and copyrights; (ii) the Licensee acquires no right(s) in the Licensed Data except to use the Licensed Data solely within the Licensee’s own organization or agency and for the Licensee’s own purposes during the License Term in

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- ☐ The Licensee will take appropriate measures, by instruction, agreement, or otherwise, to ensure compliance with this Agreement during his or her relationship with the Licensee and thereafter pursuant to this Agreement. Unless the Licensee has obtained the express prior written authorization of the Licensor, the Licensee shall not use all or any part(s) of the Licensed Data for numerical or text quotation(s) for advertising or public relations. The Licensee shall not copy or reproduce in any form any or all of the Licensed Data unless the use of that data is related to the research project described in the Licensee's Usage Agreement and Application for Access to the Dorenfest Institute for H.I.T. Research and Education Database. However, under no circumstances can the Licensee reproduce the Database in its entirety.

- ☐ The Licensee agrees to cite the source of the data used from the Dorenfest Institute for H.I.T. Research and Education Database. The following language must appear at the bottom of each page in an article or research paper in which the data is cited:

Data Source: Dorenfest Institute for H.I.T. Research and Education, HIMSS Foundation, Chicago, Illinois, 2005.

- ☐ The Licensee agrees to keep the unique password provided to the Database private and not share it with individuals not covered in the Application.

- ☐ Notwithstanding the above, the Licensee shall have no obligations with respect to any information in or about the Licensed Data demonstrated to have already been known to the Licensee before receipt of the Licensed Data, or otherwise is or becomes part of the public domain without violation of this Agreement.

4. Warranty

The Licensee acknowledges that the data in the Database are collected by or on behalf of the Licensor and, while the Licensor reasonably believes such data to be accurate, the Licensor makes and Licensee receives no warranty, express or implied, and all warranties of merchantability and fitness for a particular purpose are expressly excluded. The Licensor shall have no liability with respect to any or all of its duties and obligations under this agreement for consequential, exemplary, special, or incidental damages, even if the Licensor has been advised of the possibility of such damages. In no event shall the Licensor's liability for damages, regardless of the form of action, exceed the amount paid by the licensee for the relevant licensed data.

5. Termination

Whenever the Licensor has knowledge or reason to believe that the Licensee has failed to observe any of the terms and conditions of this Agreement, the Licensor shall notify the Licensee in writing of the suspected breach. If, within 30 days of such notice, the Licensee fails to prove to the Licensor's reasonable satisfaction that the Licensee has not breached this Agreement, the Licensor may terminate the License and this Agreement.

6. Other

- ☐ The Licensee may not assign or sub-license to any person or entity its rights, duties, or obligations under this Agreement, to any person or entity, in whole or in part. This Agreement is binding upon the Parties and their respective heirs, assigns, and successors in interest.
- ☐ This Agreement and performance hereunder shall be governed by the laws of the State of Illinois without reference to conflicts of laws provisions.
- ☐ Notwithstanding anything to the contrary in this Agreement, the Licensee acknowledges and agrees that the Licensor in its sole discretion may change any or all of the format and content of the database at any time.

Appendix F 2009 KID Inpatient Core File Data Elements

Note: Not all data elements in the KID are uniformly coded or available across all States. Each KID release differs in that some data elements were dropped, some were added, and the values of some data elements were changed.

Data elements that are *italicized* are not included in the 2009 KID, but are only available in previous years' files.

Type of	H C	Years Available	Coding Notes	Unavailable in
Admission day of	AWEEKEN D ADAYWK	2000, 2003, 2006, 2009 1997	Admission on weekend: (0) admission on Monday-Friday, (1) <i>Admission day of week:</i> (1) <i>Sunday</i> , (2) <i>Monday</i> , (3) <i>Tuesday</i> ,	
Admission month	AMONTH	1997, 2000, 2003, 2006, 2009	Admission month coded from (1) January to (12)	CT, FL
Admission source	ASOURCE	1997, 2000, 2003, 2006, 2009	Admission source, uniform coding: (1) ER, (2) another hospital, (3) another facility including long-term care, (4) court/law enforcement, (5) routine/birth/other	AZ, FL, GA, HI, IA, KS, KY, ME, MI, MN, MO, MT, NC
	ASOURCE_X	2000, 2003, 2006, 2009	Admission source, as received from data source using State-specific coding	AZ, FL, GA, HI, IA, KS, KY, ME, MI, MN, MO,
	ASOURCE UB92	2003, 2006, 2009	Admission source (UB-92 standard coding). For newborn admissions (ATYPE = 4): (1) normal delivery, (2) premature delivery, (3) sick baby, (4) extramural birth; For non-newborn admissions (ATYPE NE 4): (1) physician referral, (2) clinic referral, (3) HMO referral, (4) transfer from a hospital, (5) transfer from a skilled nursing facility,	AZ, CA, FL, GA, HI, IA, KS, KY, MD, ME, MI, MN

POINTOFO
RIGIN_X 2009

Point of origin for
admission or visit, as CA,
MD MF

Type of	H C	Years Available	Coding Notes	Unavailable in
	POINTOFO RIGIN_ UB04	2009	Point of origin for admission or visit, UB-04 standard coding. For newborn admission (ATYPE = 4): (5) Born inside this hospital, (6) Born outside of this hospital; For non-newborn admissions (ATYPE NE 4): (1) Non- health care facility point of origin, (2) Clinic, (4) Transfer from a hospital (different facility), (5) Transfer from a skilled Nursing Facility (SNF) or Intermediate Care Facility (ICF), (6) Transfer from another health care facility, (7) Emergency room, (8) Court/law	CA, MD, ME
	TRAN_IN	2009	Transfer In Indicator: (0) not a transfer, (1) transferred in from a different acute care hospital [ATYPE NE 4 & (ASOURCE=2 or POO=4)], (2)	
Admission type	ATYPE ELECTIVE	1997, 2000, 2003, 2006, 2009 2003, 2006, 2009	Admission type, uniform coding: (1) emergency, (2) urgent, (3) elective, (4) Indicates elective admission: (1)	CA
Age at admission	AGEDAY	1997, 2000, 2003, 2006, 2009	Age in years coded 0-124 years	
	AGEDAY	1997, 2000, 2003, 2006, 2009	Age in days coded 0-365 only when the age in years is less	CT, FL, MA,
	AGEMONT H	1997, 2000, 2003, 2006, 2009	Age in months (when age < 11 years)	CT, FL, ME,

Type of Data	HCUP Name	Years Available	Coding Notes	Unavailable in
Birth weight	BWT	2000, 2006, 2009	Birth weight in grams	CA, FL, IA, LA, ME, MI, MO, NE, NH, NY, OH, OK, SC, SD, TN, UT, WA, WI, ...
WY				
Chronic Conditions	NCHRONIC	2009	Number of chronic conditions	
Clinical Classifications Software (CCS)	DXCCS1 - DXCCS25	2000, 2003, 2006, 2009	CCS category for all diagnoses. Beginning in 2009, the diagnosis array was increased from 15 to 25.	
category	DCCHPR1	1997	CCS category for principal diagnosis in 1997. CCS was formerly called the Clinical Classifications for Health Policy Research (CCHPR)	
	PRCCS1 - PRCCS15	2000, 2003, 2006, 2009	CCS category for all procedures	
	PCCHPR1	1997	CCS category for principal procedure in 1997. CCS was formerly called the Clinical Classifications for Health Policy Research (CCHPR)	
Diagnoses information	DX1 – DX25	1997, 2000, 2003, 2006, 2009	Diagnoses, principal and secondary (ICD-9-CM). Beginning in 2003, the diagnosis array does not include any of external cause of injury codes. These codes have been stored in a separate array ECODEn . Beginning in 2009, the diagnosis array was increased from 15 to 25.	
	KV1 - DXV15	1997	Diagnosis validity flags	
	HOSPBIRTH	1997, 2000, 2003, 2006, 2009	Birth diagnosis, in this hospital	
	NDX	1997, 2000, 2003, 2006, 2009	Number of diagnoses coded on the original record	
	UNCBIRTH	1997, 2000,	Normal, uncomplicated birth in hospital	
	calculated without Present On Admission (POA) indicators			
DRGVER		2000, 2003, 2006, 2009	Grouper version in use on discharge date	

Type of Data Element	HCUP Name	Years Available	Coding Notes	Unavailable in 2009 for:
	DRG10	1997	DRG Version 10 (effective October 1992 - September 1993)	
	DRG18	2000, <u>2003</u>	DRG Version 18 (effective October 2000 - September 2001)	
	DRG24	2006, <u>2009</u>	DRG Version 24 (effective October 2006 - September 2007)	
	quarter DQTR	Discharge Coded: (1) Jan - Mar, (2) Apr - Jun, (3) 1997, 2000, Jul - Sep, (4) Oct - Dec 2003, 2006, <u>2009 DQTR_X</u>	Discharge Coded: (1) Jan - Mar, (2) Apr - Jun, (3) 1997, 2000, Jul - Sep, (4) Oct - Dec 2003, 2006, <u>2009 DQTR_X</u>	
weights	DISCWT	Discharge 2000, 2003, 2006, 2009	Weight to discharges in AHA universe for national estimates. In 2000, the discharge weight DISCWTcharge should be used for estimates of total charges.	
	DISCWT_U	1997	Weight to discharges in AHA universe for national estimates.	
	DISCWTcharge	2000	Weight to discharges in AHA universe for total charge estimates.	
	Discharge year	YEAR 1997, 2000, 2003, 2006, <u>2009</u>	Calendar year	
	Disposition of patient (discharge)	DIED 1997, 2000, 2003, 2006, 2009	Indicates in-hospital death: (0) did not die during hospitalization, (1) died during hospitalization	
s t a t u s)			DISP 1997 Disposition of patient, uniform coding in 1997: (1) routine, (2) short-term hospital, (3) skilled nursing facility, (4) intermediate care facility, (5) another <u>type</u> of facility, (6) home health care, (7) against medical advice, (20) died	
	DISPUB92	2000, 2003, 2006	Disposition of patient (UB-92 standard coding)	

DISPUB04	2009	Disp of patient (UB-04 standard coding)	CA, MD, ME
DISPUNIFORM	2000, 2003, 2006, 2009	Disposition of patient, uniform coding used beginning in 1998: (1) routine, (2) transfer to short term hospital, (5) other transfers, including skilled nursing facility, intermediate care, and another type of facility, (6) home health care, (7) against medical advice, (20) died in hospital, (99) discharged alive, destination unknown	

Type of Data Element	HCUP Name	Years Available	Coding Notes	Unavailable in
External causes of injury and poisoning	ECODE1 – ECODE4	2003, 2006, 2009	External cause of injury and poisoning code, primary and secondary (ICD-9- CM). Beginning in 2003, external cause of injury codes are stored in a separate array ECODEn from the diagnosis codes in the array	
	E_CCS1 - E_CCS4	2003, 2006, 2009	CCS category for the external cause of injury and poisoning	
	NECODE	2003, 2006, 2009	Number of external cause of injury codes on the	
Gender of patient	FEMALE	2000, 2003,	Indicates gender for KID beginning in	
	SEX	1997	<i>Indicates gender in 1997 KID: (1)</i>	
Hospital information	DSHOSPID	2000, 2003, 2006, 2009	Hospital number as received from the data source	CT, GA, HI, IN, KS, LA, ME, MI, MO, NE, NM, OH, OK, SC, SD,
	HOSPID	2000, 2003,	HCUP hospital number (links to Hospital file)	
	HOSPNUM	1997	<i>HCUP hospital number in 1997 (links to Hospital file)</i>	
	HOSPST	2000, 2003,	State postal code for the hospital (e.g., AZ for Arizona)	
	HOSPSTCO	2000	<i>Modified Federal Information Processing Standards (FIPS) State/county code for the hospital links to Area Resource File (available from the Bureau of Health Professions, Health Resources and Services Administration). Beginning in 2003, this data element is</i>	
	KID_STRATUM	2000, 2003,	Hospital stratum used for weights.	

Type of Data Element	HCUP Name	Years Available	Coding Notes	Unavailable in 2009 for:
Indicates Emergency Department service	HCUP_ED	2009	Indicator that discharge record includes evidence of emergency department (ED) services: (0) Record does not meet any HCUP Emergency Department criteria, (1) Emergency Department revenue code on record, (2) Positive Emergency Department charge (when revenue center codes are not available), (3) Emergency Department CPT procedure code on record, (4) Admission source of ED, (5) State-defined ED record; no ED charges available	
Length of Stay	LOS	1997, 2000, 2003, 2006, 2009	Length of stay, edited	
	LOS_X	1997, 2000, 2003, 2006, 2009	Length of stay, as received from data source	ME
Location of the patient	PL_UR_CAT4	2003	Urban-rural designation for patient's county of residence: (1) large metropolitan, (2) small metropolitan, (3) micropolitan, (4) non-core	
	PL_NCHS2006	2006, 2009	Urban-rural designation for patient's county of residence: (1) "Central" counties of metro areas >= 1 million population, (2) "Fringe" counties of metro areas >= 1 million population, (3) Counties in metro areas of 250,000 - 999,999 population, (4) Counties in metro areas of 50,000 - 249,999 population, (5) micropolitan counties, (6) non-core counties	MA
Major Diagnosis Category (MDC)	MDC	1997, 2000, 2003, 2006, 2009	MDC in use on discharge date	
	MDC_NoPOA	2009	MDC in use on discharge date, calculated without Present on Admission (POA) indicators	
	MDC10	1997	MDC Version 10 (effective October 1992 - September 1993)	
	MDC18	2000, 2003	MDC Version 18 (effective October 2000 - September 2001)	
	MDC24	2006, 2009	MDC Version 24 (effective October 2006 - September 2007)	

Type of Data Element	HCUP Name	Years Available	Coding Notes	Unavailable in 2009 for:
Median household income for patient's ZIP Code	ZIPINC_QRTL	2003, 2006, 2009	Median household income quartiles for patient's ZIP Code. Because these estimates are updated annually, the value ranges for the ZIPINC_QRTL categories vary by year. Check the HCUP-US Website for details.	
	ZIPINC	2000	Median household income category in files beginning in 1998: (1) \$1-\$24,999, (2) \$25,000-\$34,999, (3) \$35,000-\$44,999, (4) \$45,000 and above	
	ZIPINC4	1997	Median household income category in 1997: (1) \$1-\$25,000, (2) \$25,001-\$30,000, (3) \$30,001-\$35,000, (4) \$35,001 and above	
Neonatal/maternal flag	NEOMAT	1997, 2000, 2003, 2006, 2009	Assigned from diagnoses and procedure codes: (0) not maternal or neonatal, (1) maternal diagnosis or procedure, (2) neonatal diagnosis, (3) maternal and neonatal on same record	
Payer information	PAY1	1997, 2000, 2003, 2006, 2009	Expected primary payer, uniform: (1) Medicare, (2) Medicaid, (3) private including HMO, (4) self-pay, (5) no charge, (6) other	
	PAY1_N	1997	Expected primary payer, nonuniform: (1) Medicare, (2) Medicaid, (3) Blue Cross, Blue Cross PPO, (4) commercial, PPO, (5) HMO, PHP, etc., (6) self-pay, (7) no charge, (8) Title V, (9) Worker's Compensation, (10) CHAMPUS, CHAMPVA, (11) other government, (12) other	
	PAY1_X	2000, 2003, 2006, 2009	Expected primary payer, as received from the data source	ME
	PAY2	1997, 2000, 2003, 2006, 2009	Expected secondary payer, uniform: (1) Medicare, (2) Medicaid, (3) private including HMO, (4) self-pay, (5) no charge, (6) other	AZ, CA, CO, FL, HI, IA, NH, OH, OK, RI, SD, VA
	PAY2_N	1997	Expected secondary payer, nonuniform: (1) Medicare, (2) Medicaid, (3) Blue Cross, Blue Cross PPO, (4) commercial, PPO, (5) HMO, PHP, etc., (6) self-pay, (7) no charge, (8) Title V, (9) Worker's Compensation, (10) CHAMPUS, CHAMPVA, (11) other government, (12) other	
	PAY2_X	2000, 2003, 2006, 2009	Expected secondary payer, as received from the data source	AZ, CA, CO, FL, HI, IA, ME, NH,

Type of Data	H C	Years Available	Coding Notes	Unavailable
Physician	MDNUM 1_R	2003, 2006, 2009	Re-identified attending physician number in files starting in 2003	CA, CT, HI, IL, IN,
	MDID_S	1997, 2000	Synthetic attending physician number in 1997 and 2000 KID	
	MDNUM 2_R	2003, 2006, 2009	Re-identified secondary physician number in files starting in 2003	CA, CT, HI, IL, IN,
	SURGID_S	1997, 2000	Synthetic second physician number in 1997 and 2000 KID	
Procedure	PR1 - PR15	1997, 2000, 2003, 2006, 2009	Procedures, principal and secondary (ICD-9-CM)	
	PRV1 - PRV15	1997	Procedure validity flag	
	NPR	1997, 2000, 2003, 2006, 2009	Number of procedures coded on the original record	
	ORPROC	2009	Major operating room procedure indicator: (0) no major operating room procedure, (1) major	
	PRDAY1	1997, 2000, 2003, 2006, 2009	Number of days from admission to principal procedure.	OH, OK, UT,
	PRDAY2	2000, 2003, 2006, 2009	Number of days from admission to secondary procedure.	CO, IN, OH,
Race of Patient	RACE	1997, 2000, 2003, 2006, 2009	Race, uniform coding: (1) white, (2) black, (3) Hispanic, (4) Asian or Pacific Islander, (5) Native American, (6) other	MN, NC, OH, WA,
Record identifier	RECNUM	1997, 2003, 2006, 2009	HCUP unique record number	
	KEY	2000	Unique record number for 2000 KID	
Total Charges	TOTCHG	1997, 2000, 2003, 2006, 2009	Total charges, edited	
	TOTCHG_X	1997, 2000, 2003, 2006, 2009	Total charges, as received from data source	ME

Appendix G 2012 KID Inpatient Core Data File

For prior years, refer to documentation on HCUP-US (e.g. the table of data element availability by years http://hcup-us.ahrq.gov/db/nation/kid/Availability_of_KID_Data_Elements_2012.pdf or previous versions of the KID Introduction).

Data Element	Coding Notes	HCUP Name
Admission day of week or weekend	AWEEKEND	Admission on weekend: (0) admission on Monday-Friday, (1) admission on Saturday-Sunday
Admission month	AMONTH	Admission month coded from (1) January to (12) December
Transferred into hospital	TRAN_IN	Transfer <u>In</u> Indicator: (0) not a transfer, (1) transferred in from a different acute care hospital [ATYPE NE 4 & (ASOURCE=2 or POO=4)], (2) transferred in from another type of health facility [ATYPE NE 4 & (ASOURCE=3 or POO=5, 6)]
Admission type	ELECTIVE	Indicates elective admission: (1) elective, (0) non-elective admission
Age at admission	AGE	<u>Age</u> in years coded 0-124 years
Chronic Conditions	NCHRONIC	Number of chronic conditions
Clinical Classifications Software (CCS) category	DXCCS1 – DXCCS25	CCS category for all diagnoses. Beginning in 2009, the diagnosis array was increased from 15 to 25.
	PRCCS1 – PRCCS15	CCS category for all procedures
Diagnosis information	DX1 – DX25	Diagnoses, principal and secondary (ICD-9-CM). Beginning in 2003, the diagnosis array does not include any of external cause of injury codes. These codes have been stored in a separate array <u>ECODEn</u> . Beginning in 2009, the diagnosis array was increased from 15 to 25.
	HOSPBIRTH	Birth diagnosis, in this hospital
	NDX	Number of diagnoses coded on the original record
	UNCBIRTH	Normal, uncomplicated birth in hospital
Diagnosis Related Group (DRG)	DRG	<u>DRG</u> in use on discharge date
	<u>DRG_NoPOA</u>	DRG in use on discharge date, calculated without Present On Admission (POA) indicators
	DRGVER	Grouper version in use on discharge date
	DRG24	DRG Version 24 (effective October 2006 - September 2007)
Discharge <u>quarter</u>	<u>DQTR</u>	Coded: (1) Jan - Mar, (2) Apr - Jun, (3) Jul - Sep, (4) Oct - Dec

Type of Data Element	HCUP Name	Coding Notes
Discharge weights	DISCWT	Weight to discharges in AHA universe for national estimates. In 2000, the discharge weight DISCWTCHARGE should be
Discharge year	YEAR	Calendar year
Disposition of patient (discharge status)	DIED	Indicates in-hospital death: (0) did not die during hospitalization, (1) died during hospitalization
	DISPUNIFORM	Disposition of patient, uniform coding used beginning in 1998: (1) routine, (2) transfer to short term hospital, (5) other transfers, including skilled nursing facility, intermediate care, and another type of facility, (6) home health care, (7) against medical advice, (20) died in hospital, (99) discharged alive, destination
	TRAN_OUT	Transfer Out Indicator: (0) not a transfer, (1) transferred out to a different acute care hospital, (2) transferred out to another type of health facility
External causes of injury and poisoning	ECODE1 – ECODE4	External cause of injury and poisoning code, primary and secondary (ICD-9-CM). Beginning in 2003, external cause of injury codes are stored in a separate array ECODEn from the diagnosis codes in the array DXn. Prior to 2003, these codes are contained in the
	E_CCS1 – E_CCS4	CCS category for the external cause of injury and poisoning codes
	NECODE	Number of external cause of injury codes on the original
Gender of patient	FEMALE	Indicates gender for KID beginning in 1998: (0) male, (1)
Hospital information	HOSP_REGION	Region of hospital: (1) Northeast, (2) Midwest, (3) South, (4) West Prior to 2012, region of hospital is only available in the KID Hospital File.
	KID_STRATUM	Hospital stratum used for weights.
Indicates Emergency Department service	HCUP_ED	Indicator that discharge record includes evidence of emergency department (ED) services: (0) Record does not meet any HCUP Emergency Department criteria, (1) Emergency Department revenue code on record, (2) Positive Emergency Department charge (when revenue center codes are not available), (3) Emergency Department CPT procedure code on record, (4) Admission source of ED, (5) State-defined ED
Length of Stay	LOS	Length of stay, edited
Location of the patient	PL_NCHS2006	Urban–rural designation for patient's county of residence: (1) "Central" counties of metro areas $\geq$ 1 million population, (2) "Fringe" counties of metro areas $\geq$ 1 million population, (3) Counties in metro areas of 250,000 - 999,999 population, (4) Counties in metro areas of 50,000 - 249,999 population,

Type of Data Element	HCUP Name	Coding Notes
Major Diagnosis Category (MDC)	MDC	<u>MDC</u> in use on discharge date
	<u>MDC_NoPOA</u>	MDC in use on discharge date, calculated without Present on Admission (POA) indicators
	MDC24	MDC Version 24 (effective October 2006 - September 2007)
Median household income for patient's ZIP Code	ZIPINC_QRTL	Median household income quartiles for patient's ZIP Code. Because these estimates are updated annually, the value ranges for the ZIPINC_QRTL categories vary by year. Check the HCUP-US Website for details.
Neonatal/maternal flag	NEOMAT	Assigned from diagnoses and procedure codes: (0) not maternal or neonatal, (1) maternal diagnosis or procedure, (2) neonatal diagnosis, (3) maternal and neonatal on same record
Payer information PAY1		Expected primary payer, uniform: (1) Medicare, (2) Medicaid, (3) private including HMO, (4) self-pay, (5) no charge, (6) other
Procedure information	PR1 – PR15	Procedures, principal and secondary (ICD-9-CM) NPR
		Number of procedures coded on the original record
	ORPROC	Major operating room procedure indicator: (0) no major operating room procedure, (1) major operating room procedure
	PRDAY1	Number of days from admission to principal procedure.
	PRDAY2 – PRDAY15	Number of days from admission to secondary procedures.
Race of Patient	RACE ¹⁴	Race, uniform coding: (1) white, (2) black, (3) Hispanic, (4) Asian or Pacific Islander, (5) Native American, (6) other
Record identifier, synthetic	RECNUM	HCUP unique record number

Total Charges

TOTCHG

Total charges, edited

Appendix H HIMSS Analytics 2009 Element List by Table

Table Name	Field Name	SQL Data Type	Access Data Type	Description	New in 2009
AcuteInfo	AcuteId	int	Number/Long Integer	Record identification number	
AcuteInfo	CCD_Transaction	bit	Yes/No	Yes = the hospital is using HL7 CCD (continuum of care document) transactions to share patient data with other organizations?	Yes
AcuteInfo	CIOBiometricalOper	bit	Yes/No	Yes = the hospital CIO has responsibility for Biomedical Operations	
AcuteInfo	CIOTelecommunications	bit	Yes/No	Yes = the hospital CIO has responsibility for Telecommunications	
AcuteInfo	ClosedLoop	bit	Yes/No	Yes=doing closed-loop medication administration at the point of care	Yes
AcuteInfo	ConsumerDashboard	bit	Yes/No	Yes = the hospital utilizes a consumer dashboard	
	CPOEAffiliatedPhysPerc	varchar	Text	The percentage of affiliated physicians using the CPOE system	
AcuteInfo	CPOEHospitalsPerc	varchar	Text	The percentage of hospitalists	

				using the CPOE system	
	CPOEOtherFTPerc	varchar	Text	The percentage of other physicians using the CPOE system	
AcuteInfo	CPOEPhysicianPerc			The percentage range of all medical orders entered by physicians using CPOE (see tab AS-Perc Ranges)	
	CPOEResidentsPerc	varchar	Text	The percentage of residents using the CPOE system	
AcuteInfo	CPOEWhenOwnOrders	varchar	Text	The time frame for all physicians to be entering all orders into the CPOE system (see tab F-CPOEOwnOrdersTimeFrames)	
AcuteInfo	ElectronicMedRecPerc	varchar	Text	The percent range of the hospital's current medical record that is electronic (includes digital and/or scanned data) (see tab AS-Perc Ranges)	
AcuteInfo	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
AcuteInfo	IEInitiative	bit	Yes/No	Yes = the hospital participates in an Information Exchange Initiative(s)	

AcuteInfo	IEInitiativeAgency	bit	Yes/No	Yes = the hospital participates in an "Agency for Health Research and Quality HIT project" Information Exchange Initiative	
AcuteInfo	IEInitiativeAgency Name	varchar	Text	Name of the "Agency for Health Research and Quality HIT project" Information Exchange Initiative	
AcuteInfo	IEInitiativeAgency Plan	bit	Yes/No	Yes = the hospital plans to participate in an "Agency for Health Research and Quality HIT project" Information Exchange Initiative	
AcuteInfo	IEInitiativeAgency PlanType	varchar	Text	Timeframe in months for when the hospital plans to begin participation in the "Agency for Health Research and Quality HIT project" Information Exchange Initiative (See tab A-Plan Timeframe)	
AcuteInfo	IEInitiativeBridge	bit	Yes/No	Yes = the hospital participates in a "Bridges to	

				Excellence "Link" programs" Information Exchange Initiative	
AcuteInfo	IEInitiativeBridge Name	varc har	Text	Name of the "Bridges to Excellence "Link" programs" Information Exchange Initiative	
AcuteInfo	IEInitiativeBridge Plan	bit	Yes/No	Yes = the hospital plans to participate in an "Bridges to Excellence "Link" programs" Information Exchange Initiative	
AcuteInfo	IEInitiativeBridge PlanType	varc har	Text	Timeframe in months for when the hospital plans to begin participation in the "Bridges to Excellence "Link" programs" Information Exchange Initiative (See tab A-Plan Timeframe)	
AcuteInfo	IEInitiativeCMSC hronic	int	Yes/No	Yes = the hospital participates in a "CMS's Chronic Care Improvement Programs" Information	

				Exchange Initiative	
AcuteInfo	IEInitiativeCMSC hronicName	varc har	Text	Name of the "CMS's Chronic Care Improvement Programs" Information Exchange Initiative	
AcuteInfo	IEInitiativeCMSC hronicPlan	bit	Yes/No	Yes = the hospital plans to participate in an "CMS's Chronic Care Improvement Programs" Information Exchange Initiative	
AcuteInfo	IEInitiativeCMSC hronicPlanType	varc har	Text	Timeframe in months for when the hospital plans to begin participation in the "CMS's Chronic Care Improvement Programs" Information Exchange Initiative (See tab A-Plan Timeframe)	
AcuteInfo	IEInitiativeCMSQI O	bit	Yes/No	Yes = the hospital participates in a "CMS's QIO Doctors' Office Quality Improvement Technology program" Information	

				Exchange Initiative	
AcuteInfo	IEInitiativeCMSQIOName	varchar	Text	Name of the "CMS's QIO Doctors' Office Quality Improvement Technology program" Information Exchange Initiative	
AcuteInfo	IEInitiativeCMSQIOPlan	bit	Yes/No	Yes = the hospital plans to participate in an "CMS's QIO Doctors' Office Quality Improvement Technology program" Information Exchange Initiative	
AcuteInfo	IEInitiativeCMSQIOPlanType	varchar	Text	Timeframe in months for when the hospital plans to begin participation in the "CMS's QIO Doctors' Office Quality Improvement Technology program" Information Exchange Initiative (See tab A-Plan Timeframe)	
AcuteInfo	IEInitiativeHealth	bit	Yes/No	Yes = the hospital participates in a "Health Information	

				Exchange/RHIO initiative" Information Exchange Initiative	
AcuteInfo	IEInitiativeHealth Name	varchar	Text	Name of the "Health Information Exchange/RHIO initiative" Information Exchange Initiative	
AcuteInfo	IEInitiativeHealth Plan	bit	Yes/No	Yes = the hospital plans to participate in an "Health Information Exchange/RHIO initiative" Information Exchange Initiative	
AcuteInfo	IEInitiativeHealth PlanType	varchar	Text	Timeframe in months for when the hospital plans to begin participation in the "Health Information Exchange/RHIO initiative" Information Exchange Initiative (See tab A-Plan Timeframe)	
AcuteInfo	IEInitiativePlan	bit	Yes/No	Yes = the hospital plans to participate in an Information Exchange Initiative(s)	
AcuteInfo	IsAttachmentRules	bit	Yes/No	Yes = that claims attachment rules are available to	

				identify claims the require additional clinical information before being transmitted to the payer	
AcuteInfo	IsBiometric	bit	Yes/No	Yes = the hospital uses biometric technology for security	
AcuteInfo	IsBiometricPlan	bit	Yes/No	Yes = the hospital plans to purchase/use biometric technology for security	
AcuteInfo	ISBudget	decimal	Number/Decimal	The total amount budgeted by the IS department at the Acute-Care Hospital for the current fiscal year end. This amount includes all operating expenses.	
AcuteInfo	IsClaimsRemittance	bit	Yes/No	Yes = claims remittance transactions are received directly from the payer and the AR system is automatically updated with no clearinghouse involved	
AcuteInfo	IsDashBoard	bit	Yes/No	Yes = the biller has a dashboard for the business office on which rejected claims can be edited and	

				resubmitted and updates to the files used to create the bills are triggered by the editing process	
AcuteInfo	IsEFTTransaction	bit	Yes/No	Yes = electronic funds transactions are submitted directly to the hospital's bank by the payer with no clearinghouse involved	
AcuteInfo	IsEligibilityTransaction	bit	Yes/No	Yes = eligibility and authorization transactions are executed directly with the payer with no clearinghouse involved	
AcuteInfo	IsEMRDocumentation	bit	Yes/No	Yes = bill can be created from the encoded clinical documentation of the EMR and no intervention from the HIM department is required	
AcuteInfo	IsIdentifyRules	bit	Yes/No	Yes = that pending or rejected claims are identified and rules can be created to ensure future claims are not pending or rejected for the same reason	
AcuteInfo	IsNecessityAlert	bit	Yes/No	Yes = the scheduling system has	Yes

				medical necessity checking rule alerts for services not covered by the payer	
AcuteInfo	IsPayerSubmitted	bit	Yes/No	Yes = claims are submitted directly to the payer with no clearinghouse involved	
AcuteInfo	LastMonthFiscalYear	int	Number/Long Integer	The month of the year that the Acute-Care Hospital fiscal year closes	
AcuteInfo	NetOperRevenue	float	Number/Double	Net operating revenue includes revenues associated with the main operations of the hospital (net inpatient+ net out patient revenue). It does not include dividends, interest income or non-operating income.	
AcuteInfo	NofAdjDischarge	int	Number/Long Integer	For 2007 this field is defined as an aggregate figure that reflects outpatient utilization. This is accomplished by dividing gross revenue by gross inpatient revenue which usually results in a factor greater than 1.0, unless there was	

				no outpatient revenue. For 2008, this field is defined as total number of discharges at each acute care hospital in the most recent fiscal year.	
AcuteInfo	NofAdjPatientDays	int	Number/Long Integer	For 2007 this field is defined as an aggregate figure reflecting the number of days of inpatient care, plus an estimate of the volume of outpatient services, expressed in units equivalent to an inpatient day in terms of level of effort. For 2008, this field refers to each calendar day of care provided to a hospital inpatient under the terms of the patient's health plans, excluding the day of discharge.	
AcuteInfo	NofBirths	int	Number/Long Integer	Number of births at each Acute-Care Hospital in the most recent fiscal year	
AcuteInfo	NofEmergRoomVisits	int	Number/Long Integer	Number of emergency room visits at each Acute-Care	

				Hospital in the most recent fiscal year	
AcuteInfo	NofOperatingRooms	int	Number/Long Integer	Number of operating rooms at each Acute-Care Hospital	
AcuteInfo	NofOutpatientVisits	int	Number/Long Integer	Number of outpatient visits at each Acute-Care Hospital in the most recent fiscal year.	
AcuteInfo	NofTotDischarge	int	Number/Long Integer	The total number of patients discharged from the hospital in a calendar year	
AcuteInfo	NofTotPatientDays	int	Number/Long Integer	The number of calendar days of care provided for hospital inpatient treatment under the terms of the patient's health plan, excluding the day of discharge	
AcuteInfo	RevManagedCare	int	Number/Long Integer	Percent of Managed Care that makes up the patient revenue at the hospital	
AcuteInfo	RevMedicaid	int	Number/Long Integer	Percent of Medicaid that makes up the patient revenue at the hospital	
AcuteInfo	RevMedicare	int	Number/Long Integer	Percent of Medicare that makes up the patient revenue at the hospital	
AcuteInfo	RevOther	int	Number/Long Integer	Additional information on the patient	

				revenue breakdown at the hospital	
AcuteInfo	RevTradComm	int	Number/ Long Integer	Percent of traditional commercial insurance that makes up the patient revenue at the hospital	
AcuteInfo	StructuredPhysDocPerc	varchar	Text	The percent range of physician documentation that is captured from structured template documentation solutions (see tab AS-Perc Ranges)	
AcuteInfo	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
AcuteInfo	TotalOperExpense	float	Number/ Double	The total amount of money the Acute-Care Hospital spends on operations such as staffing, property expenses, etc. for the most recent fiscal year.	
AcuteInfo	NofNurses	int	Number/ Long Integer	Number of nurses at the acute care hospital	Yes
AppVendorPlan	AppId	int	Number/ Long Integer	Identification number for applications with software purchase plan. Use this field to link to the	

				HAEntityApplicationPlan table.	
AppVendorPlan	Id	int	Number/ Long Integer	Record identification number	
AppVendorPlan	ProductId	int	Number/ Long Integer	Unique identification number for product	
AppVendorPlan	ProductName	varchar	Text	The software product being considered for purchase	
AppVendorPlan	VendorId	int	Number/ Long Integer	Unique identification number for vendor	
AppVendorPlan	VendorName	varchar	Text	The software vendor being considered for purchase	
AutoIdentification	DepartmentId	int	Number/ Long Integer	Identification number of the department type	
AutoIdentification	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
AutoIdentification	InUseFlag	bit	Yes/No	Yes = the hospital utilizes bar coding, RFID or bar coding/RFID	
AutoIdentification	PlanFlag	bit	Yes/No	Yes = the hospital plans to use bar coding, RFID or bar coding/RFID	
AutoIdentification	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
AutoIdentification	Timeframe	varchar	Text	The timeframe for purchasing bar coding, RFID	

				or bar coding/RFID	
AutoIdentificationProduct	Type	varchar	Text	Type of autoidentification (see tab AT-AutoID Type)	
AutoIdentificationProduct	Category	varchar	Text	The type of bar coding equipment (See tab B-Category)	
AutoIdentificationProduct	Department	varchar	Text	The department where bar coding, RFID, or bar coding/RFID is being used.	
AutoIdentificationProduct	DepartmentId	int	Number/Long Integer	Identification number of the department type	
AutoIdentificationProduct	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
AutoIdentificationProduct	ProductId	int	Number/Long Integer	Identification number for product	
AutoIdentificationProduct	ProductName	varchar	Text	The product name for bar coding, RFID, bar coding/RFID equipment	
AutoIdentificationProduct	Status	varchar	Text	Status of the bar coding, RFID, bar coding/RFID equipment	
AutoIdentificationProduct	SurveyId	int	Number/Long Integer	Identification number assigned to survey	
AutoIdentificationProduct	Type	varchar	Text	Type of autoidentification (see tab AR-AutoId Time Frame)	

AutoIdentificationProduct	VendorId	int	Number/ Long Integer	Identification number for vendor	
AutoIdentificationProduct	VendorName	varchar	Text	The vendor name for bar coding, RFID, bar coding/RFID equipment	
BiometricTechnology	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
BiometricTechnology	Id	int	Number/ Long Integer	Record identification number	
BiometricTechnology	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
BiometricTechnology	TechnologyId	int	Number/ Long Integer	Identification number for biometric technology type used	
BiometricTechnology	TechnologyName	varchar	Text	The type of biometric technology used (See tab C- Biometric Tech)	
BiometricTechnology	Type	varchar	Text	The status of the use of the biometric technology (i.e. current or plan)	
CDSS	ID	int	Number/ Long Integer	Record identification number	Yes
CDSS	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	Yes
CDSS	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity.	Yes

				Unique within survey year.	
CDSS	ProcessID	int	Number/ Long Integer	Identification number associated with the components of the Clinical Decision Support System (CDSS)	Yes
CDSS	ProcessName	varchar	Text	Components of a Clinical Decisions Support System (CDSS) (see tab AX- Process Name)	Yes
Computer	ComputerType	varchar	Text	Type of Computer (see tab D- ComputerTypes)	
Computer	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
Computer	HowManyPlanned	int	Number/ Long Integer	Number of Units Planned	
Computer	Id	int	Number/ Long Integer	Record identification number	
Computer	InUse	bit	Yes/No	Yes = the hospitals is using the specified vendor currently	
Computer	NofComputers	int	Number/ Long Integer	Number of Units in Use	
Computer	OperatingSystem	varchar	Text	Name of the operating system the computers run on	
Computer	Planned	bit	Yes/No	Yes/No Field indicating	

				Computer purchase plans	
Computer	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
Computer	VendorId	int	Number/ Long Integer	Record identification number	
Computer	VendorName	varchar	Text	Name of Computer Vendor	
Connectivity	Category	varchar	Text	Further Detail on Connectivity Type (See tab E-Connectivity Types)	
Connectivity	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
Connectivity	Id	int	Number/ Long Integer	Record identification number	
Connectivity	PlanTerm	varchar	Text	Planned timeframe to purchase Broadband services (See tab A-Plan Timeframes)	
Connectivity	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
Connectivity	Type	varchar	Text	Type of Connectivity (See tab E-Connectivity Types)	
Connectivity	UsePlan	varchar	Text	Indicated current or planned use	
Connectivity	VendorId	int	Number/ Long Integer	Unique identification number for vendor	

Connectivity	VendorName	varchar	Text	Name of Connectivity Vendor	
Contact	ContactId	int	Number/ Long Integer	Unique identification number for contact	
Contact	Credentials	varchar	Text	Contact's Credentials (See tab H- Credentials)	
Contact	Email	varchar	Text	Contact's Email Address	
Contact	Ext	varchar	Text	Contact's Phone Extension	
Contact	FirstName	varchar	Text	Contact's First Name	
Contact	LastName	varchar	Text	Contact's Last Name	
Contact	MiddleInitial	varchar	Text	Contact's Middle Initial	
Contact	ParentId	int	Number/ Long Integer	Parent Entity identification number for the contact	
Contact	Phone	varchar	Text	Contact's Phone	
Contact	Salutation	varchar	Text	Contact's Salutation	
Contact	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
Contact	Title	varchar	Text	Contact's Title	
Contact	UniqueId	int	Number/ Long Integer	Fixed unique identifier for the contact. This number will not change from year to year.	Yes
ContactSource	ContactSourceId	int	Number/ Long Integer	Identification number of the position	
ContactSource	Name	varchar	Text	The name of the position function	

				(See tab I-Contact Sources)	
ContactType	Name	varchar	Text	The name of the type of contact (See tab J-Contact Types)	
ContactType	TypeId	int	Number/Long Integer	identification number of the contact type	
DataCenterApplication	Id	int	Number/Long Integer	Record identification number	Yes
DataCenterApplication	SurveyId	int	Number/Long Integer	Identification number assigned to survey	Yes
DataCenterApplication	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	Yes
DataCenterApplication	CategoryId	int	Number/Long Integer	Unique identification number for application category	Yes
DataCenterApplication	Category	varchar	Text	The category the software application is associated with (See table P-Application List)	Yes
DataCenterApplication	ApplicationId	int	Number/Long Integer	Unique identification number for application	Yes
DataCenterApplication	Application	varchar	Text	Software application name (See tab P-Application List)	Yes
DataCenterFacility	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	

DataCenterFacility	Id	int	Number/ Long Integer	Record identification number	
DataCenterFacility	ParentId	int	Number/ Long Integer	Unique Identification number of data center	
DisasterRecoveryPlan	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
DisasterRecoveryPlan	Id	int	Number/ Long Integer	Record identification number	
DisasterRecoveryPlan	Plan	varchar	Text	Facilities Included in Disaster Recovery Plan (See tab L-Plan Facilities)	
DisasterRecoveryPlan	PlanId	int	Number/ Long Integer	Identification number for type of facilities included in Disaster Recovery Plan	
DisasterRecoveryPlan	PlanOther	varchar	Text	Description of Other Planned Facilities	
DisasterRecoveryPlan	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
DistributionPlan	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
DistributionPlan	Id	int	Number/ Long Integer	Record identification number	
DistributionPlan	Option	varchar	Text	Options for expanding the	

				distribution of PACS images	
DistributionPlan	Other	varchar	Text	Description of Other Distribution Plans	
DistributionPlan	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
DistributionPlan	Type	varchar	Text	Type of PACS Images, Radiology or Cardiology	
ExpenditureApproval	ApprovedBy	varchar	Text	The individual or group with the authority to approve the expenditure	
ExpenditureApproval	ApprovedFrom	float	Number/ Double	The least amount of money the approving individual or group has the authority to approve	
ExpenditureApproval	ApprovedTo	float	Number/ Double	The Largest amount of money the approving individual or group has the authority to approve	
ExpenditureApproval	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
ExpenditureApproval	Id	int	Number/ Long Integer	Record identification number	
ExpenditureApproval	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	

HAEntity	AcuteId	int	Number/ Long Integer	For sub-acute care facilities the HAEntityID of the acute care facility that the sub-acute care facility uses the same software platform as.	
HAEntity	Address1	varchar	Text	Entity's Street Address	
HAEntity	Address2	varchar	Text	Additional Address Info if Necessary	
HAEntity	CBSA	varchar	Text	Core Business Statistical Area where the Entity is located	
HAEntity	City	varchar	Text	City where the Entity is located	
HAEntity	DataCenterAcuteId	int	Number/ Long Integer	Unique identifier of Data Center serving the Entity	
HAEntity	EmailConvention	varchar	Text	Email Convention for Entity	
HAEntity	EntityNo	int	Number/ Long Integer	FacilityID or IDS or Independent Health SystemID from 2004	
HAEntity	Fax	varchar	Text	Fax Number	
HAEntity	FreeStanding	bit	Yes/No	Yes = the sub-acute care facility is not housed in another facility	
HAEntity	FTEEMRSupport	int	Number/ Long Integer	Number of IS FTEs that support EMR applications	
HAEntity	FTEHelpDesk	decimal	Number/ Decimal	Number of IS FTEs at the Help Desk	
HAEntity	FTEMgmt	decimal	Number/ Decimal	Number of IS FTEs in management	

HAEntity	FTENetworkAdmins	decimal	Number/Decimal	Number of IS FTEs that are network administrators	
HAEntity	FTEOperations	decimal	Number/Decimal	Number of IS FTEs working in operations	
HAEntity	FTEOther	decimal	Number/Decimal	Number of other IS FTEs	
HAEntity	FTEPCSupport	decimal	Number/Decimal	Number of IS FTEs providing PC support	
HAEntity	FTEProgrammers	decimal	Number/Decimal	Number of IS FTEs that are Programmers	
HAEntity	FTEProjectMgmt	decimal	Number/Decimal	Number of IS FTEs that are Project Managers.	
HAEntity	FTERCMSupport	int	Number/Long Integer	Number of IS FTEs that support RCM applications	
HAEntity	FTESecurity	decimal	Number/Decimal	Number of IS FTEs in IS Security	
HAEntity	FTETotal	decimal	Number/Decimal	Total number of IS FTEs	
HAEntity	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
HAEntity	HAEntityType	varchar	Text	Description of surveyed entity type (See tab M-Facility Types)	
HAEntity	HAEntityTypeId	int	Number/Long Integer	Unique identification number associated with surveyed entity type (See tab M-Facility Types)	

HAEntity	IsImaging	bit	Yes/No	Yes = the ambulatory facilities provides imaging services (sometimes in addition to the primary service offered)	
HAEntity	MedicareNumber	varchar	Text	Medicare identification number	
HAEntity	Name	varchar	Text	Entity's Name	
HAEntity	NofBeds	int	Number/Long Integer	Number of Licensed Beds	
HAEntity	NofFTE	decimal	Number/Decimal	Total number of FTEs	
HAEntity	NofHCareVisits	int	Number/Long Integer	Number of Home Health Visits annually	
HAEntity	NofPhysicians	int	Number/Long Integer	Number of Physicians employed at the ambulatory	
HAEntity	NofStaffedBeds	int	Number/Long Integer	Number of Beds that can be operated at present staffing levels	
HAEntity	OwnershipStatus	varchar	Text	Ownership Status; Owned, Managed, Leased, or Affiliated	
HAEntity	ParentId	int	Number/Long Integer	identification number of the IDS and Independent Health System that the facilities and data centers are associated	
HAEntity	Phone	varchar	Text	Phone Number	

HAEntity	PhysAffiliated	int	Number/ Long Integer	Total number of physicians affiliated with the hospital through an affiliated physician organization	
HAEntity	PhysFT	int	Number/ Long Integer	Total number of full-time salaried physicians employed by the hospital, receiving a regular paycheck from the organization	
HAEntity	PhysHospitalists	int	Number/ Long Integer	Total number of hospitalists employed by the hospital who are responsible for the patient's care during the hospital stay.	
HAEntity	PhysOther	int	Number/ Long Integer	Additional information on the physicians at the hospital	
HAEntity	PhysResidents	int	Number/ Long Integer	Total number of residents at the hospital.	
HAEntity	PhysTotal	int	Number/ Long Integer	Total number of physicians in the hospital	
HAEntity	ProfitStatus	varc har	Text	Not for Profit or Profit	
HAEntity	SameISSystem	bit	Yes/No	Yes = the sub-acute care facility uses the same software platform as a hospital in the health care system	

HAEntity	ServicePopulation	int	Number/ Long Integer	Size of Population served by entity	
HAEntity	State	varc har	Text	State where entity is located	
HAEntity	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
HAEntity	Type	varc har	Text	Description of the entities primary service provided (see tab N-Facility Descriptions)	
HAEntity	UniqueId	int	Number/ Long Integer	Fixed unique identifier for the entity. This number will not change from year to year.	
HAEntity	VendorSelStrategy	varc har	Text	Description of the facility's vendor selection strategy (See tab O-Selection Strategies)	
HAEntity	Website	varc har	Text	Entity's website	
HAEntity	YearFormed	int	Number/ Long Integer	Year Entity Formed	
HAEntity	YearOpened	int	Number/ Long Integer	Year Entity was acquired	
HAEntity	Zip	varc har	Text	Entity's Postal Zip Code	
HAEntityApplication	AEMR_CDR	bit	Yes/No	Yes = the clinical data repository component of the Ambulatory EMR system is in use.	
HAEntityApplication	AEMR_CPOE	bit	Yes/No	Yes = the CPOE component of the Ambulatory	

				EMR system is in use.	
HAEntityApplication	AEMR_DocChart	bit	Yes/No	Yes = the Document Charting component of the Ambulatory EMR system is in use.	
HAEntityApplication	AppId	int	Number/Long Integer	Record identification number	
HAEntityApplication	Application	varchar	Text	Software application name (See tab P-Application List)	
HAEntityApplication	ApplicationId	int	Number/Long Integer	Unique identification number for application	
HAEntityApplication	Category	varchar	Text	The category the software application is associated with (See table P-Application List)	
HAEntityApplication	CategoryId	int	Number/Long Integer	Unique identification number for application category	
HAEntityApplication	ContractMonth	int	Number/Long Integer	The month the software was contracted	
HAEntityApplication	ContractYear	int	Number/Long Integer	The year the software was contracted	
HAEntityApplication	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
HAEntityApplication	HardwareProductId	int	Number/Long Integer	Unique identification	

				number for product	
HAEntityApplication	HardwareProductName	varchar	Text	Hardware model running the software system	
HAEntityApplication	HardwareVendorId	int	Number/Long Integer	Unique identification number for vendor	
HAEntityApplication	HardwareVendorName	varchar	Text	Hardware vendor running the software system	
HAEntityApplication	ImplementedMonth	int	Number/Long Integer	The month the contracted software will be implemented	
HAEntityApplication	ImplementedYear	int	Number/Long Integer	The year the contracted software will be implemented	
HAEntityApplication	ReplacementPlan	bit	Yes/No	Yes = there are plans to replace the software system for facilities	
HAEntityApplication	SoftwareProductId	int	Number/Long Integer	Unique identification number for product	
HAEntityApplication	SoftwareProductName	varchar	Text	Software vendor's product utilized	
HAEntityApplication	SoftwareVendorId	int	Number/Long Integer	Unique identification number for vendor	
HAEntityApplication	SoftwareVendorName	varchar	Text	Name of the software vendor utilized	
HAEntityApplication	Status	varchar	Text	Indicates the status of an application (See Q-Automation Status)	

HAEntityApplication	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
HAEntityApplicationCharacteristics	AppId	int	Number/ Long Integer	Record identification number	Yes
HAEntityApplicationCharacteristics	Characteristic	text	Text	Description of departments where document management and electronic forms are being used, where medical necessity checking is being used and the transaction standards used for EDI. (See tab AW- Characteristics)	Yes
HAEntityApplicationCharacteristics	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity. Unique within survey year.	Yes
HAEntityApplicationCharacteristics	Id	int	Number/ Long Integer	Record identification number	Yes
HAEntityApplicationCharacteristics	SurveyId	int	Number/ Long Integer	Record identification number	Yes
HAEntityApplicationPlan	AppId	int	Number/ Long Integer	identification number for applications with software purchase plan	
HAEntityApplicationPlan	Application	varchar	Text	Software application name (See tab P- Application List)	
HAEntityApplicationPlan	ApplicationId	int	Number/ Long Integer	Unique identification number for application	

HAEntityApplicationPlan	Budgeted	bit	Yes/No	Yes = the software purchase has been budgeted	
HAEntityApplicationPlan	Contract	varchar	Text	The estimated timeframe the facility plans to sign a contract (See tab A-Plan Timeframe)	
HAEntityApplicationPlan	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
HAEntityApplicationPlan	Installation	varchar	Text	The estimated timeframe the facility plans to have completed installation of the system (See tab A-Plan Timeframe)	
HAEntityApplicationPlan	RFP	bit	Yes/No	Yes = the facility uses RFP's when purchasing	
HAEntityApplicationPlan	RFPDateMonth	int	Number/Long Integer	The month the RFP has or will be sent out	
HAEntityApplicationPlan	RFPDateYear	int	Number/Long Integer	The year the RFP has or will be sent out	
HAEntityApplicationPlan	SurveyId	int	Number/Long Integer	Identification number assigned to survey	
HAEntityApplicationPlan	VendorDecision	varchar	Text	The estimated timeframe the facility plans to make a vendor decision (See tab A-Plan Timeframe)	
HAEntityContact	ContactId	int	Number/Long Integer	Unique identification	

				number for contact	
HAEntityContact	HAContactSourceId	int	Number/Long Integer	Identification number of the position	
HAEntityContact	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
HAEntityContact	Id	int	Number/Long Integer	Record identification number	
HAEntityContact	Status	varchar	Text	The status of the position and the system or facility (See tab G-Contact Status)	
HAEntityContact	SurveyId	int	Number/Long Integer	Identification number assigned to survey	
HAEntityContact	TypeId	int	Number/Long Integer	identification number of the contact type	
HAEntityHistory	Action	varchar	Text	Type of current or planned activity (See tab R-Actions)	
HAEntityHistory	BedSize	int	Number/Long Integer	Planned Number of Licensed Beds for a hospital being constructed or expanded	
HAEntityHistory	BeginConstruction	varchar	Text	Timeframe to begin the construction or expansion project (see Tab A - Plan Timeframe)	
HAEntityHistory	EndConstruction	varchar	Text	Timeframe to complete the construction or expansion project (see Tab A - Plan Timeframe)	

HAEntityHistory	FundingAmount	varchar	Text	Amount of funding for the construction or expansion project	
HAEntityHistory	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
HAEntityHistory	HAEntityTypeId	int	Number/Long Integer	Unique identification number associated with surveyed entity type	
HAEntityHistory	HistoryId	int	Number/Long Integer	Record identification number	
HAEntityHistory	IsPlan	bit	Yes/No	Yes = the project is planned (See tab R-Actions)	
HAEntityHistory	ProjectDescription	text	Memo	Details for the plan the facility is a part of which may include time frames and facility details such as bed size	
HAEntityHistory	ProjectType	varchar	Text	Type of planned construction or expansion project (see Tab - AY ProjectType)	
HAEntityHistory	SubjectHAEntityId	int	Number/Long Integer	HAEntityID of the facility that the project is associated with	
HAEntityHistory	SubjectName	varchar	Text	Name of the entity that the project is associated with.	
HAEntityHistory	SurveyId	int	Number/Long Integer	Identification number assigned to survey	

HAEntityRegion	Description	varchar	Text	The specific names of the counties, states, etc. the IDS/ Independent Health System services	
HAEntityRegion	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
HAEntityRegion	RegionId	int	Number/ Long Integer	Record identification number	
HAEntityRegion	RegionName	varchar	Text	The type of region that the IDS/Independent Health System services (Counties; State; Regional; National; or Other)	
HAEntityRegion	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
HandheldInfo	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
HandheldInfo	Id	int	Number/ Long Integer	Record identification number	
HandheldInfo	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
HandheldInfo	Type	varchar	Text	Handheld Use or Areas	
HandheldInfo	Value	varchar	Text	Description of Handheld use and areas of use	

				(see tab S-HandHeld Uses)	
HandheldInfo	ValueOther	varchar	Text	Further Description of Other uses or areas of uses	
HostedSoftware	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	Yes
HostedSoftware	Id	int	Number/Long Integer	Record identification number	Yes
HostedSoftware	ServiceId	int	Number/Long Integer	Identification number assigned to the service	Yes
HostedSoftware	SurveyId	int	Number/Long Integer	Identification number assigned to survey	Yes
HostedSoftware	VendorId	int	Number/Long Integer	Unique identification number for vendor	Yes
HostedSoftware	VendorName	varchar	Text	Name of the vendor hosting the software on their servers	Yes
IHDSChanges	ChangeDate	varchar	Date/Time	The date the change was made to the HIMSS Analytics Database	
IHDSChanges	ChangeId	int	Number/Long Integer	Record identification number	
IHDSChanges	ChangeType	varchar	Text	Description of the reason for the change to the HIMSS Analytics Database, such as a merger, a new system or a deletion	

IHDSChanges	Comment	text	Memo	Explanation of changes made to the HIMSS Analytics Database	
IHDSChanges	Edition	varchar	Text	Indicates which edition of the HIMSS Analytics Database the data is from	
IHDSChanges	Id	int	Number/Long Integer	Unique identification for each changed record	
IHDSChanges	IsPlan	bit	Yes/No	Yes = the change is planned	
IHDSChanges	NewIDSId	int	Number/Long Integer	The new healthcare system's EntityNo	
IHDSChanges	OldIDSId	int	Number/Long Integer	The old healthcare system's EntityNo	
IHDSChanges	Surveyid	int	Number/Long Integer		
ISPlan	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
ISPlan	Id	int	Number/Long Integer	Record identification number	
ISPlan	Plan	varchar	Text	Description of the areas the IS strategic plan addresses (See tab T-Strategic Plans)	
ISPlan	SurveyId	int	Number/Long Integer	Identification number assigned to survey	

ISPlanDecision	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
ISPlanDecision	Id	int	Number/ Long Integer	Record identification number	
ISPlanDecision	Plan	varchar	Text	Description of the facilities that drive the IS strategic plan (See tab L-Plan Facilities)	
ISPlanDecision	PlanId	int	Number/ Long Integer	Identification number for the type of facilities that drive the IS strategic plan	
ISPlanDecision	PlanOther	varchar	Text	Description of the other facilities that drive the IS strategic plan	
ISPlanDecision	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
LongTermStorage	Area	varchar	Text	Indicates the area where the long term storage technology is used (See tab AN-Storage Areas)	
LongTermStorage	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
LongTermStorage	Id	int	Number/ Long Integer	Record identification number	

LongTermStorage	StorageOther	varchar	Text	Description of Other storage types	
LongTermStorage	StorageType	varchar	Text	Type of storage used for all long term storage at the hospital (See tab U-Storage Types)	
LongTermStorage	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
LongTermStorage	Type	varchar	Text	Current or Planned Use	
LongTermStorage	VendorId	int	Number/ Long Integer	Unique identification number for vendor	
LongTermStorage	VendorName	varchar	Text	Name of the vendor used for long term storage.	
MedAdministration	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
MedAdministration	ProcessDesc	varchar	Text	A description of the elements that are bar coded or have an RFID tag in the medication administration process (see tab AV-ProcessDec)	
MedAdministration	ProcessID	int	Number/ Long Integer	Identification number associated with the elements that are bar coded or have an RFID tag in the medication administration process	

MedAdministration	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
PACSComponent	Category	varc har	Text	Already Purchased or Planned	
PACSComponent	Component	varc har	Text	Type of PACS Component (See tab V-PACS Components)	
PACSComponent	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
PACSComponent	Id	int	Number/ Long Integer	Record identification number	
PACSComponent	Other	varc har	Text	Further Description of Other components	
PACSComponent	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
PACSComponent	Type	varc har	Text	Department that is referred to regarding PACS (see tab W-PACS Types)	
PACInfo	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
PACInfo	Id	int	Number/ Long Integer	Record identification number	
PACInfo	ImgDistrCCU	bit	Yes/No	Yes/No Images distributed to Critical Care Unit	
PACInfo	ImgDistrER	bit	Yes/No	Yes/No Images distributed to	

				Emergency Room	
PACSInfo	ImgDistrICU	bit	Yes/No	Yes/No Images distributed to Intensive Care Unit	
PACSInfo	ImgDistrOR	bit	Yes/No	Yes/No Images distributed to Operating Rooms	
PACSInfo	ImgDistrOther	bit	Yes/No	Yes/No Images distributed to other departments	
PACSInfo	ImgDistrOtherComment	varchar	Text	Description of other distribution departments	
PACSInfo	ImgDistrThisDept Only	bit	Yes/No	Yes/No Images only distributed with in Radiology or Cardiology	
PACSInfo	ImgDistrWeb	bit	Yes/No	Yes/No Images distributed over the Web	
PACSInfo	NofDigitalStudies	int	Number/ Long Integer	Number of digitized studies or procedures done annually	
PACSInfo	NofStudies	int	Number/ Long Integer	Total number of studies or procedures done annually	
PACSInfo	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
PACSInfo	Type	varchar	Text	Department that is referred to regarding PACS (see tab W-PACS Types)	
PACSInfo	PACSIntegrated	bit	Yes/No	Yes = Radiology/ Cardiology PACS is integrated with RIS/ CIS	Yes

PACInfo	OtherLocationAccess	bit	Yes/No	Yes = The images are accessible from locations outside of the hospital	Yes
PACSVendor	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
PACSVendor	NofWorkstations	int	Number/Long Integer	Number of Workstations Licensed from PACS vendor	
PACSVendor	PACSVendorId	int	Number/Long Integer	Unique identification number for vendor	
PACSVendor	SurveyId	int	Number/Long Integer	Identification number assigned to survey	
PACSVendor	Type	varchar	Text	Radiology or Cardiology	
PACSVendor	VendorId	int	Number/Long Integer	Unique identification number for vendor	
PACSVendor	VendorName	varchar	Text	Name of PACS vendor	
ParentInfo	AnnualOpCost	float	Number/Double	The annual operating cost for the entire healthcare organization spent on operations such as staffing, property expenses, etc. In numeric form for the most recent fiscal year end	
ParentInfo	AnnualRevenue	float	Number/Double	The amount of net income that a system generated	

				from patient care, investments and other sources for the most recent fiscal year end; revenues in excess of expenses	
ParentInfo	BackUpFacilityType	varchar	Text	Description of the type of backup facility (see tab Z-Backup Facility Types)	
ParentInfo	DateOfData	datetime	Date/Time	Date the data collection was completed	
ParentInfo	ExtAuditFirmId	int	Number/Long Integer	Unique identification number for vendor	
ParentInfo	ExtAuditFirmName	varchar	Text	Name of the external auditing firm	
ParentInfo	FiscalEndDateMonth	int	Number/Long Integer	The month the fiscal year ends	
ParentInfo	ISBudget	decimal	Number/Decimal	The total amount budgeted by the IS department at the healthcare systems for the current fiscal year end. This amount includes all operating expenses.	
ParentInfo	ISPlan	bit	Yes/No	Yes = the system has an IS strategic plan	
ParentInfo	ISPlanInEffect	varchar	Text	The length of time the strategic plans is in effect for from the year it was written (See tab Y-	

				ISPlan Timeframes)	
ParentInfo	ISPlanYear	int	Number/ Long Integer	The year the IS strategic plan was written	
ParentInfo	NofOutpatientVisits	int	Number/ Long Integer	Total number of individuals seen on an outpatient basis at the integrated healthcare delivery system for the most recent fiscal year	
ParentInfo	NofRadiologyProcs	int	Number/ Long Integer	Number of radiology studies/procedures at the health system for the most recent fiscal year	
ParentInfo	OutsourceRecovery	bit	Yes/No	Yes = the IDS/Independent Hospital System outsources their disaster recovery	
ParentInfo	OutsourceRecoveryVendor	varchar	Text	The name of the vendor the IDS/Independent Hospital System providing the outsourced disaster recovery services	
ParentInfo	OutsourceRecoveryVendorId	int	Number/ Long Integer	Unique identification number for vendor	
ParentInfo	ParentId	int	Number/ Long Integer	Identification number for IDS and Independent Health Systems. Unique with survey year	

ParentInfo	PhysAffiliated	int	Number/ Long Integer	Total number of physicians affiliated with the system through an affiliated physician organization	
ParentInfo	PhysFT	int	Number/ Long Integer	Total number of full-time salaried physicians employed by the ihealth care system, receiving a regular paycheck from the organization	
ParentInfo	PhysHospitalists	int	Number/ Long Integer	Total number of hospitalists employed by the health care system	
ParentInfo	PhysOther	int	Number/ Long Integer	Additional information on the physicians at the health care system	
ParentInfo	PhysResidents	int	Number/ Long Integer	Total number of residents at the health care system	
ParentInfo	PhysTotal	int	Number/ Long Integer	Total number of other (not on-staff, full-time salaried or affiliated) physicians at the health care system	
ParentInfo	RecoveryPlan	bit	Yes/No	Yes = the IDS/Independent Hospital System has a disaster recover plan	
ParentInfo	RecoveryPlanIsBackup	bit	Yes/No	Yes = the IDS/Independent Hospital System	

				has a backup facility for disaster recovery	
ParentInfo	RecoveryPlanYear	int	Number/ Long Integer	The year the disaster recover plan was written	
ParentInfo	RevManagedCare	float	Number/ Double	Percentage of patient revenue from managed care organizations	
ParentInfo	RevMedicaid	float	Number/ Double	Percentage of patient revenue from Medicaid (Public) insurance	
ParentInfo	RevMedicare	float	Number/ Double	Percentage of patient revenue from Medicare	
ParentInfo	RevOther	float	Number/ Double	Percentage of patient revenue from other sources, such as CHAMPUS, worker's comp., self pay, etc.	
ParentInfo	RevTradComm	float	Number/ Double	Percentage of patient revenue from traditional commercial insurance	
ParentInfo	StarkNofClinics	int	Number/ Long Integer	Number of clinics the system currently provides Ambulatory EMR services to community physicians under the current Stark relaxation laws (non-owned clinics)	
ParentInfo	StarkNofSolutions	int	Number/ Long Integer	Number of Ambulatory EMR solutions	

				the system currently provides to community physicians under the current Stark relaxation laws (non-owned clinics)	
ParentInfo	StarkPlan	bit	Yes/No	Yes = the system plans to offer Ambulatory EMR services to community physicians (non-owned clinics) (See tab A-Plan Timeframe)	
ParentInfo	StarkPlanTimeFrame	varchar	Text	The timeframe in which the system plans to offer Ambulatory EMR services to community physicians (non-owned clinics)	
ParentInfo	StarkRelaxation	bit	Yes/No	Yes = the system currently provides Ambulatory EMR services to community physicians under the current Stark relaxation laws (non-owned clinics)	
ParentInfo	SteeringCommittee	bit	Yes/No	Yes = the system has a formal IS steering committee	
ParentInfo	SurveyId	int	Number/Long Integer	Identification number assigned to survey	
Pharmacy	ADM	bit	Yes/No	Yes = the facility uses ADMs to	

				dispense medication	
Pharmacy	ADMPerc	decimal	Number/Decimal	The percentage of the total dispensed medication that is done via the Automated Dispensing Machines (ADMs)	
Pharmacy	ADMPlanned	bit	Yes/No	Yes = the facility plans to purchase ADMs to dispense medication (See tab A-Plan Timeframes)	
Pharmacy	ADMTIMEFrame	varchar	Text	The time frame for purchasing ADMs to dispense medication (See tab AA-Pharmacy Plan Timeframes)	
Pharmacy	DeptED	bit	Yes/No	Yes = the facility uses ADMs to dispense medication in the emergency department	
Pharmacy	DeptMedical	bit	Yes/No	Yes = the facility uses ADMs to dispense medication in the Medical/Surgical department	
Pharmacy	DeptOR	bit	Yes/No	Yes = the facility uses ADMs to dispense medication in the operating room	
Pharmacy	DeptOther	bit	Yes/No	Yes = the facility uses ADMs to dispense	

				medication in the another department	
Pharmacy	DeptOtherName	varchar	Text	Description of the other department where ADMs are used to dispense medication	
Pharmacy	DifferentThanInpatient	bit	Yes/No	Yes = the software system in the outpatient facility is different than the inpatient Pharmacy Management System	
Pharmacy	EMAR_CPOE	varchar	Text	Indicates if the EMAR is integrated with pharmacy, CPOE or both.	
Pharmacy	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
Pharmacy	Id	int	Number/Long Integer	Record identification number	
Pharmacy	IVPumpPlanned	bit	Yes/No	Yes = the facility plans to purchase IV Pumps	
Pharmacy	IVPumpsPlanTime Frame	varchar	Text	The timeframe the hospitals plans to purchase IV Pumps in months (See tab AA-Pharmacy Plan Timeframes)	
Pharmacy	IVPumpsPlanTime Qty	varchar	Text	Number of IV Pumps the	

				hospital plans to purchase	
Pharmacy	IvPumpsSafetySoftware	bit	Yes/No	Yes = safety software is utilized on the IV Pumps	
Pharmacy	OutpatientDispensing	bit	Yes/No	Yes = the facility's outpatient pharmacy uses an automated system for bottle filling and pill counting	
Pharmacy	OutpatientPharmacy	bit	Yes/No	Yes = the facility has an outpatient pharmacy	
Pharmacy	OutpatientPlanned	bit	Yes/No	Yes = the facility has plans to use an automated outpatient dispensing software for pill counting and bottle filling	
Pharmacy	OutpatientTimeFrame	varchar	Text	The timeframe to implement the planned automated outpatient dispensing software for pill counting and bottle filling (See tab A-Plan Timeframes 1)	
Pharmacy	Robot	bit	Yes/No	Yes = the facility uses robot technology to fill medication orders	
Pharmacy	RobotPlanned	bit	Yes/No	Yes = the facility has plans to use or change robot technology to fill	

				medication orders	
Pharmacy	RobotTimeFrame	varchar	Text	The time frame for purchasing robot technology to fill medication orders (See tab AA-Pharmacy Plan Timeframes)	
Pharmacy	SurveyId	int	Number/Long Integer	Identification number assigned to survey	
PharmacyProduct	ContractMonth	int	Number/Long Integer	The month the facility plans to purchase the technology for the pharmacy	
PharmacyProduct	ContractYear	int	Number/Long Integer	The year the facility plans to purchase the technology for the pharmacy	
PharmacyProduct	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
PharmacyProduct	Id	int	Number/Long Integer	Record identification number	
PharmacyProduct	NofDevices	int	Number/Long Integer	Number of ADM devices used at the facility	
PharmacyProduct	ProductId	int	Number/Long Integer	Unique identification number for product	
PharmacyProduct	ProductName	varchar	Text	The name of the vendor's product used	
PharmacyProduct	Qty	varchar	Text	The number of devices the hospital has	

PharmacyProduct	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
PharmacyProduct	Type	varc har	Text	The type of technology used (See tab AB- Pharmacy Technology)	
PharmacyProduct	VendorId	int	Number/ Long Integer	Unique identification number for vendor	
PharmacyProduct	VendorName	varc har	Text	The name of the vendor used	
PreferredSupplier	Channel	varc har	Text	Preferred Channel for acquiring hardware; Direct from Manufacturer, Reseller, Third Party Vendor, or No Preference	
PreferredSupplier	ChannelVendor	varc har	Text	Primary supply chain vendor for reseller & gpo	Yes
PreferredSupplier	ChannelVendorID	int	Number/ Long Integer	Unique identification number for channel vendor	Yes
PreferredSupplier	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
PreferredSupplier	Id	int	Number/ Long Integer	Record identification number	
PreferredSupplier	Supplier	varc har	Text	Preferred Vendor for specified Type of Hardware (see tab AC-Preferred Supplier Types)	

PreferredSupplier	SupplierId	int	Number/ Long Integer	Unique identification number for vendor	
PreferredSupplier	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
PreferredSupplier	Type	varc har	Text	Types of Hardware	
ProductHistory	AcquisitionDate	datet ime	Date/Tim e	Date and time the acquisition occurred in the HIMSS Analytics DatabaseTM derived from the Dorenfest IHDS+ DatabaseTM	
ProductHistory	Comment	varc har	Text	Description of the action putting the product in the history table	
ProductHistory	CurrentOwnerName	varc har	Text	Name of the vendor who currently owns the product	
ProductHistory	DateNameChange d	datet ime	Date/Tim e	Date and time the acquisition occurred in the HIMSS Analytics DatabaseTM derived from the Dorenfest IHDS+ DatabaseTM	
ProductHistory	Id	int	Number/ Long Integer	Record identification number	
ProductHistory	IndustryChangeDate_Day	varc har	Text	Day the product was acquired in the industry by the new vendor	
ProductHistory	IndustryChangeDate_Month	varc har	Text	Month the product was acquired in the	

				industry by the new vendor	
ProductHistory	IndustryChangeDate_Year	varchar	Text	Year the product was acquired in the industry by the new vendor	
ProductHistory	PreviousName	varchar	Text	The previous name of the product	
ProductHistory	PreviousOwner	varchar	Text	The vendor who owned the product before an acquisition	
ProductHistory	Product	varchar	Text	Product Name	
ProductHistory	ProductID	int	Number/Long Integer	Identification number for the product	
PurchasingOrganization	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
PurchasingOrganization	Id	int	Number/Long Integer	Record identification number	
PurchasingOrganization	Organization	varchar	Text	Name of purchasing alliance or group	
PurchasingOrganization	OrganizationId	int	Number/Long Integer	Identification number of purchasing alliance or group	
PurchasingOrganization	SurveyId	int	Number/Long Integer	Identification number assigned to survey	
SecuritySoftware	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
SecuritySoftware	Id	int	Number/Long Integer	Record identification number	

SecuritySoftware	Software	varchar	Text	Type of Security software (See tab AD-Security Technology)	
SecuritySoftware	SoftwareId	int	Number/Long Integer	Identification number for type of security used	
SecuritySoftware	SurveyId	int	Number/Long Integer	Identification number assigned to survey	
SecuritySoftware	Type	varchar	Text	Indicates if the security technology is current or planned	
Server	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
Server	HostSWVendorID	int	Number/Long Integer	Identification number for the vendor for the host software on Virtual Servers	
Server	HostSWVendorName	varchar	Text	Name of Host Software Vendor in Use on Virtual Servers	
Server	HowManyPlanned	int	Number/Long Integer	Number of Units Planned	
Server	Id	int	Number/Long Integer	Record identification number	
Server	InUseFlag	bit	Yes/No	Yes = the server is currently used	
Server	NofUnits	int	Number/Long Integer	Number of Servers	
Server	OperatingSystem	varchar	Text	Unique ID for Server Operating System	

Server	OperatingSystemName	varchar	Text	Name of Server Operating System	
Server	PlannedFlag	bit	Yes/No	Yes/No Planning New Servers	
Server	ProductId	int	Number/ Long Integer	Unique identification number for product	
Server	ProductName	varchar	Text	Name of Server Product in Use	
Server	ServerType	varchar	Text	The type of server used at the hospital (See tab AE-Server Types)	
Server	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
Server	Timeframe	varchar	Text	The timeframe in which there are plans to implement virtual servers	
Server	VendorId	int	Number/ Long Integer	Unique identification number for vendor	
Server	VendorName	varchar	Text	Name of Server Vendor in Use	
Service	Category	varchar	Text	The status of the use of the consulting services or outsourcing (i.e. current or plan)	
Service	CompanyId	int	Number/ Long Integer	Identification of the organization providing the consulting or outsourcing service	
Service	CompanyName	varchar	Text	Name of the organization providing the consulting or	

				outsourcing service	
Service	ContractLength	varchar	Text	The length of the contract from the date it was contracted	
Service	ContractMonth	int	Number/ Long Integer	The month the service was or will be contracted	
Service	ContractYear	int	Number/ Long Integer	The year the service was or will be contracted	
Service	Function	varchar	Text	Type of service being supplied (See tab AF-Service Types)	
Service	FunctionOther	varchar	Text	Description of services out side of the listed options	
Service	HAEntityId	int	Number/ Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
Service	Id	int	Number/ Long Integer	Record identification number	
Service	SignContractTimeframe	varchar	Text	The time frame the hospital will sign a contract for outsourcing and consulting services	
Service	SurveyId	int	Number/ Long Integer	Identification number assigned to survey	
Service	Type	varchar	Text	Indicates if the service (see tab AF-Service Types)	
Survey	IncompleteData	bit	Yes/No	Yes = new hospitals added	

				in 2006 updates were not completed	
Survey	IsUncooperative	bit	Yes/No	Yes = the entire health system was uncooperative and no IT data was updated	
Survey	SurveyId	int	Number/Long Integer	Identification number assigned to survey	
Survey	Year	int	Number/Long Integer	Year the system and facilities have been updated in	
SurveySegment	SegmentID	varchar	Number/Long Integer	Unique identification number for segment	
SurveySegment	SegmentName		Text	Name of the segment (See tab ??-Segments)	
SurveySegment	SurveyId	int	Number/Long Integer	Identification number assigned to survey	
Telecommunication	Category	varchar	Text	Differentiates between type of telecommunication types (see tab AG-Telecommunication Types)	
Telecommunication	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
Telecommunication	Id	int	Number/Long Integer	Record identification number	
Telecommunication	Status	varchar	Text	The status of the use of the telecommunication technology	

				(i.e. current or planned)	
Telecommunication	SurveyId	int	Number/Long Integer	Identification number assigned to survey	
Telecommunication	Type	varchar	Text	Differentiates between the types of services (see tab AG-Telecommunication Types)	
Telecommunication	VendorId	int	Number/Long Integer	Unique identification number for vendor	
Telecommunication	VendorName	varchar	Text	The vendor providing the telecommunication technology	
VendorHistory	DateOfChange	datetime	Date/Time	Date the action was taken on the vendor	
VendorHistory	HistoryID	int	Number/Long Integer	Record identification number	
VendorHistory	IndustryChangeDate_Day	varchar	Text	Day the vendor change occurred in the industry	
VendorHistory	IndustryChangeDate_Month	varchar	Text	Month the vendor change occurred in the industry	
VendorHistory	IndustryChangeDate_Year	varchar	Text	Year the vendor change occurred in the industry	
VendorHistory	Note	text	Text	Description of the action putting the vendor in the history table	
VendorHistory	PrevName	varchar	Text	Previous name of the original vendor that the action was taken on	
VendorHistory	Vendor	varchar	Text	Name of the original vendor	

				that the action was taken on	
VendorHistory	VendorID	int	Number/Long Integer	Identification number for the vendor	
VendorHistory	vendorName	varchar	Text	Name of the vendor that acquired the original vendor	
Wireless	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
Wireless	HandHeldPerc	decimal	Number/Decimal	The percentage of physicians using handheld devices	
Wireless	Id	int	Number/Long Integer	Record identification number	
Wireless	IsWLAN	bit	Yes/No	Yes = the hospital has a wireless local area network (WLAN)	
Wireless	IsWLANPlan	bit	Yes/No	Yes = the hospital has plans to implement or expand their wireless local area network (WLAN)	
Wireless	NofAccessPoints	int	Number/Long Integer	The number of current access points to the WLAN	
Wireless	NofAccessPointsEndOfYear	int	Number/Long Integer	The number of access points to the WLAN planned in the next year.	
Wireless	SurveyId	int	Number/Long Integer	Identification number assigned to survey	

Wireless	Version	varchar	Text	The 802.11 standard used (i.e. a, b, g, n)	
Wireless	VersionEndOfYear	varchar	Text	The 802.11 standard planned (i.e. b, g, n)	
WirelessAccess	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
WirelessAccess	Id	int	Number/Long Integer	Record identification number	
WirelessAccess	Location	varchar	Text	The location of the WLANs in the facility (see tab AK-WLAN Locations)	
WirelessAccess	SurveyId	int	Number/Long Integer	Identification number assigned to survey	
WirelessSecurity	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity. Unique within survey year.	
WirelessSecurity	Id	int	Number/Long Integer	Record identification number	
WirelessSecurity	Security	varchar	Text	The type of security protocols on the WLAN (See tab AL-WLAN Security Protocols)	
WirelessSecurity	SurveyId	int	Number/Long Integer	Identification number assigned to survey	
WirelessVendor	HAEntityId	int	Number/Long Integer	Identification number associated with surveyed entity.	

				Unique within survey year.	
WirelessVendor	Id	int	Number/Long Integer	Record identification number	
WirelessVendor	NofUnits	int	Number/Long Integer	The number of units provided by the vendor for the type of wireless technology	
WirelessVendor	OperatingSystem	varchar	Text	Unique identification number for product	
WirelessVendor	OperatingSystemName	varchar	Text	The name of the operating system running the wireless device	
WirelessVendor	SurveyId	int	Number/Long Integer	Identification number assigned to survey	
WirelessVendor	Type	varchar	Text	The type of wireless technology (See tab AM-Wireless Devices)	
WirelessVendor	VendorId	int	Number/Long Integer	Unique identification number for vendor	
WirelessVendor	VendorName	varchar	Text	The name of the vendor used for the type of wireless technology	

Appendix I HIMSS Analytics 2012 Table Description

Table Name	Description	Links	New in 2009
AcuteInfo	This table contains statistic and summary information about the hospitals (acute care facilities) in the database.	This table links to the other tables by the HAEntityID	
AppVendorPlan	This table contains a list of the vendors under consideration for purchase for the applications tracked.	This table links to the HAEntityApplicationPlan table by AppID	
AutoIdentification	High level information about the use of bar coding and RFID by department	This table links to the other tables by the HAEntityID	
AutoIdentificationProduct	This table provides information about the vendors and products used for printing and scanning technology for bar coding in specific departments.	This table links to the other tables by the HAEntityID	
BiometricTechnology	This table contains information on the status of Biometric technology at the hospitals.	This table links to the other tables by the HAEntityID	
CDSS	This table contains the components of a Clinical Decision Support System (CDSS)	This table links to the other tables by HAEntityID	Yes

Computer	This table contains information on the use of computers such as handheld devices, desktops, laptops and PC Blades.	This table links to the other tables by the HAEntityID	
Connectivity	This table contains information on the status of the hospitals connectivity.	This table links to the other tables by the HAEntityID	
Contact	This table is a duplicate free list of the contacts at all the facilities in the database.	This table links to the HAEntityContact table by ContactID	
ContactSource	This table is a code table for the functions a contact fills.	This tables links to the HAEntityContact table by HAEntityContactSourceID to ContactSourceID	
ContactType	This table is a code table for the type of contact an individual fills such as Key Personnel, HIPPA Security, Steering Committee, etc.	This table links to the HAEntityContact table by TypeID	
DataCenterApplication	This table list the applications that the data center is running	This table links to the other tables by HAEntityID	Yes
DataCenterFacility	This table establishes the link between data centers and the facilities they service.	This table links to the HAEntity table either by ParentID (data center's HAEntityID) or HAEntityID (facilities HAEntityID)	
DisasterRecoveryPlan	This table provides information on the types of facilities that are included in the system's	This table links to the other tables by the HAEntityID	

	disaster recovery plan.		
DistributionPlan	This table provides information on how the hospital distributes and physicians access softcopy images in the radiology and cardiology departments.	This table links to the other tables by the HAEntityID	
ExpenditureApproval	This table provides information regarding the expenditure approval process at the integrated delivery system.	This table links to the other tables by the HAEntityID	
HAEntity	This table contains the demographic information for all the facilities and systems tracked in the database. (This is a self referencing table).	This table links to the other tables by the HAEntityID. This table also links to itself by HAEntityID to ParentID. The table linked by HAEntityID will pull the IDS information and the table linked by ParentID will pull the facility information.	
HAEntityApplication	This table contains the automation information for all the facilities in the database.	This table links to the other tables by the HAEntityID. This table also links to the HAEntityApplicationPlan table by ApplicationId or Application.	
HAEntityApplicationCharacteristics	This table contains information on transaction standards for EDI, where medical necessity checking is used and the departments where	This table links to the other tables by the HAEntityID. This table also links to the HAEntityApplication table by the AppID.	Yes

	document management and electronic forms are being used.		
HAEntityApplicationPlan	This table contains the plan details for the applications tracked in the HAEntityApplicait on table.	This table links to the other tables by the HAEntityID. This table also links to the HAEntityApplication table by ApplicationId or Application.	
HAEntityContact	This is an index table that links contact information to facility and IDS demographic information in other tables. This table includes the status of the contact type.	This table links to the Contact table by ContactID (to include names), to the Contact Source table by HAEntityContactSourceID to ContactSourceID (to determine functions) and to the Contact Type table by TypeID (to included contact type information) as well as to the HAEntity table by HAEntityID (to include demographic details)	
HAEntityHistory	This table provides information on the construction, divestiture, merger and acquisitions that have occurred at the system.	This table links by NewIDSID to the HAEntity table by EntityNo	
HAEntityRegion	This table provides information regarding the regions or areas a health system provides services to.	This table links to the other tables by the HAEntityID	
HandheldInfo	This table provides information on how and where handheld devices	This table links to the other tables by the HAEntityID	

	are used at a hospital.		
HostedSoftware	This table lists the software vendors the remote hosted company is supporting.	This table links to other tables by the HAEntityID. This table also links to the Service table by the ServiceID.	Yes
IHDSChanges	This table is designed to provide insight into changes made to the IHDSs in the database. Included in this table are any IHDSs that have been deleted or added to the HIMSS Analytics Database.	This table links by NewIDSID to the HAEntity table by EntityNo	
ISPlan	This table provides information on what areas the IS Strategic plan addresses at the system.	This table links to the other tables by the HAEntityID	
ISPlanDecision	This table provides information on the facilities that drive the IS Strategic plan.	This table links to the other tables by the HAEntityID	
LongTermStorage	This table provides information on the types and status of general long term storage used and the vendors who provide this technology to the hospitals.	This table links to the other tables by the HAEntityID	
MedAdministration	This table provides information on the elements that are bar coded or have an RFID tag for the medication	This table links to the other tables by the HAEntityID	

	administration process.		
PACSComponent	The tables contains information on PACS components in use and PACS component purchase plans.	This table links to the other tables by the HAEntityID	
PACSInfo	The table provides an overview of PACS, including number and types of images, image distribution, and purchase plans and statements.	This table links to the other tables by the HAEntityID	
PACSVendor	This table contains the PACS vendor, products, and number of licensed work stations.	This table links to the other tables by the HAEntityID	
ParentInfo	This table contains parent level demographic information including, number and types of visits, parent financial data, date of data, sources of patient revenue, number of physicians, disaster recovery detail, IS strategic plans, IS budget, and statements.	This table links to the other tables by the SuveryID of by ParentID	
Pharmacy	This tables provides an overview of the pharmacy department, including FDA bar code regulations, use and planned ADMS, Robots,	This table links to the other tables by the HAEntityID	

	and EMARs, and the status and products in use in the outpatient pharmacy.		
PharmacyProduct	This table contains the vendor and product detail for the pharmacy department.	This table links to the other tables by the HAEntityID	
PreferredSupplier	This table contains detail on preferred hardware suppliers and preferred channels for acquiring hardware from those vendors	This table links to the other tables by the HAEntityID	
ProductHistory	This table provides by ProductID the history of a product appearing in the database. These changes include name changes, company mergers and product acquisitions.	This table links to the VendorHistory table by VendorID	
PurchasingOrganization	This table lists the GPOs that parent or hospital (2008) organizations are members of.	This table links to the other tables by the HAEntityID	
SecuritySoftware	This tables lists the security systems in place at the organizations	This table links to the other tables by the HAEntityID	
Server	This table contains information on the use of servers such as mainframes, application servers, and network servers, including types,	This table links to the other tables by the HAEntityID	

	vendors and products, numbers in use, and numbers planned.		
Service	This table contains detail on consultants and outsourcers in use or planned, including the service, the supplier, and the contract date and length.	This table links to the other tables by the HAEntityID	
Survey	This table identifies the year the system's interview was completed.	This table links to the other tables by the SurveyID.	
SurveySegment	This table identifies the segment that the survey in.	This table links to the other tables by the SurveyID.	
Telecommunication	This table contains the vendors used for long distance and network voice and data telecommunication s services.	This table links to the other tables by the HAEntityID	
UseOfITComponent	This table contains detail on the types of IT components used by physicians, what percentage of physicians use those components, and whether the components are accessible via a physician dashboard	This table links to the other tables by the HAEntityID	

VendorHistory	This table provides by VendorID the history of a product appearing in the database. These changes include name changes, company mergers and product acquisitions.	This table links to the AppVendorPlan, CardiologyBarCode, Computer, Connectivity, DocMgmtApp, HAEntityApplication, LaboratoryBarCode, LongTermStorage, MaterialMgmtApp, NurseBarCode, PACSLongTermStorage, PACSVendor, PharmacyBarCode, PharmacyProduct, PreferredSupplier, ProductHistory, RadiologyBarCode, Server, Service, Telecommunications, and WirelessVendor by VendorID	
Wireless	This table contains an overview of the wireless environment, including WLAN use and plans, 802.11 standards planned and in use, WLAN types, number of access points planned and in use, number and types of devices on WLAN, percent using WLAN, percent using handhelds, where wireless access is in use and planned, and how wireless is used or will be used.	This table links to the other tables by the HAEntityID	

WirelessAccess	This table list the departments where wireless devices are in use.	This table links to the other tables by the HAEntityID	
WirelessSecurity	This table lists the type of wireless security in place.	This table links to the other tables by the HAEntityID	
WirelessVendor	This table lists the vendors and products in use for the various types of wireless technology.	This table links to the other tables by the HAEntityID	

Appendix J HIMSS EMRAM Detail



Electronic Medical Record Adoption Model™

The HIMSS Analytics EMRAM incorporates methodology and algorithms to automatically score hospitals around the world relative to their EMR capabilities.

STAGE	HIMSS Analytics EMRAM EMR Adoption Model Cumulative Capabilities
7	Complete EMR, Data Analytics to improve care
6	Physician Documentation (templates), Full CDSS, Closed Loop Medication Administration
5	Full R-PACS
4	CPOE; Clinical Decision Support (clinical protocols)
3	Clinical Documentation, CDSS (error checking)
2	CDR, Controlled Medical Vocabulary, CDS, HIE Capable
1	All Three Ancillaries Installed — Lab, Rad, Pharmacy
0	All Three Ancillaries Not Installed

The stages of the model are as follows:

Stage 0: The organization has not installed all of the three key ancillary department systems (laboratory, pharmacy, and radiology).

Stage 1: All three major ancillary clinical systems are installed (i.e., pharmacy, laboratory, and radiology).

Stage 2: Major ancillary clinical systems feed data to a clinical data repository (CDR) that provides physician access for reviewing all orders and results. The CDR contains a controlled medical vocabulary, and the clinical decision support/rules engine (CDS) for rudimentary conflict checking. Information from document imaging systems may be linked to the CDR at this stage. The hospital may be health information exchange (HIE) capable at this stage and can share whatever information it has in the CDR with other patient care stakeholders.

Stage 3: Nursing/clinical documentation (e.g., vital signs, flow sheets, nursing notes, eMAR) is required and is implemented and integrated with the CDR for at least one inpatient service in the hospital; care plan charting is scored with extra points. The Electronic Medication Administration Record application (eMAR) is implemented. Medical image access from picture archive and communication systems (PACS) is available for access by physicians outside the Radiology department via the organization's intranet.

Stage 4: Computerized Practitioner Order Entry (CPOE) for use by any clinician licensed to create orders is added to the nursing and CDR environment along with the second level of clinical decision support capabilities related to evidence-based medicine protocols. If one inpatient service area has implemented CPOE with physicians entering orders and completed the previous stages, then this stage has been achieved.

Stage 5: A full complement of radiology PACS systems provides medical images to physicians via an intranet and displaces all film-based images. Cardiology PACS and document imaging are scored with extra points.

Stage 6: Full physician documentation with structured templates and discrete data is implemented for at least one inpatient care service area for progress notes, consult notes, discharge summaries or problem list & diagnosis list maintenance. Level three of clinical decision support provides guidance for all clinician activities related to protocols and outcomes in the form of variance and compliance alerts. The closed loop medication administration with bar coded unit dose medications environment is fully implemented. The eMAR and bar coding or other auto identification technology, such as radio frequency identification (RFID), are implemented and integrated with CPOE and pharmacy to maximize point of care patient safety processes for medication administration. The "five rights" of medication administration are verified at the bedside with scanning of the bar code on the unit dose medication and the patient ID.

Stage 7: The hospital no longer uses paper charts to deliver and manage patient care and has a mixture of discrete data, document images, and medical images within its EMR environment. Data warehousing is being used to analyze patterns of clinical data to improve quality of care, patient safety, and care delivery efficiency. Clinical information can be readily shared via standardized electronic transactions (i.e., CCD) with all entities that are authorized to treat the patient, or a health information exchange (i.e., other non-associated hospitals, outpatient clinics, sub-acute environments, employers, payers and patients in a data sharing environment). The hospital demonstrates summary data continuity for all hospital services (e.g., inpatient, outpatient, ED, and with any owned or managed outpatient clinics). Blood products and human milk are included in the closed-loop medication administration process.

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Appendix K ANOVA of mean LOS in KID 2009-2012 with LSD post-hoc analysis

Test of Homogeneity of Variances

LOS

Levene Statistic	df1	df2	Sig.
9.859	18	32909	.000

ANOVA LOS for all HIT Stages 2009-2012

LOS

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	866.500	18	48.139	44.853	.000
Within Groups	35319.665	32909	1.073		
Total	36186.165	32927			

Fisher's LSD HIT Stages 2009-2012

Dependent Variable: LOS

LSD

(I) Stage_X	(J) Stage_X	Mean	Std. Error	Sig.	95% Confidence Interval	
		Difference (I-J)			Lower Bound	Upper Bound
2.80	3.43	-.256*	.059	.000	-.37	-.14
	3.67	.032	.041	.427	-.05	.11
	4.33	.197*	.042	.000	.11	.28
	4.43	.124*	.031	.000	.06	.19
	4.60	.254*	.029	.000	.20	.31
	4.80	-.017	.034	.620	-.08	.05
	4.88	-.162*	.037	.000	-.24	-.09
	5.07	-.026	.034	.441	-.09	.04
	5.09	-.313*	.031	.000	-.37	-.25
	5.14	.081*	.040	.046	.00	.16
	5.15	.067	.034	.052	.00	.13
	5.30	-.044	.042	.300	-.13	.04
	5.56	.082*	.030	.005	.02	.14
	5.75	.491*	.037	.000	.42	.56

	5.80	.113*	.034	.001	.05	.18
	6.00	.053	.028	.055	.00	.11
	6.50	-.032	.030	.287	-.09	.03
	6.67	-.072	.038	.060	-.15	.00
3.43	2.80	.256*	.059	.000	.14	.37
	3.67	.288*	.064	.000	.16	.41
	4.33	.453*	.065	.000	.33	.58
	4.43	.380*	.058	.000	.27	.49
	4.60	.510*	.057	.000	.40	.62
	4.80	.239*	.060	.000	.12	.36
	4.88	.094	.062	.129	-.03	.22
	5.07	.230*	.060	.000	.11	.35
	5.09	-.057	.058	.325	-.17	.06
	5.14	.337*	.064	.000	.21	.46
	5.15	.323*	.060	.000	.21	.44
	5.30	.212*	.065	.001	.09	.34
	5.56	.339*	.058	.000	.23	.45
	5.75	.747*	.062	.000	.63	.87
	5.80	.369*	.060	.000	.25	.49
	6.00	.310*	.057	.000	.20	.42
	6.50	.224*	.058	.000	.11	.34
	6.67	.185*	.062	.003	.06	.31
3.67	2.80	-.032	.041	.427	-.11	.05
	3.43	-.288*	.064	.000	-.41	-.16
	4.33	.164*	.049	.001	.07	.26
	4.43	.092*	.040	.022	.01	.17
	4.60	.222*	.039	.000	.15	.30
	4.80	-.049	.043	.249	-.13	.03
	4.88	-.194*	.045	.000	-.28	-.11
	5.07	-.059	.043	.170	-.14	.03
	5.09	-.346*	.040	.000	-.42	-.27
	5.14	.048	.048	.311	-.05	.14
	5.15	.035	.043	.418	-.05	.12
	5.30	-.076	.049	.123	-.17	.02
	5.56	.050	.039	.199	-.03	.13
	5.75	.459*	.045	.000	.37	.55
	5.80	.081	.043	.060	.00	.16
	6.00	.021	.038	.576	-.05	.09

4.33	6.50	-.064	.039	.103	-.14	.01
	6.67	-.104*	.046	.023	-.19	-.01
	2.80	-.197*	.042	.000	-.28	-.11
	3.43	-.453*	.065	.000	-.58	-.33
	3.67	-.164*	.049	.001	-.26	-.07
	4.43	-.072	.042	.084	-.15	.01
	4.60	.058	.041	.155	-.02	.14
	4.80	-.214*	.044	.000	-.30	-.13
	4.88	-.359*	.047	.000	-.45	-.27
	5.07	-.223*	.044	.000	-.31	-.14
	5.09	-.510*	.042	.000	-.59	-.43
	5.14	-.116*	.049	.018	-.21	-.02
	5.15	-.130*	.044	.003	-.22	-.04
	5.30	-.240*	.051	.000	-.34	-.14
	5.56	-.114*	.041	.005	-.19	-.03
	5.75	.295*	.046	.000	.20	.39
	5.80	-.084	.044	.059	-.17	.00
	6.00	-.143*	.039	.000	-.22	-.07
	6.50	-.229*	.041	.000	-.31	-.15
	6.67	-.268*	.047	.000	-.36	-.18
4.43	2.80	-.124*	.031	.000	-.19	-.06
	3.43	-.380*	.058	.000	-.49	-.27
	3.67	-.092*	.040	.022	-.17	-.01
	4.33	.072	.042	.084	-.01	.15
	4.60	.130*	.029	.000	.07	.19
	4.80	-.141*	.034	.000	-.21	-.07
	4.88	-.286*	.037	.000	-.36	-.21
	5.07	-.151*	.034	.000	-.22	-.08
	5.09	-.438*	.030	.000	-.50	-.38
	5.14	-.044	.040	.276	-.12	.03
	5.15	-.057	.034	.092	-.12	.01
	5.30	-.168*	.042	.000	-.25	-.09
	5.56	-.042	.029	.152	-.10	.02
	5.75	.367*	.037	.000	.29	.44
	5.80	-.011	.034	.738	-.08	.06
	6.00	-.071*	.027	.009	-.12	-.02
	6.50	-.156*	.030	.000	-.21	-.10
	6.67	-.196*	.038	.000	-.27	-.12

4.60	2.80	-.254*	.029	.000	-.31	-.20
	3.43	-.510*	.057	.000	-.62	-.40
	3.67	-.222*	.039	.000	-.30	-.15
	4.33	-.058	.041	.155	-.14	.02
	4.43	-.130*	.029	.000	-.19	-.07
	4.80	-.271*	.032	.000	-.33	-.21
	4.88	-.417*	.035	.000	-.49	-.35
	5.07	-.281*	.032	.000	-.34	-.22
	5.09	-.568*	.029	.000	-.62	-.51
	5.14	-.174*	.039	.000	-.25	-.10
	5.15	-.187*	.032	.000	-.25	-.12
	5.30	-.298*	.041	.000	-.38	-.22
	5.56	-.172*	.027	.000	-.23	-.12
	5.75	.237*	.035	.000	.17	.31
	5.80	-.141*	.032	.000	-.20	-.08
	6.00	-.201*	.025	.000	-.25	-.15
	6.50	-.286*	.028	.000	-.34	-.23
	6.67	-.326*	.036	.000	-.40	-.26
4.80	2.80	.017	.034	.620	-.05	.08
	3.43	-.239*	.060	.000	-.36	-.12
	3.67	.049	.043	.249	-.03	.13
	4.33	.214*	.044	.000	.13	.30
	4.43	.141*	.034	.000	.07	.21
	4.60	.271*	.032	.000	.21	.33
	4.88	-.145*	.040	.000	-.22	-.07
	5.07	-.009	.037	.799	-.08	.06
	5.09	-.296*	.034	.000	-.36	-.23
	5.14	.098*	.043	.022	.01	.18
	5.15	.084*	.037	.023	.01	.16
	5.30	-.027	.044	.547	-.11	.06
	5.56	.100*	.033	.002	.04	.16
	5.75	.508*	.039	.000	.43	.59
	5.80	.130*	.037	.000	.06	.20
	6.00	.070*	.031	.023	.01	.13
	6.50	-.015	.033	.648	-.08	.05
	6.67	-.055	.040	.176	-.13	.02
4.88	2.80	.162*	.037	.000	.09	.24
	3.43	-.094	.062	.129	-.22	.03

	3.67	.194*	.045	.000	.11	.28
	4.33	.359*	.047	.000	.27	.45
	4.43	.286*	.037	.000	.21	.36
	4.60	.417*	.035	.000	.35	.49
	4.80	.145*	.040	.000	.07	.22
	5.07	.136*	.040	.001	.06	.21
	5.09	-.151*	.037	.000	-.22	-.08
	5.14	.243*	.045	.000	.15	.33
	5.15	.229*	.040	.000	.15	.31
	5.30	.118*	.047	.011	.03	.21
	5.56	.245*	.036	.000	.17	.31
	5.75	.653*	.042	.000	.57	.74
	5.80	.275*	.040	.000	.20	.35
	6.00	.216*	.034	.000	.15	.28
	6.50	.130*	.036	.000	.06	.20
	6.67	.091*	.043	.035	.01	.17
5.07	2.80	.026	.034	.441	-.04	.09
	3.43	-.230*	.060	.000	-.35	-.11
	3.67	.059	.043	.170	-.03	.14
	4.33	.223*	.044	.000	.14	.31
	4.43	.151*	.034	.000	.08	.22
	4.60	.281*	.032	.000	.22	.34
	4.80	.009	.037	.799	-.06	.08
	4.88	-.136*	.040	.001	-.21	-.06
	5.09	-.287*	.034	.000	-.35	-.22
	5.14	.107*	.043	.012	.02	.19
	5.15	.093*	.037	.011	.02	.17
	5.30	-.017	.044	.696	-.10	.07
	5.56	.109*	.033	.001	.05	.17
	5.75	.518*	.039	.000	.44	.60
	5.80	.139*	.037	.000	.07	.21
	6.00	.080*	.031	.010	.02	.14
	6.50	-.006	.033	.864	-.07	.06
	6.67	-.045	.040	.263	-.12	.03
5.09	2.80	.313*	.031	.000	.25	.37
	3.43	.057	.058	.325	-.06	.17
	3.67	.346*	.040	.000	.27	.42
	4.33	.510*	.042	.000	.43	.59

	4.43	.438*	.030	.000	.38	.50
	4.60	.568*	.029	.000	.51	.62
	4.80	.296*	.034	.000	.23	.36
	4.88	.151*	.037	.000	.08	.22
	5.07	.287*	.034	.000	.22	.35
	5.14	.394*	.040	.000	.32	.47
	5.15	.380*	.034	.000	.31	.45
	5.30	.270*	.042	.000	.19	.35
	5.56	.396*	.029	.000	.34	.45
	5.75	.805*	.036	.000	.73	.88
	5.80	.426*	.034	.000	.36	.49
	6.00	.367*	.027	.000	.31	.42
	6.50	.281*	.029	.000	.22	.34
	6.67	.242*	.037	.000	.17	.32
	5.14	2.80	-.081*	.040	.046	-.16
		3.43	-.337*	.064	.000	-.46
		3.67	-.048	.048	.311	-.14
		4.33	.116*	.049	.018	.02
		4.43	.044	.040	.276	-.03
		4.60	.174*	.039	.000	.10
		4.80	-.098*	.043	.022	-.18
		4.88	-.243*	.045	.000	-.33
		5.07	-.107*	.043	.012	-.19
		5.09	-.394*	.040	.000	-.47
		5.15	-.014	.043	.748	-.10
		5.30	-.124*	.049	.011	-.22
		5.56	.002	.039	.962	-.07
		5.75	.411*	.045	.000	.32
		5.80	.032	.043	.449	-.05
		6.00	-.027	.037	.467	-.10
		6.50	-.113*	.039	.004	-.19
		6.67	-.152*	.046	.001	-.24
	5.15	2.80	-.067	.034	.052	-.13
		3.43	-.323*	.060	.000	-.44
		3.67	-.035	.043	.418	-.12
		4.33	.130*	.044	.003	.04
		4.43	.057	.034	.092	-.01
		4.60	.187*	.032	.000	.12

	4.80	-.084*	.037	.023	-.16	-.01
	4.88	-.229*	.040	.000	-.31	-.15
	5.07	-.093*	.037	.011	-.17	-.02
	5.09	-.380*	.034	.000	-.45	-.31
	5.14	.014	.043	.748	-.07	.10
	5.30	-.111*	.044	.013	-.20	-.02
	5.56	.016	.033	.633	-.05	.08
	5.75	.424*	.040	.000	.35	.50
	5.80	.046	.037	.215	-.03	.12
	6.00	-.014	.031	.661	-.07	.05
	6.50	-.099*	.033	.003	-.16	-.03
	6.67	-.139*	.040	.001	-.22	-.06
	5.30	2.80	.044	.042	.300	-.04
3.43		-.212*	.065	.001	-.34	-.09
3.67		.076	.049	.123	-.02	.17
4.33		.240*	.051	.000	.14	.34
4.43		.168*	.042	.000	.09	.25
4.60		.298*	.041	.000	.22	.38
4.80		.027	.044	.547	-.06	.11
4.88		-.118*	.047	.011	-.21	-.03
5.07		.017	.044	.696	-.07	.10
5.09		-.270*	.042	.000	-.35	-.19
5.14		.124*	.049	.011	.03	.22
5.15		.111*	.044	.013	.02	.20
5.56		.126*	.041	.002	.05	.21
5.75		.535*	.046	.000	.44	.63
5.80		.157*	.044	.000	.07	.24
6.00		.097*	.039	.014	.02	.17
6.50		.012	.041	.777	-.07	.09
6.67		-.028	.047	.555	-.12	.06
5.56		2.80	-.082*	.030	.005	-.14
	3.43	-.339*	.058	.000	-.45	-.23
	3.67	-.050	.039	.199	-.13	.03
	4.33	.114*	.041	.005	.03	.19
	4.43	.042	.029	.152	-.02	.10
	4.60	.172*	.027	.000	.12	.23
	4.80	-.100*	.033	.002	-.16	-.04
	4.88	-.245*	.036	.000	-.31	-.17

	5.07	-.109*	.033	.001	-.17	-.05
	5.09	-.396*	.029	.000	-.45	-.34
	5.14	-.002	.039	.962	-.08	.07
	5.15	-.016	.033	.633	-.08	.05
	5.30	-.126*	.041	.002	-.21	-.05
	5.75	.409*	.035	.000	.34	.48
	5.80	.030	.033	.351	-.03	.09
	6.00	-.029	.025	.253	-.08	.02
	6.50	-.115*	.028	.000	-.17	-.06
	6.67	-.154*	.036	.000	-.23	-.08
5.75	2.80	-.491*	.037	.000	-.56	-.42
	3.43	-.747*	.062	.000	-.87	-.63
	3.67	-.459*	.045	.000	-.55	-.37
	4.33	-.295*	.046	.000	-.39	-.20
	4.43	-.367*	.037	.000	-.44	-.29
	4.60	-.237*	.035	.000	-.31	-.17
	4.80	-.508*	.039	.000	-.59	-.43
	4.88	-.653*	.042	.000	-.74	-.57
	5.07	-.518*	.039	.000	-.60	-.44
	5.09	-.805*	.036	.000	-.88	-.73
	5.14	-.411*	.045	.000	-.50	-.32
	5.15	-.424*	.040	.000	-.50	-.35
	5.30	-.535*	.046	.000	-.63	-.44
	5.56	-.409*	.035	.000	-.48	-.34
	5.80	-.378*	.040	.000	-.46	-.30
	6.00	-.438*	.034	.000	-.50	-.37
	6.50	-.523*	.036	.000	-.59	-.45
	6.67	-.563*	.043	.000	-.65	-.48
5.80	2.80	-.113*	.034	.001	-.18	-.05
	3.43	-.369*	.060	.000	-.49	-.25
	3.67	-.081	.043	.060	-.16	.00
	4.33	.084	.044	.059	.00	.17
	4.43	.011	.034	.738	-.06	.08
	4.60	.141*	.032	.000	.08	.20
	4.80	-.130*	.037	.000	-.20	-.06
	4.88	-.275*	.040	.000	-.35	-.20
	5.07	-.139*	.037	.000	-.21	-.07
	5.09	-.426*	.034	.000	-.49	-.36

	5.14	-.032	.043	.449	-.12	.05
	5.15	-.046	.037	.215	-.12	.03
	5.30	-.157*	.044	.000	-.24	-.07
	5.56	-.030	.033	.351	-.09	.03
	5.75	.378*	.040	.000	.30	.46
	6.00	-.059	.031	.055	-.12	.00
	6.50	-.145*	.033	.000	-.21	-.08
	6.67	-.185*	.040	.000	-.26	-.11
6.00	2.80	-.053	.028	.055	-.11	.00
	3.43	-.310*	.057	.000	-.42	-.20
	3.67	-.021	.038	.576	-.09	.05
	4.33	.143*	.039	.000	.07	.22
	4.43	.071*	.027	.009	.02	.12
	4.60	.201*	.025	.000	.15	.25
	4.80	-.070*	.031	.023	-.13	-.01
	4.88	-.216*	.034	.000	-.28	-.15
	5.07	-.080*	.031	.010	-.14	-.02
	5.09	-.367*	.027	.000	-.42	-.31
	5.14	.027	.037	.467	-.05	.10
	5.15	.014	.031	.661	-.05	.07
	5.30	-.097*	.039	.014	-.17	-.02
	5.56	.029	.025	.253	-.02	.08
	5.75	.438*	.034	.000	.37	.50
	5.80	.059	.031	.055	.00	.12
	6.50	-.085*	.026	.001	-.14	-.03
	6.67	-.125*	.035	.000	-.19	-.06
6.50	2.80	.032	.030	.287	-.03	.09
	3.43	-.224*	.058	.000	-.34	-.11
	3.67	.064	.039	.103	-.01	.14
	4.33	.229*	.041	.000	.15	.31
	4.43	.156*	.030	.000	.10	.21
	4.60	.286*	.028	.000	.23	.34
	4.80	.015	.033	.648	-.05	.08
	4.88	-.130*	.036	.000	-.20	-.06
	5.07	.006	.033	.864	-.06	.07
	5.09	-.281*	.029	.000	-.34	-.22
	5.14	.113*	.039	.004	.04	.19
	5.15	.099*	.033	.003	.03	.16

	5.30	-.012	.041	.777	-.09	.07
	5.56	.115*	.028	.000	.06	.17
	5.75	.523*	.036	.000	.45	.59
	5.80	.145*	.033	.000	.08	.21
	6.00	.085*	.026	.001	.03	.14
	6.67	-.040	.037	.283	-.11	.03
6.67	2.80	.072	.038	.060	.00	.15
	3.43	-.185*	.062	.003	-.31	-.06
	3.67	.104*	.046	.023	.01	.19
	4.33	.268*	.047	.000	.18	.36
	4.43	.196*	.038	.000	.12	.27
	4.60	.326*	.036	.000	.26	.40
	4.80	.055	.040	.176	-.02	.13
	4.88	-.091*	.043	.035	-.17	-.01
	5.07	.045	.040	.263	-.03	.12
	5.09	-.242*	.037	.000	-.32	-.17
	5.14	.152*	.046	.001	.06	.24
	5.15	.139*	.040	.001	.06	.22
	5.30	.028	.047	.555	-.06	.12
	5.56	.154*	.036	.000	.08	.23
	5.75	.563*	.043	.000	.48	.65
	5.80	.185*	.040	.000	.11	.26
	6.00	.125*	.035	.000	.06	.19
	6.50	.040	.037	.283	-.03	.11

*. The mean difference is significant at the 0.05 level.