

**AN EVALUATION OF THE ICD-10-CM SYSTEM: DOCUMENTATION  
SPECIFICITY, REIMBURSEMENT, AND METHODS FOR IMPROVEMENT  
(INTERNATIONAL CLASSIFICATION OF DISEASES; 10<sup>TH</sup> REVISION; CLINICAL  
MODIFICATION)**

by

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The research project consists of three studies to identify the documentation specificity, reimbursement and documentation improvement for the upcoming International Classification of Diseases, 10<sup>th</sup> revision, Clinical Modification (ICD-10-CM) coding system. A descriptive research study using quantitative methods was conducted for the first study, which focused on coding electronic documents across each major diagnostic chapter for ICD-10-CM. The coding was ranked according to the Watzlaf et al (2007) study where a ranking score was provided if the diagnosis was fully captured by the ICD-10-CM code sets. The ICD-10-CM codes were then compared to the current ICD-9-CM codes to evaluate the details on the descriptions of the codes. The rankings were determined by comparing the ICD-10-CM systems for the number of codes, the level of specificity and the ability of the code description to fully capture the diagnostic term based on the resources available at the time of coding.

A descriptive research study using quantitative methods was conducted for the second study, which focused on evaluating the reimbursement differences in coding with ICD-10- CM with and without the supporting documentation. Reimbursement amounts or the MS-DRG (Medicare Severity Diagnosis Related Groups) weight differences were examined to demonstrate

the amount of dollars lost due to incomplete documentation. Reimbursement amounts were calculated by running the code set on the CMS ICD-10 grouper.

An exploratory descriptive research study using qualitative methods was conducted for the third study which focused on developing a documentation improvement toolkit for providers and technology experts to guide them towards an accurate selection of codes. Furthermore a quick reference checklist geared towards the physician, coders and the information technology development team was developed based on their feedback and documentation needs.

The results of the studies highlighted the clinical areas which needed the most documentation attention in order to accurately code in ICD-10-CM and the associated potential loss of revenue due to absent documentation. Further, the results from the educational tool kit could be used in the development of a better inpatient Computer Assisted Coding (CAC) product.

## TABLE OF CONTENTS

<b>PREFACE.....</b>	<b>XI</b>
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
<b>1.1 HISTORY OF CODING.....</b>	<b>1</b>
<b>1.2 ICD-10 CODING .....</b>	<b>3</b>
<b>2.0 CODING AN INPATIENT HEALTH RECORD.....</b>	<b>11</b>
<b>2.1 CMS REIMBURSEMENT METHODOLOGIES .....</b>	<b>11</b>
<b>3.0 COMPUTER ASSISTED CODING (CAC) .....</b>	<b>13</b>
<b>3.1 COMPUTER ASSISTED CODING TECHNOLOGY (CAC).....</b>	<b>13</b>
<b>3.2 TECNOLOGIES IN CAC (NLP VS. SI).....</b>	<b>15</b>
<b>4.0 CASE STUDIES AND FIELD TESTING CAC.....</b>	<b>17</b>
<b>4.1 SIGNIFICANCE OF THE STUDY .....</b>	<b>19</b>
<b>4.2 SPECIFIC AIM AND RESEARCH QUESTION .....</b>	<b>21</b>
<b>5.0 METHODOLOGY.....</b>	<b>23</b>
<b>5.1 RESEARCH DESIGN.....</b>	<b>23</b>
<b>5.2 RESEARCH METHODS.....</b>	<b>24</b>
<b>5.2.1 Development of the Coding Guidelines .....</b>	<b>25</b>

5.3	SAMPLE.....	38
5.4	DATA ANALYSIS.....	39
6.0	RESULTS .....	40
6.1	CODING STUDY .....	40
6.2	REIMBURSEMENT STUDY .....	56
6.3	DOCUMENTATION IMPROVEMENT STUDY.....	63
6.3.1	Analysis and Recommendations for Chapter 1 .....	64
6.3.2	Analysis and Recommendations for Chapter 2-6.....	66
6.3.3	Analysis and Recommendations for Chapter 7 .....	70
6.3.4	Analysis and Recommendations for Chapter 8 .....	73
6.3.5	Analysis and Recommendations for Chapter 9 .....	74
6.3.6	Analysis and Recommendations for Chapter 10 .....	75
6.3.7	Analysis and Recommendations for Chapter 11 .....	76
6.3.8	Analysis and Recommendations for Chapter 12 .....	77
6.3.9	Analysis and Recommendations for Chapter 13 .....	78
6.3.10	Analysis and Recommendations for Chapter 14 .....	79
6.3.11	Analysis and Recommendations for Chapters 17-21 .....	80
6.3.12	Summary of the Recommendations .....	82
7.0	DISCUSSION .....	88
7.1	CODING STUDY .....	89
7.2	REIMBURSEMENT STUDY .....	91
7.3	DOCUMENTATION IMPROVEMENT STUDY.....	94
8.0	CONCLUSION.....	98

<b>APPENDIX A .....</b>	<b>100</b>
<b>SUBSET OF WORKSHEETS USED FOR CODING STUDY .....</b>	<b>100</b>
<b>APPENDIX B .....</b>	<b>234</b>
<b>SUBSET OF WORKSHEETS FOR REIMBURSEMENT STUDY .....</b>	<b>234</b>
<b>BIBLIOGRAPHY .....</b>	<b>249</b>

## LIST OF TABLES

Table 1: ICD-10-CM Chapter Designations .....	28
Table 2: Worksheet for Study 1 (Coding Study) .....	32
Table 3: Distribution of the documents into each of the ICD-10-CM chapters.....	46
Table 4: Percentage of absent documentation per ICD-10-CM chapter.....	48
Table 5: Significance on the absent documentation *P<0.001, Post Hoc Analysis .....	50
Table 6: Mean Rankings for each of the ICD-10-CM Chapters *P<0.001; Wilcoxon Signed Ranks Test. **P<0.05; Wilcoxon Signed Ranks Test .....	53
Table 7: Reimbursement analysis for the electronic documents with absent documentation .....	58
Table 8: The 10 records with the highest reimbursement differences .....	62
Table 9: List of MDC's for ICD-10.....	93

## LIST OF FIGURES

Figure 1: Orientation Of the Electronic Document.....	30
Figure 2: Methodology for the Coding Study.....	30
Figure 3: Methodology for reimbursement Study .....	34
Figure 4: Sample screen shot of the ICD-10 grouper software .....	35
Figure 5: Sample output screen for the ICD-10 grouper software.....	36
Figure 6: Overview of Study 3 (Documentation Improvement Study) .....	38
Figure 7: Distribution of the sample into individual ICD-10-CM chapters.....	47
Figure 8: Evaluation of the percentage of absent documentation *P<0.001 (Mann-Whitney U test).....	49
Figure 9: Comparison of Rankings between ICD-9-CM and ICD-10-CM; *P<0.001 (Wilcoxon Signed Ranks Test) .....	54
Figure 10: Comparison of Rankings between ICD-9-CM and ICD-10-CM;*P<0.001; **P<0.05; (Wilcoxon Signed Ranks Test) .....	55
Figure 11: Differences in Reimbursement for combined documents with absent documentation	61
Figure 12: The codes with the highest amount of documentation deficiencies .....	87

## PREFACE

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## **1.0 INTRODUCTION**

### **1.1 HISTORY OF CODING**

Historically, all of our lives have been affected in one way or another by the use of coded medical information. Medical codes are used from the cradle to the grave. Medical coding is used to record various aspects of one's life history. It is used in health coverage and patient care, to name a few. When it comes to patient care, coding determines which health services are reimbursed and how much is reimbursed. If an error is made in coding diagnosis or treatment, payment could be denied or excessive payments might be made for services.

François Bossier de Lacroix (also known as Sauvages) (1706-1777), has been recognized as the founding member and a pioneer in the field of developing a systematic approach to classifying diseases. (ICD-0: second edition, Geneva, WHO 1990; Bertillion J, 1912; Manual of International Classification of Diseases, WHO 1997). After centuries passed, William Farr worked hard to secure a better classification system which for the first time, attracted international use.

Upon Farr's death, a statistician by the name of Jacques Bertillon (1851-1922) prepared the classification of causes of death (Manual of the international statistical classification of diseases, Vol 1, WHO 1977). In accordance with the instructions of the Vienna Congress,

Bertillon included three classifications: the first, an abridged classification of 44 titles; the second, a classification of 99 titles; and the third, a classification of 161 titles.

The Bertillon Classification of Causes of Death, as it was first called, received general approval and was adopted by several countries, as well as by many cities. The classification was first used in North America by Jesús E. Monjarás for the statistics of San Luis de Potosí, Mexico. In 1898, the American Public Health Association recommended the adoption of the Bertillon Classification by registrars of Canada, Mexico, and the United States of America. The Association further suggested that the classification be revised every ten years. According to the World Health Organization's History of development of the International Classification of Diseases (ICD) report, the adoption of ICD by the United States began in 1900 with the adoption of the 1<sup>st</sup> revision of ICD (ICD-1); 1910 saw the second revision (ICD-2); 1921 was credited with the third revision (ICD-3); 1930 was the adoption of the fourth revision (ICD-4); 1939 was the adoption of the fifth revision (ICD-5); 1949 was the adoption of the sixth revision (ICD-6); it was during this period that the WHO started taking a leadership role in the classification system and expanded the system to capture both morbidity and mortality data. 1958 marked the adoption of the seventh revision (ICD-7); in 1968, the eighth revision (ICD-8); and in 1979, the ninth revision (ICD-9), which is still our current revision. The tenth revision (ICD-10) is proposed to be implemented in 2014.

In the United States, the classification system is used for various purposes. They include morbidity and mortality statistics, and, Quality Measurement and reimbursement. The implementation of ICD-10 would further advance the uses of the classification system to reflect uses of research, organization monitoring, IT advances and better public health monitoring tools.

The WHO developed ICD-9 for use worldwide. The United States developed a clinical modification (ICD-9-CM), which was implemented in 1979. It enabled the expansion of a number of diagnosis codes and the development of the procedure coding system (CPT) The ICD-9-CM diagnosis is used by all types of providers. The ICD-9-CM procedures are used by inpatient hospitals and the Current Procedure Terminology (CPT) is used for all ambulatory and physician procedure reporting.

An extensive program of work followed which led to the development of the Tenth Revision of the ICD and is described in the Report of the International Conference for the Tenth Revision of the International Classification of Diseases, reproduced in Volume 1. The World Health Assembly endorsed ICD-10 in 1990. Since then a number of countries have been using ICD-10 for reimbursement or case mix evaluation: United Kingdom (1995), Nordic Countries (1994-1997); France (1997); Australia (1998); Belgium (1999); Germany (2000); Canada (2001). The United States is set to implement it in 2014.

## **1.2 ICD-10 CODING**

The International Classification of Diseases, 10<sup>th</sup> revision, Clinical Modification (ICD-10-CM) includes the diagnosis codes, and the International Classification of Diseases, 10<sup>th</sup> revision, Procedural Coding System (ICD-10-PCS) includes the Procedure codes. The PCS offers greater detail and increased ability to accommodate new technologies and procedures. The codes have the potential to provide better data for evaluating and improving the quality of patient care. (Alexander, 2003; Bowman 2008)

Many quality measures, such as those from Health Grades and the Agency for Healthcare Research and Quality (AHRQ), rely on ICD-9-CM codes. Increasing the detail and better depicting severity will help clarify the connection between a provider’s treatment and the patient’s condition. (Foundation of Research and Education Report, 2005). In addition, ICD-10-CM/PCS greatly expands the codes for medical complications and medical safety issues. ICD-10-CM/PCS is estimated to have approximately 70, 000 diagnoses codes versus ICD-9-CM which has only 13,500 diagnosis codes. Further, the ICD-10CM/PCS has an estimated 72,000 procedure codes versus 4,000 procedure codes found in the ICD-9-CM version.

<b>Comparing the Numbers</b>
<b>ICD-9 CM</b> 13,500 Diagnoses 4,000 Procedures 5-digit max for diagnosis codes 4-digit max for procedure codes
<b>ICD-10-CM/PCS</b> 70,000 Diagnoses 72,000 Procedures 6-digit max for diagnosis codes 7-digit procedure codes All codes are alphanumeric

Structural differences between the two code sets also exist. ICD-9-CM diagnosis codes have three to five digits that are mostly numeric (supplemental chapters have an alpha first digit). The ICD-10-CM diagnosis codes have three to seven digits with an alpha first digit, numeric second digit, and alpha or numeric third through seventh digits.

Capturing these increased volumes of codes in ICD-10 without the use of some kind of information technology is nearly impossible. Therefore, the benefits of using an electronic health record to capture the health care encounters along with using a Computer Assisted Coding (CAC) technology are greatly beneficial with the progression toward ICD-10 implementation.

ICD-10 (WHO, ICD-10, 1992) will advance the healthcare arena in many categories and disciplines. Some of the major categories include quality measurement, public health, research, organizational monitoring and performance, and IT advances and reimbursement (Bowman 2008), all of which are quite broad and extensive and, consequently, in need of further research. According to the RAND report conducted to evaluate the cost and benefits of moving to ICD-10, the codes have a potential for capturing meaningful data at a higher quality than the ICD-9-CM codes (Gersenovic,1995). Adoption of ICD-10-CM also would facilitate international comparisons of quality of care and the sharing of best practices globally. Overall, ICD-10-CM is more effective at capturing public health diseases than ICD-9-CM. It is more specific and fully captures more of the nationally reportable public health diseases (Watzlaf, 2007). ICD-10's increased specificity offers payers and providers the potential for considerable cost savings through more accurate trends and cost analysis. Greater detail can improve payers' abilities to forecast healthcare needs and trends and analyze costs. (RAND Study, 2004)

Upgrading to ICD-10 is a necessary step in realizing health IT potential. ICD-10 data are more easily retrieved in electronic format than ICD-9-CM data (Bowman, 2005). It further offers better mapping from SNOMED CT, a terminology used to capture the clinical detail of an encounter (Bowman, 2005). Those maps facilitate the administrative reporting process by enabling CAC. CAC offers improved coding consistency, efficiency, and accuracy (RAND Corporation, 2004). The detailed and logical structure of ICD-10-CM and ICD-10-PCS

simplifies the development of map rules and algorithms used in CAC applications. (Bowman, 2005)

The improved logic and increased specificity in ICD-10-CM and ICD-10-PCS also will facilitate the development of sophisticated tools for detection of questionable patterns and suspected fraud (Foundation of Research and Education, 2005). An anti-fraud study conducted for the Office of the National Coordinator for Health Information Technology (ONCHIT) concluded that a standardized reference terminology and up-to-date classification systems are essential to the adoption of EHRs and the associated IT-enabled healthcare fraud management programs.

According to the study conducted by the American Academy of Orthopedic Surgeons, the cost of implementing ICD-10 for a healthcare organization could range from \$83,000 (typically small practice) to \$2.7 million (typically large practice).

Therefore, the benefits of switching to ICD-10 are obvious. The ICD-9-CM system can no longer keep up with the current medical practice. After 30 years, the code set is outdated and can no longer meet the demands of healthcare data needs. It cannot accurately describe the diagnoses and inpatient procedures for care delivered. Some of the chapters in ICD-9 have been utilized to its full capacity and cannot be expanded further. The need for greater coding accuracy and specificity has heightened considerably since the implementation of ICD-9-CM. ICD was primarily used in the hospital inpatient setting for indexing purposes at the time ICD-9-CM was implemented.

New procedures and technology are emerging at a rapid pace and it is very important that the data capturing mechanism, which is through the classification system, be up to date in order to realize the full potential of the booming health information technology. Inaccurate or limited

data and insufficient detail affect our knowledge of diagnoses, procedures, severity, quality, and technology. (Bowman, 2008) For these reasons, ICD-9-CM cannot support many of the health IT and data exchange initiatives targeted as healthcare's future.

On January 16, 2009, the Department of Health and Human Services (HHS) published a Final rule for the adoption of the ICD-10-CM and ICD-10-PCS code sets under rules 45 CFR Parts 160 and 162 of the Health Insurance Portability and Accountability Act of 1996 (HIPAA). The compliance date was set as October 1, 2013. However, after reconsidering, the Department of Health and Human Services postponed the implementation date to 2014. There is a heightened awareness and activity among the Health information professionals and healthcare organizations, which is indeed an encouraging fact. For example, AHIMA started hosting an annual ICD-10 Summit starting in 2009. One of the major concerns was the use of the ICD-10 maps and mapping. There are several different options that are out there for mapping. ICD-9-CM has been used in the US for reimbursement and public health reporting. However, it has numerous terminological weaknesses (Cimino, 1998). It has been reported that ICD lacks granularity in capturing nuances of the clinical encounter that would impact the patient's care (Brouch, 2003) and outcome research (Nanovic et al, 2009; Stein et al 2000).

Another tool that is currently being used is the General Equivalence Mappings (GEMs). GEMs were developed as a tool to assist with the conversion of ICD-9-CM codes to ICD-10-CM and the conversion of ICD-10-CM codes back to ICD-9-CM. The GEMs are forward and backward mappings between the ICD-9-CM and ICD-10-CM coding systems. They are also referred to as crosswalks since they provide important information linking codes of one system with codes in the other system. So far, GEMs are not capable of providing exact matches from ICD-9 to ICD-10 and vice versa. When conducting forward mapping using GEMs (ICD-9-CM

to ICD-10-CM) 77% of codes had approximate matches, while conducting backward mapping (ICD-10-CM to ICD-9-CM), 93% of the codes had approximate matches (Ross-Davis, 2012). Therefore, and the field is need of a more robust mapping system.

Rossi et al (1998) describe three generations of medical terminology systems. The first generation is the traditional terminology system, which includes controlled vocabularies, nomenclatures, taxonomies and coding systems. ICD-9, ICD-10 and ICF are all examples of this generation. The second generation is compositional systems, which include categorical structure, structural lists of phrases and knowledge base of dissections. Systematic Nomenclature of Medicine (SNOMED) international is an example. The third generation consists of formal systems. This generation has a set of symbols and a set of formal rules. SNOMED-CT has evolved towards this generation (Nystrom, 2010). Numerous studies have shown that the Systematic Nomenclature of Medicine (SNOMED Clinical term; CT) is significantly different from any other terminology for encounter encoding. (Chiang et al, 2005; Chen et al, 2005; Warren et al, 1998; Vardy et al, 1998; Chute et al 1996, Campbell et al, 1994).

SNOMED CT was developed by the College of American Pathologists and is now managed by the International Health Terminology Standards Development Organization (IHTSDO), which includes the US National Library of Medicine (NLM). Since most organizations have existing legacy ICD-encoded data, there are several efforts underway for mapping between ICD and SNOMED CT. There was a collaborative effort made by The American Health Information Management Association (AHIMA) and the College of American Pathologists to record exact-match and broader-to-narrow mappings (Imel, 2002). There is currently a joint venture between WHO and IHTSDO that is going on to try and map SNOMED CT to ICD-10. The outcome would be to provide a semi-automated generation of ICD-10 codes

from SNOMED CT encoded clinical records (Berg and Campbell, 2008). AHIMA's current stand on the deployment on SNOMED CT is that in order to effectively use SNOMED CT, the organization would have to have an Electronic Health Record (EHR). A study of Health Information Technology (HIT) vendors conducted by Giannangelo et al (2008) tried to identify which EHR vendors are currently using or anticipate using SNOMED CT. Out of the 72 vendors that responded to the survey, only 33% used SNOMED CT (Giannangelo, 2008).

Moving to the new code sets will also permit improved efficiencies and lower administrative costs due to replacement of a dysfunctional classification system. This in turn allows for the following: increased use of automated tools to facilitate the coding process, decreased claims submission or claims adjudication costs, fewer rejected and improper reimbursement claims, greater interoperability, decreased need for manual review of health records to meet the information needs of payers, researchers, and other data mining purposes, decreased need for large research organizations to maintain dual classification systems (one for reimbursement and one for research), reduced coding errors, reduced labor costs and increased productivity, and increased ability to prevent and detect healthcare fraud and abuse.

The National Committee on Vital and Health Statistics asked RAND the following questions: 1) What are the costs and benefits of switching from ICD-9's diagnostic codes to those of ICD-10-CM? 2) What are the costs and benefits of switching from ICD-9's procedure codes to those of ICD-10-PCS? and 3) If it is advisable to switch to both ICD-10-CM and ICD-10-PCS, should the switching be done sequentially or simultaneously? The conclusions from the study yielded vital information: Costs were expected to range between \$425 million and \$1.15 billion and benefits were expected to range between \$700 million and \$7.7 billion. Therefore,

perhaps after initial break-in costs have been realized, the benefits are likely to outweigh the cost involved.

While the United States is gearing up for the implementation of ICD-10, the rest of the world is starting to implement ICD-11. According to the WHO, ICD-11 is scheduled to be implemented by 2015 and is currently in the beta testing stage. Therefore, the changes in the coding workflow will need to be kept up-to-date as there will be constant changes in the healthcare environment in the coming years. These changes will have an impact in the capabilities of EHRs and in the capabilities of CAC systems.

## **2.0 CODING AN INPATIENT HEALTH RECORD**

### **2.1 CMS REIMBURSEMENT METHODOLOGIES**

Various healthcare reimbursement methodologies exist. In a prospective payment system (PPS), payment rates for healthcare services are established in advance for a specific time period. The predetermined rates are based on average levels of resource use for certain types of healthcare services. In contrast, the retrospective payment method is a type of fee-for-service (FFS) reimbursement where providers receive payment, after health services have been rendered, based on either billed charges for services provided or on annually updated fee schedules. Capitation is a method of reimbursement for health services in which an individual or institutional provider is paid a fixed, per capita amount for each person enrolled, without regard to the actual number of services provided or actual costs incurred. The Centers for Medicare and Medicaid Services (CMS) have implemented different payment methodologies for specific types of healthcare services.

IPPS is the Medicare PPS used for acute care hospital inpatient stays. Under the IPPS, each case is categorized into a diagnosis-related group (DRG) with a payment weight assigned to it based on the average resources used to treat patients in that particular DRG. Annually, Medicare publishes a final rule with revisions to the IPPS for the upcoming fiscal year. adopted as final its proposal to restructure the older 538 Diagnosis-Related Groups (DRGs) to 745 new MS-DRGs

(Medicare Severity-adjusted Diagnosis Related Groups) to better recognize severity of patient illness. ([www.cms.gov](http://www.cms.gov))

These proposed changes occurred in two phases: the first phase was in 2008 and the second phase followed in 2009. According to the CMS and the consulting RAND corporation, the newer MS-DRGs more accurately capture resource utilization by splitting the large number of former DRGs into three different categories based on the presence or absence of diagnoses classified as “major complication or co-morbidities” (MCC), “complications or co-morbidities” (CC), or “without MCC/CC” (Non-CC).

According to the AHRQ report on Healthcare Cost and Utilization Project (HCUP) published in Oct 2010, some key and interesting data emerged on inpatient hospital stays. Some of the key highlights for inpatient hospital stays include: The number of hospital discharges increased from 34.7 million in 1997 to 39.9 million in 2008 (a 15-percent increase overall or an average annual increase of 1.3 percent). The costs rose from \$227.2 billion to \$364.7 billion which was an average annual increase of 4.4 percent. The Average Length of Stay (ALOS) declined throughout most of the 1990s and has remained unchanged since 2000. Circulatory conditions were the most frequent major cause of hospital stays in 2008, accounting for 5.9 million stays or 15 percent of all discharges, pregnancy and childbirth was the reason for 1 out of every 5 female hospitalizations (4.7 million stays). Medicare and Medicaid were the expected primary payers for more than half (55 percent) of all inpatient hospital discharges and the number of discharges billed to Medicare grew by 18%.

### **3.0 COMPUTER ASSISTED CODING (CAC)**

#### **3.1 COMPUTER ASSISTED CODING TECHNOLOGY (CAC)**

CAC is defined by the American Health Information Management Association (AHIMA) as the: “...use of computer software that automatically generates a set of medical codes for review, validation and use, based upon clinical documentation provided by healthcare practitioners.”

Inpatients usually have multiple diagnoses, so once codes are assigned, the coder must place them in the proper order. Principal and secondary diagnoses are determined by certain definitions in the hospital setting. Secondary diagnoses can be further separated into complications or co-morbidities in the DRG system, which can affect reimbursement. Therefore, accurate and clear physician documentation in the inpatient record serves multiple purposes. Documentation is the principal and only source of data for hospital billing since coders must assign a code based on what is documented in the chart. If a key medical detail is absent, then coding can be inaccurate. Inaccurate coding may lead to inappropriate compensation for utilized resources to the healthcare system. This is another reason why effective and continuous communication along with good documentation is needed for high quality inpatient coding (Alexander et al, 2003). With the implementation of the ICD-10 code set, the value of utilizing CAC Technology is realized. The field of vendors providing inpatient CAC is still small, while

the field providing outpatient CAC is more prevalent. In 2004, the e-HIM workgroup coordinated by AHIMA found only one CAC application for inpatient acute care setting.

The early 1950's claimed the birth of natural language processing (NLP) with the formal language theory. The advancement of technology since then has been slow, with the first encoding software being implemented only in the late 1970s. (e-HIM Workgroup AHIMA, 2004) The 1980's saw the implementation of speech recognition software systems, first prospective payment systems and charge master software and encoder software systems for coding. Encoders have since helped improve productivity and accuracy of coders. (Pavelchak et al, 1997). Although the first CAC tool was developed and used in the early 1990's at Columbia Presbyterian Medical Center, there is still a dearth of inpatient CAC tools. Organizations planning on transitioning to CAC should consider a commitment to life-long learning.

Remote coding was introduced in 2000. Remote coding helped in reducing the coder vacancy rate. In 1999, the American Hospital Association (AHA) reported the coder vacancy rate was 18% nationwide. In 2004, after remote coding was introduced, the vacancy rate was reduced to 8.5%. The conclusion from the e-HIM workgroup along with multiple studies was that the accuracy rate of CAC tools ranged from 57%-98% ( Hripcsak et al, 1995; Elkins et al, 2000; Warner 2000; Warner 2001; Mamlin et al, 2003; Schadow et al, 2003; Friedman 2004). However, the quality of the codes assigned by the CAC and the consistency of codes varied greatly compared with the human coder (Lorence et al, 2003) The CAC can assign codes much faster but the codes are not always accurate (AHIMA e-HIM Workgroup). This is further validated by the study conducted by Resnik et al (2006), evaluating the accuracy and facilitation in CAC by using intrinsic and extrinsic metrics. The study shows that the accuracy of CAC is comparable to human coders; however the extrinsic result demonstrates significant facilitation

for inter-coder agreement and intra-coder consistency when CAC is used to assist the human coder. Although the technology is evolving rapidly, the expertise of the human coders is still needed. Computers will not be able to replace the human coder completely. The coders will have modified roles to play when using CAC and especially the expertise of the coder will be needed for the inpatient setting. Further knowledge of anatomy, physiology, pharmacology, and clinical terminology will be needed by coders in order to better navigate the ICD-10 system, especially with ICD-10-PCS. (Smith et al, 2010).

### **3.2 TECHNOLOGIES IN CAC (NLP VS. SI)**

Currently there are two technology options for CAC. The first is natural language processing (NLP) and the second is structured input (SI). Both options are CAC models.

NLP uses artificial intelligence to extract the needed data and terms from an electronic text-based document (preferably an EHR) and convert them into medical codes, which could then be edited by a coder. (AHIMA e-HIM workgroup, 2004) NLP is also known as computational linguistics, which means it uses linguistics, semantics and computer science to determine the phrases and sentences.

Structure input (SI), on the other hand, uses menus that contain clinical terms. Each menu item is directly mapped to a relevant code (AHIMA e-HIM workgroup, 2004). Either way, the traditional coding workflow has been dramatically altered with the use of the above technology.

A study by Medquist concluded that the NLP technology used in CAC works best in outpatient settings, since NLP requires electronic documentation and has a limited number of

terms. Early results from the use of CAC on the outpatient side indicate a 20-30% increase in coder productivity and better consistency in code assignment (Cummins et al, 2006). The same cannot be said, however, for the inpatient setting. A few of the barriers encountered in the development of inpatient CAC are the complexity and vast number of diagnoses and procedures, the use of multiple forms (History and Physical, discharge summary, operative report and consultations), and the variety of formats and lack of a complete EHR (Cummins, 2006). Therefore, the development of a NLP technology for an inpatient setting is quite complex and more research is needed in that particular area. The benefits of having an inpatient CAC include increased productivity and quality, increased automation, time savings and decreases in Discharged not final billed( DNFB), and decreases in chart processing time (Lang, 2007).

For manual coding by a human coder, it is estimated that a coder has to look at, on average, 100 pages for the average length of stay. To make matters even worse, these pages are located in various sources within the medical record. The CAC has the power to put all of these documents from all different sources into one single view. As described above, some of the advantages of a CAC tool include: increase in coding productivity; increase in coding consistency; CAC is very consistent even when it is not right; availability of coding audit trail; and the potential increase in coding accuracy and system improvements through feedback. As with any software product, however, there are a few unforeseen disadvantages: user-specific integration, user acceptance and change management, cost and potential for coding errors or fraudulent claims since "Machine learning" could potentially present problems if coders teach the software their errors.

#### **4.0 CASE STUDIES AND FIELD TESTING CAC**

A study by Cummins et al (2006) reviewed a case study, in which a CAC was implemented in an orthopedic ambulatory setting (outpatient). Seven hundred cases were analyzed and 50% of the codes mismatched (between the human coder and CAC). Upon further analyzing a subset of codes, the authors found that the differences do not reflect accuracy and may not affect reimbursement. This observation points to the fact that the human coder has additional documentation to refer to and code from, whereas the CAC only has the electronic documentation that was input into the system. Therefore, it is not really a fair comparison to directly evaluate the human coder vs. CAC.

A study by Servais et al (2002) reviewed CAC usage in inpatient charts for accuracy of code assignment, ease of use, and the ability of the software to enhance coder productivity. The group found that the coders did not accept 75% of the diagnosis codes and 90% of the procedure codes. In 58% of the cases, coders added diagnosis codes and in 45% of the cases the coders added procedure codes. The ease of the software was reported as very intuitive and required minimal training. Coder productivity was found to be decreased. The authors, however, failed to mention that if the human coders had access to additional documentation that was not available to the CAC system when deciding on the codes, this could impact coder productivity and accuracy.

A study by Longosky et al (2008 and a follow-up study in 2009) reviewed coding of outpatient records. Upon review of the differences in E&M levels assigned, the CAC software found that the software under-coded 46% of the time, over-coded 13% of the time and was correct 41% of the time. They found that the software needed to learn from its 'mistakes'.

A study by Towers et al (2009) reviewed inpatient CAC in 3 hospitals at UPMC. Most coders showed improvement over baseline productivity by week 4 after training. They were able to achieve improvements in quality, productivity (by 20%) and satisfaction of the coders, decrease in overtime by 85%, decrease in external auditor recommendations by 50%, decrease in external audit fees by 60%, increase in the case mix index by 0.08 or 4%. Furthermore, the quality review for internal purposes was greatly improved since there was an audit trail for the source documentation on the CAC software. Of note, most of the coders worked from home. A study conducted at the Eastern Maine Medical Center (EMMC) (HIMSS conference and Exhibit, 2010) which implemented an inpatient CAC system, reported several benefits as well. The number of records processed per hour increased by 15% in the first 45 days and 30% in the first 90 days, there was a decrease in the average turnaround time for coding from 5 to 4 days, the average days in accounts receivable dropped by 7% and they were able to reduce the coding staff by one FTE.

From the literature reviewed, CAC from inpatient documentation needs additional refinements before it will enhance coder productivity and coding accuracy. Computer-assisted inpatient coding is more sophisticated and more complex than computer-assisted outpatient coding. As opposed to studies that report on the successful performance of CAC for outpatient coding, studies of performance of CAC for inpatient coding did not find parallel success.

The above studies mention the benefits of using CAC; however, it is worth noting that the cost of acquisition and maintenance as well as the requirements on the clinicians to adjust for CAC tools are yet to be fully researched.

#### **4.1 SIGNIFICANCE OF THE STUDY**

Since the 1980s clinical coding has become increasingly complex. Prospective payment systems (PPSs) have expanded to multiple healthcare settings. As this occurred, each PPS brought specific reporting requirements that a coder must understand and recall. As all of these services are expected from the coder, the actual time available to code the record keeps decreasing. Meanwhile, medical care continues to advance and increase in complexity, especially with the introduction of the American Recovery and Reinvestment Act of 2009 (ARRA) and the Health Information Technology for Economic and Clinical Health (HITECH) along with the advancements of health information technology. To add to the above burden, there is already a shortage of skilled HIM-educated and certified coding professionals. Having accurate and up-to-date documentation is vital as we move toward the transition to ICD-10. As described above, there are many more codes available for a coder to choose from in coding with ICD-10 along with a higher degree of specificity. In order to locate the accurate codes, the documentation requirement needs to be in place on the medical record.

The blog post by Chris Dimmick (2011), Smith from 3M Health Information Systems identified a list of 10 areas that had documentation issues according to some of the feedback from different facilities that were in the process of transitioning to ICD-10. Some of those areas

include: diabetes mellitus, injuries, drug under dosing, cerebral infarctions, acute myocardial infarction, neoplasms, musculoskeletal conditions, pregnancy and respiratory/vents and in the ICD-10-PCS sections. Further, the study by Moczygemba and Fenton (2012) evaluated the clinical documentation needs in specific areas (heart disease, pneumonia, and diabetes) and highlighted the importance of having accurate clinical documentation and identifying gaps along with the importance of coder training and education.

The purpose of this research is to identify the barriers involved with documentation specificity and identify the absent documentation across all the ICD-10-CM chapters (twenty one chapters). The findings of the research could be used for alerting physicians and other documentation specialists as to what, if any, practices need to be changed on their end in order to obtain accurate coding. Furthermore, the results could be used in the development of better inpatient CAC products. The industry needs automated solutions to allow the coding process to become more productive, efficient, accurate, and consistent. CAC in outpatient care is well-researched and studied with several successful software products being implemented to the healthcare setting. However, CAC's application to inpatient care is still minimal as it requires a more complex set of tools.

## 4.2 SPECIFIC AIM AND RESEARCH QUESTION

### **Overall Hypothesis:**

Although ICD-10-CM is better able to capture and extract data from the medical record, current documentation is lacking the specificity and detail to accurately capture the code(s).

The documentation available for coding is not stable. Changes in documentation created by modifications in care delivery processes require HIM involvement to assure that the automated support provided by CAC is not out of sync.

**Specific Aim 1:** Evaluate the complexity and specificity of inpatient records coded in ICD-10-CM. Identify barriers and absent documentation in ICD-10-CM.

**Hypothesis Aim 1:** absent documentation will consist of incomplete, inconsistent, and inaccurate data needed for high quality coding in ICD-10-CM.

**Specific Aim 2:** Evaluate the reimbursement differences (along with cost weight differences) in coding with ICD-10- CM with and without the supporting documentation.

**Hypothesis Aim 2:** ICD-10-CM coded medical records with absent documentation would result in lower reimbursement amounts. It would highlight the importance of having accurate documentation and financial gains for a healthcare organization

**Specific Aim 3a:** Develop recommendations based on the absent documentation for a CAC product as well as other uses of complete documentation, such as meaningful use and, patient safety measures.

**Specific Aim 3b:** Develop a Documentation Improvement Toolkit for providers and technology experts that demonstrate what needs to be documented to obtain effective coding in their healthcare settings.

**Hypothesis Aim 3:** Create a uniform set of accurate documentation for physicians, coders and the technology team, which would greatly aid in combating the issue of absent and improper documentation.

## **5.0 METHODOLOGY**

### **5.1 RESEARCH DESIGN**

The research project consists of three studies to identify the documentation specificity, reimbursement and documentation improvement for the upcoming ICD-10-CM coding system.

A descriptive research study using quantitative methods was conducted for the first study, which focused on coding electronic documents across each major diagnostic category for ICD-10-CM. Each of the records was categorized into each of the ICD-10-CM chapters. The coding was ranked according to the Watzlaf et al (2007) study where a ranking score was provided if the diagnosis was fully captured by the ICD-10-CM code sets and its descriptions. The ICD-10-CM codes were then compared to the current ICD-9-CM codes to evaluate the details on the descriptions of the codes. The rankings were determined by comparing the ICD-10-CM systems to the number of codes, the level of specificity, and the ability of the code description to fully capture the diagnosis/procedure term based on the resources available at the time of coding. (Watzlaf 2007).

A descriptive research study using quantitative methods was conducted for the second study, which focused on evaluating the reimbursement differences in coding with ICD-10- CM with and without the supporting documentation. Reimbursement amounts or the MS-DRG (Medicare Severity Diagnosis Related Group) weight differences were examined to demonstrate

the amount of dollars lost (if any) due to incomplete documentation. Two sets of ICD-10-CM codes were generated for records that were identified as having absent documentation, while only one set of codes was generated for the records identified as having complete documentation. Reimbursement amounts were calculated by running the code set on an ICD-10 grouper. Records with absent documentation were run through the grouper twice to generate the two different reimbursement amounts, while the complete records were run through only once.

An exploratory descriptive research study using qualitative methods was conducted for the third study, which focused on developing a documentation improvement toolkit for providers and technology experts to guide them towards an accurate selection of codes. Furthermore, a quick reference checklist geared towards the physician, coder and the information technology development team based on their feedback and documentation needs were developed.

The dissertation project was initiated after the approval of the Institutional Review Board at the University of Pittsburgh.

## **5.2 RESEARCH METHODS**

A descriptive research study was conducted to identify the completeness and specificity of the inpatient electronic documents when coded in ICD-10-CM. The first study focused on coding all available electronic documents across each of the major ICD-10-CM chapters. Each of the records was distributed into each of the ICD-10-CM chapters (Table 1).The coding was performed as normally as possible using the 2011 version of the ICD-10-CM draft manual that

was available at the time and without a time limit, with the exceptions that the coding was done continuously and with few interruptions and distractions as possible. After thorough investigation of the de-identified database that was provided, there were a total of 656 electronic inpatient documents with a total of 4,791 diagnoses. In order to study the extent of the available population, the researcher decided to code the entire data set (4791 diagnoses) using the 2011 version of the ICD-10-CM codebook and the ICD-10-CM guidelines. The electronic document consisted of multiple sections (Chief Complaint, History of Present illness, Past Medical History/Family History/Social History, Review of Symptoms, Physical Exam, Labs and Studies and Assessment and Plan) (Figure 1). These documents are a combination of structured (as CDA level 2) and unstructured information. For the structured sections, metadata, section headings, and subsection headings are all structured in the Extensible Markup Language (XML) format. However, clinical facts within the sections are not structured and, therefore, there is a possibility that a part of the structure can be removed by a medical transcriptionist since they often follow an “as dictated” method of transcription and might remove section/subsection headings at any given time.

### **5.2.1 Development of the Coding Guidelines**

The Centers for Medicare and Medicaid Services (CMS) and the National Center for Health Statistics (NCHS), two departments within the department of Health and Human Services (DHHS), provide the set of guidelines for coding and reporting using ICD-10-CM. These guidelines were used as a companion document along with the official version of the ICD-10-CM. The ICD-10-CM is a morbidity classification system for classifying diagnoses and reason

for visits in all health care settings. This set of guidelines has been approved by the four organizations that make up the cooperating parties for the ICD-10-CM: the American Hospital Association (AHA), the American Health Information Management Association (AHIMA), CMS, and NCHS. The guidelines are organized into sections. Section I include the structure and conventions of the classification and general guidelines apply to the entire classification: chapter-specific guidelines correspond to the chapters as they are arranged in the classification. Section II includes guidelines for selection of principal diagnosis for non-outpatient settings. Section III includes guidelines for reporting additional diagnoses in non-outpatient settings. Section IV is for outpatient coding and reporting.

The coding methodology involved, reviewing all the diagnoses listed on the last section (Assessment and Plan). The first listed diagnosis was identified as the principal diagnosis and all remaining diagnoses were identified as secondary diagnoses. After the identification of the diagnoses, the researcher went back to review all the different sections in the record to identify if the supporting documentation was present and/or if anything was absent. The term ‘absent’ is used to relate to documentation that was not present in the electronic documents that were used for coding. Therefore, the lack of documentation is defined as being ‘absent’ and it is described using the following two scenarios:

**Scenario 1:** the documentation that was not present at the time and availability of the record review. (E.g. Ear infection is stated as a diagnosis; however the laterality is not present on the electronic document.)

**Scenario 2:** the patient might not have had the condition requiring the additional documentation. (E.g. congestive heart failure is listed on the diagnosis, for the purposes of reimbursement, to obtain the maximum potential reimbursement; we selected the more specific

and complex code of ‘acute on chronic congestive heart failure’. However there is the possibility that the patient did not have that specific diagnosis.)

Further, using the Coding manual, the appropriate ICD-10-CM codes for all the principal and secondary diagnoses were designated, followed by the appropriate ICD-9-CM codes that correspond to the ICD-10-CM code and the associated code description. There are essentially two sub-studies within this first study. The first sub section concentrated on evaluating the absent documentation (methodology described above) and the second sub section concentrated on evaluating how effectively the two different coding systems (the code and the description of the code) perform in describing the diagnoses (Figure 2). The methodology involved for this section was to rank how well the diagnosis (documentation) was captured by the code. The ranking system was expanding on Watzlaf et al (2007), in which the inpatient records of every possible diagnosis category would be studied. Since the coding will be performed on inpatient records, all ICD-10-CM chapters were included. The ranking system was categorized from numbers five through one, where a five was given when the diagnosis was fully captured by the code(s) descriptions, and a one was given when the diagnosis was not captured by the code(s) descriptions. The entire ranking system was as follows:

5=Diagnosis (documentation) is fully captured by the code(s) description(s) (All codes, specificity, description is found)

4=Diagnosis (documentation) is almost fully captured by the code(s) descriptions(s) (minor detail is absent)

3=Diagnosis (documentation) is partially captured by the code(s) description(s) (moderate detail is absent)

2=Diagnosis (documentation) is less than partially captured by the code(s) description(s)  
 (Major detail is absent)

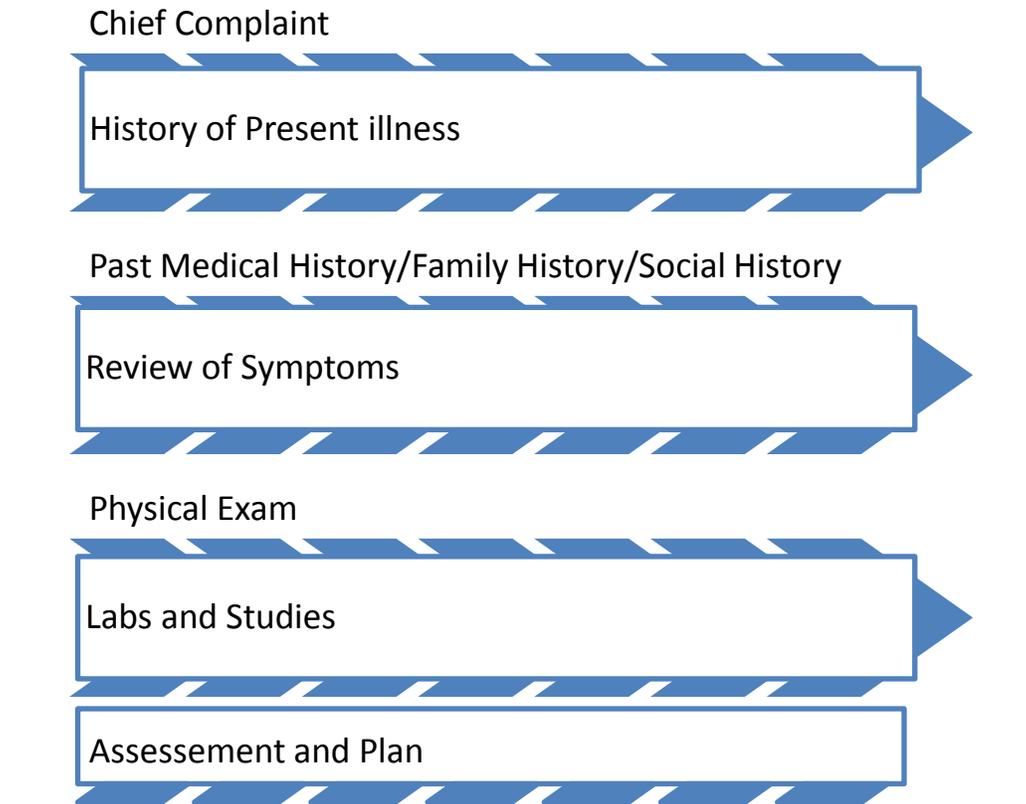
1=Diagnosis (documentation) is not captured by the code(s) descriptions(s) (Codes,  
 specificity, description is not found)

**Table 1: ICD-10-CM Chapter Designations**

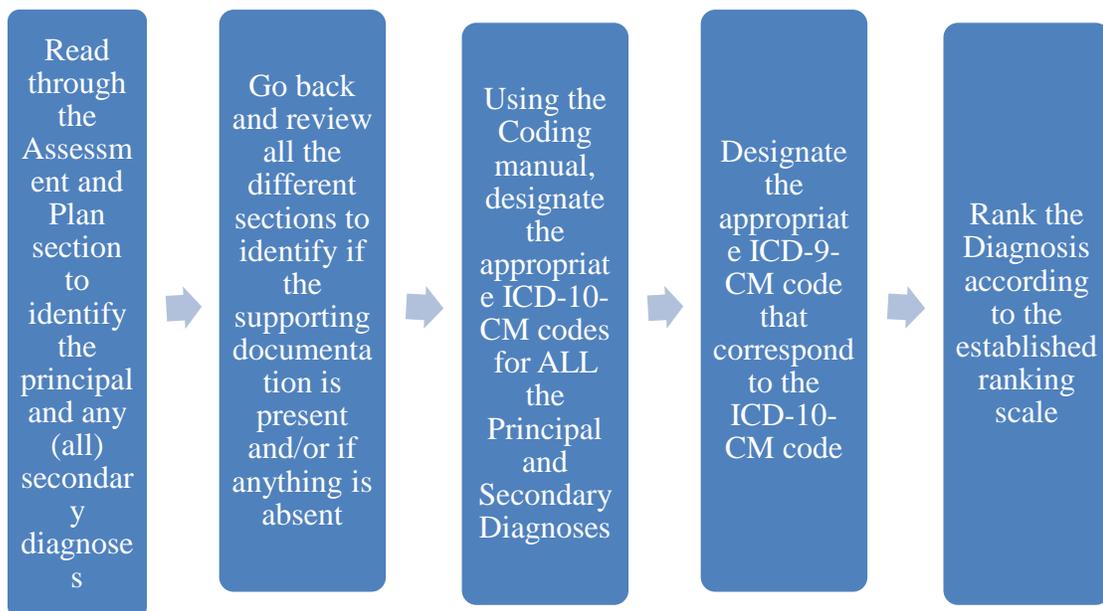
<b>ICD-10-CM Chapter Number and Designation</b>	<b>ICD-10-CM Chapter Name</b>
Chapter 1: A00-B99	Infectious and Parasitic diseases
Chapter 2: C00-D49	Neoplasms
Chapter 3: D50-D89	Diseases of the blood and blood forming organs and certain disorders involving the immune mechanism
Chapter 4: E00-E89	Endocrine, nutritional and metabolic diseases
Chapter 5: F01-F99	Mental and Behavioral disorders
Chapter 6: G00-G99	Diseases of the nervous system and SenseOrgans
Chapter 7: H00-H59	Diseases of Eye and Adnexa
Chapter 8: H60-H95	Diseases of Ear and Mastoid Process
Chapter 9: I00-I99	Diseases of Circulatory System
Chapter 10: J00-J99	Diseases of Respiratory System

**Table 1 (Continued)**

Chapter 11: K00-K94	Diseases of the digestive system
Chapter 12: L00-L99	Diseases of the skin and subcutaneous tissue
Chapter 13: M00-M99	Diseases of the musculoskeletal system and connective tissue
Chapter 14: N00-N99	Diseases of the genitourinary system
Chapter 15: O00-O9A	Pregnancy, childbirth, puerperium
Chapter 16: P00-P96	Newborn (Perinatal) Guidelines
Chapter 17: Q00-Q99	Congenital malformations, Deformations, and chromosomal Abnormalities
Chapter 18: R00-R99	Symptoms, Signs, and Abnormal Clinical and Laboratory Findings, Not Elsewhere Classified
Chapter 19: S00-T88	Injury, Poisoning, and Certain Other Consequences of External Causes
Chapter 20: V01-Y99	External causes of Morbidity
Chapter 21: Z00-Z99	Factors influencing Health Status and contact with Health Services



**Figure 1: Orientation Of the Electronic Document**



**Figure 2: Methodology for the Coding Study**

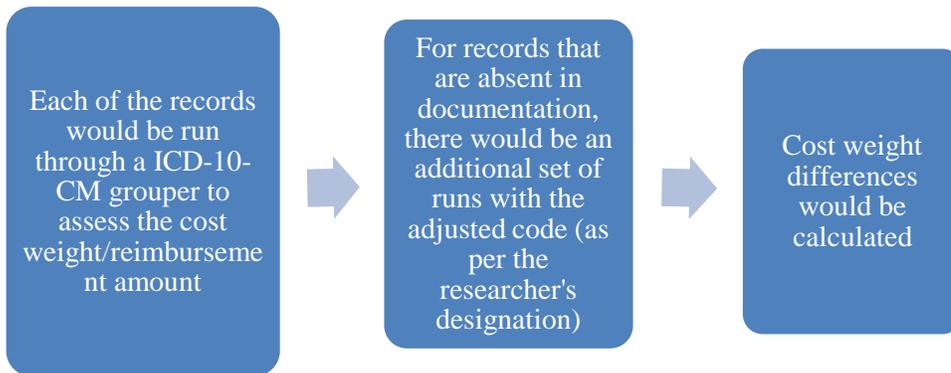
Table 2 depicts an example of the worksheet used to capture the principle diagnoses, all possible secondary diagnoses, absent documentation, ranking of the ICD-10-CM and the ICD-9-CM codes along with any comments/remarks that were deemed important. Further, an ICD-10 certified trainer and a researcher at the University of Pittsburgh was able to validate Five percent of the total records (44 records including 737 diagnoses).

**Table 2: Worksheet for Study 1 (Coding Study)**

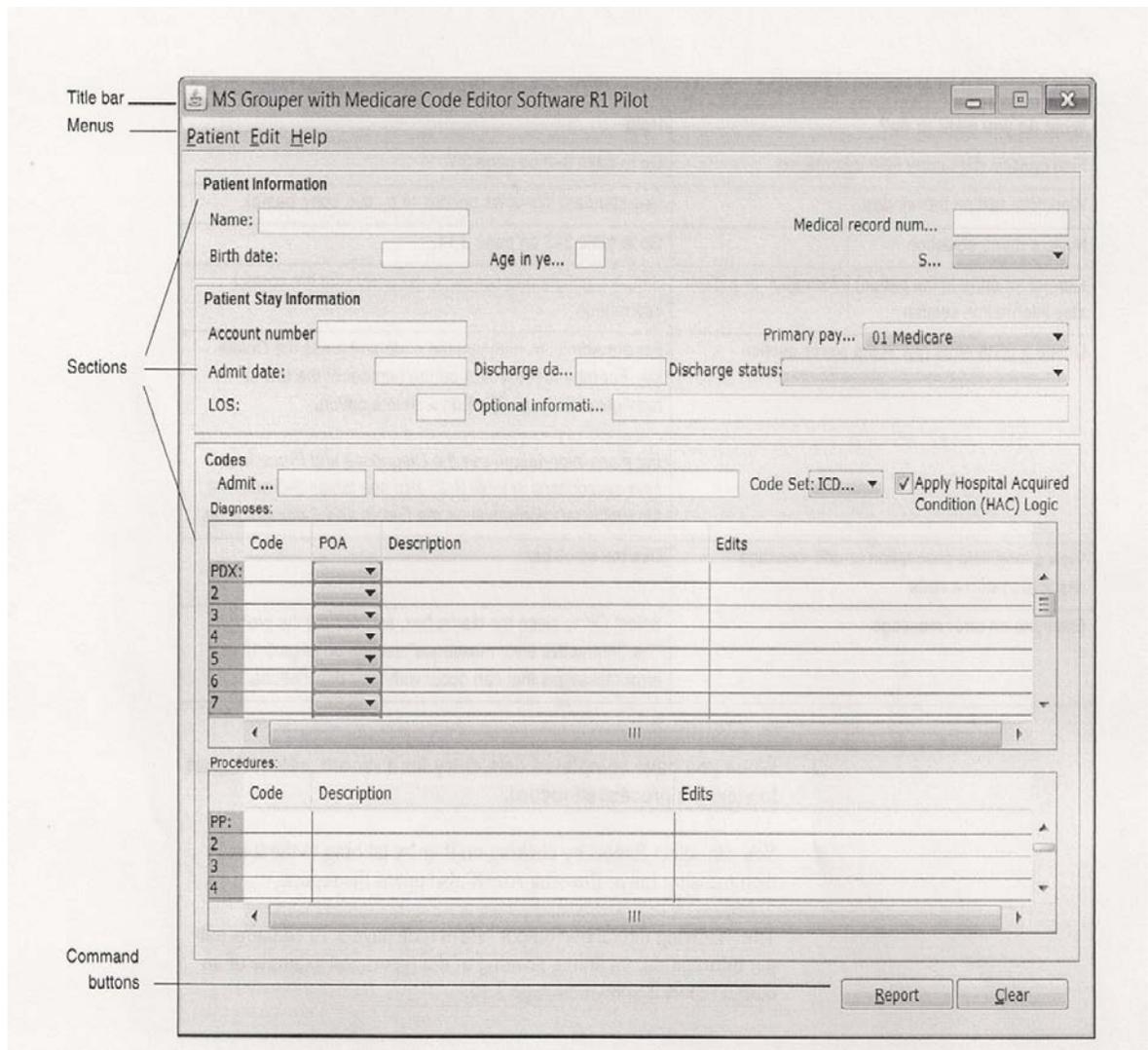
Diagnoses (Principal and Secondary)	Documents reviewed	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
Principal DX: -Intractable nausea and vomiting	History Of Present Illness, Past Medical History, Medication, Allergies, Review of Systems, Physical Examination, Labs and Studies, Assessment and Plan	R11.2	nausea with vomiting, unspecified	787.01	Nausea with vomiting	No	55	55	
Secondary Dx:									
Diabetic gastroparesis	same as above	E11.43	Type 2 diabetes mellitus with diabetic autonomic (poly) neuropathy/ Type 2 diabetes mellitus with diabetic gastroparesis	250.6 with 536.3	Diabetes mellitus with neurological manifestations type 2 or unspecified type not stated as uncontrolled with Gastroparesis	No	55	55	
Hyponatremia.	same as above	E87.1	Hypo-osmolality and hyponatremia	276.1	Hyposmolality and/or hyponatremia	No	55	55	
Hypertension	same as above	I10	Essential (primary) hypertension	401.9	Unspecified essential hypertension	No	55	55	
Gastroesophageal reflux disease	same as above	K21.9	Gastro-esophageal reflux disease without esophagitis	530.81	Esophageal reflux	No	55	44	
Anxiety and depression	same as above	F41.8	Other specified anxiety disorders (anxiety depression mild or not persistent)	300.09	Other anxiety states	No	55	44	
Hyperlipidemia.	same as above	E78.5	Hyperlipidemia, unspecified	7272.4	Other and unspecified hyperlipidemia	No	55	45	

The second study evaluated the reimbursement differences (including cost weight differences) in coding in ICD-10- CM with and without the supporting (absent) documentation. Differences in the level of documentation were examined based on the differences in the codes and reimbursement amounts. Reimbursement amounts were examined to demonstrate the amount of dollars lost /associated cost weight differences due to incomplete documentation (Figure 3). The reimbursement methodology for inpatient settings is acute inpatient PPS - IPPS is the Medicare PPS used for acute care hospital inpatient stays. Under the IPPS, each case is categorized into a diagnosis-related group (DRG) with a payment weight assigned to it based on the average resources used to treat patients in that particular DRG. The ICD-10 Medicare Code Editor v27 and a text version of the ICD-10-CM/PCS MS-DRGv28 which is distributed through the CMS were used for this study. Since ICD-10 is in its draft format, the ICD-10 grouper does not provide reimbursement amounts; however, it does provide the DRG weight. Therefore, a 'hypothetical' figure was used for the purpose of reimbursing a typical inpatient acute care facility. The amount that was used was \$3800.

Reimbursement differences were conducted only on the records with absent documentation. For those documents with absent documentation, two sets of ICD-10-CM codes were generated as follows: The researcher coded the absent documentation as is and generated the ICD-10-CM code for the diagnosis and, further, the researcher generated another set of ICD-10-CM codes 'pretending' that the documentation was present and generating an adjusted code to reflect the highest specificity and complexity code (Figure 3). Subsequently both of these sets of codes were fed through the ICD-10-CM grouper to obtain the reimbursement values (Figure 4 and 5).



**Figure 3: Methodology for reimbursement Study**



**Figure 4: Sample screen shot of the ICD-10 grouper software**

(Courtesy of CMS Medicare Severity (MS) Grouper with Medicare Code Editor (MCE) ICD-10 R1 Pilot Software (Version 28.0))

```

Title line ——— MS-DRG Assignment with Medicare Code Editor R1 Pilot V28.0

Patient
information——— Patient name: Jane Smith Medical rec #: 1054879

Admit date: 10/01/2010 Discharge date: 10/06/2010 Birth date: 09/09/1943
Optional information:

Patient acct #: 458799
Age in years: 67 Sex: Female
Discharge status: 01 Home or self-care

Grouping
information——— MDC: 10 ENDOCRINE, NUTRITIONAL & METABOLIC DISEASES & DISORDERS
Final
DRG: 639 Diabetes w/o CC/MCC
Cost weight: 00.5544
MS-DRG Grouper version 28.0 (October 1, 2010) used.
HAC Status: One or more HAC criteria met, Final DRG changes.

Clinical
information ——— Admitting Diagnosis:
E109 Type 1 diabetes mellitus without complications

Principal Diagnosis:
E109 Type 1 diabetes mellitus without complications (DRG)
POA: Yes, present at the time of inpatient admission

Secondary Diagnoses:
E109 Type 1 diabetes mellitus without complications
POA: Yes, present at the time of inpatient admission
Edit: Duplicate of principal diagnosis (MCE)

Edit ——— T8351XA Infect/inflm reaction due to indwell urinary catheter, init (DRG)(HAC)

POA indicator ——— POA: No, not present at the time of inpatient admission
N390 Urinary tract infection, site not specified (DRG)(HAC)
POA: No, not present at the time of inpatient admission
I10 Essential (primary) hypertension
POA: Yes, present at the time of inpatient admission
N469 Male infertility, unspecified
POA: Yes, present at the time of inpatient admission
Edit: Sex conflict (MCE)

No procedures performed

Initial
DRG: 638 Diabetes w CC
Primary Payer: 01 Medicare

Actual LOS: 5

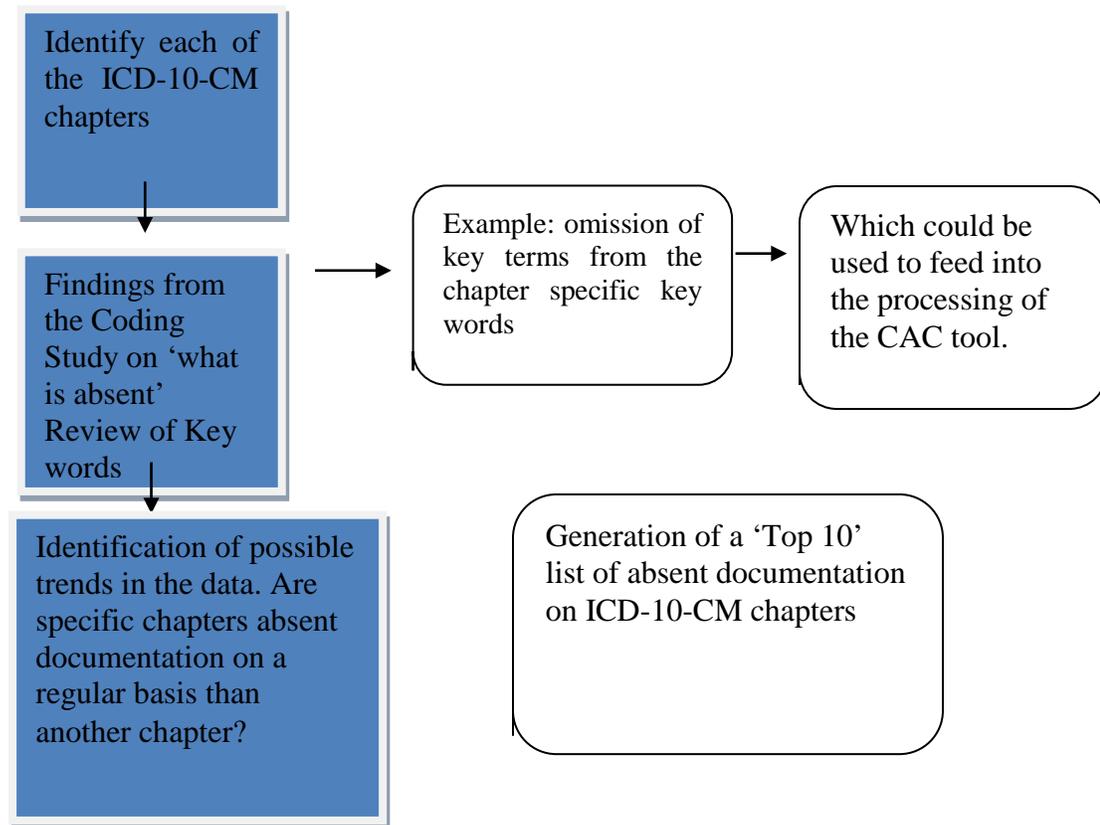
Patient Summary Edits:
MCE pre-payment errors only

```

**Figure 5: Sample output screen for the ICD-10 grouper software**

Courtesy of CMS Medicare Severity (MS) Grouper with Medicare Code Editor (MCE) ICD-10 R1 Pilot Software (Version 28.0)

The third study focused on developing recommendations based on the absent documentation for the use of physicians, coders and the information technology team. Having accurate documentation at the initial point of patient-clinician interaction is very important, as that initial documentation would help the coder in selecting the most accurate and specific ICD-10-CM codes, which would result in the optimal and accurate reimbursement for the healthcare facility. Further, the input of accurate documentation is vital for the information technology team at any healthcare facility in developing an efficient CAC tool. We obtained feedback from physicians, coders, and technology experts in order to obtain their valuable insights and suggestions in developing the toolkit. The toolkit concentrated on all ICD-10-CM chapters; however special emphasis was given to the chapters with the highest amount of absent documentation. Recommendations were provided for those chapters to guide the physician in relation to the specificity and complexity descriptions that were required by specific ICD-10 codes. A quick guide was developed in the form of a table for quick reference of these chapters/codes with the highest amount of documentation deficiencies (Figure 6).



**Figure 6: Overview of Study 3 (Documentation Improvement Study)**

### 5.3 SAMPLE

After reevaluating the database that was provided for the inpatient documents and after a thorough cleanup of the database (omission of duplicate records and erroneous records), we identified 656 patient records, each including from 1- 29 different diagnoses each. There were a total of 4,791 diagnoses coded for the study and all possible diagnoses in order to gain knowledge and the extent of documentation requirements for ICD-10-CM. The records were approximately one year old. Electronic documents reflecting only the medical cases were selected as the research involved evaluation of only the ICD-10-CM (diagnoses coding).

According to the results of HCPro's 2009 coding productivity benchmarking survey, it was estimated that the average time spent coding an inpatient record was 20min each. Therefore to code 656 records at 20min per record, it was anticipated to take the researcher (DRD) approximately 219 hrs.. In reality, however, it took approximately double that time to code the entire set of records.

## **5.4 DATA ANALYSIS**

The Kruskal-Wallis test was used to test the null hypothesis of no differences between chapters with respect to proportion of records with absent documentation. Since the null hypothesis was rejected, Mann-Whitney U tests were used to carry out post hoc comparisons of pairs of chapters. The strategy used involved ranking chapters according to proportion of absent documentation. The difference between the chapter with the highest proportion and the chapter with the lowest proportion was tested first, followed by the difference between the chapter with the highest proportion and the chapter with the next lowest proportion, etc.

Wilcoxon signed ranks tests were used to compare median rankings of records within each chapter according to ICD-10-CM and ICD-9-CM. Wilcoxon signed ranks tests were also used to test for significant differences in reimbursement amounts with and without the adjusted codes for documents with absent documentation.

## **6.0 RESULTS**

### **6.1 CODING STUDY**

The coding study involved, reviewing and coding all the diagnoses listed on the electronic document. The first listed diagnosis was identified as the principal diagnosis and all remaining diagnoses were identified as secondary diagnoses. After the identification of the diagnoses, the researcher went back to review all the different sections in the electronic document to identify if the supporting documentation was present and/or if anything was absent. The term ‘absent’ is used to relate to documentation not present in the electronic documents that were used for coding. Each of the diagnoses was categorized into the ICD-10-CM chapters as depicted in Table 3. As shown in figure 7 and as expected, the distribution of the chapters into each of the ICD-10-CM chapters were uneven with some chapters having upwards of 500 records (chapters 4, 9 and 18), some having less than 50 records (chapters 7,8,12, 17,19 and 20), and two chapters containing no records (chapters 15 and 16). This is as expected when considering the background of the data set.

The first part of the coding study involved coding all the diagnoses (4,791 diagnoses) and evaluating for completeness of the documentation. Overall, it was found that 736 diagnoses were identified with absent documentation, generating an overall absent documentation percentage of 15.4 percent. The absent documentation was broken down into each of the ICD-10-CM chapters

to get a better idea of how each of the chapters performed (Table 4). The ten chapters with the highest percentage of absent documentation were: Chapter 7 (Diseases of Eye and Adnexa) with 67.65%, Chapter 8 (Diseases of Ear and Mastoid Process) with 63.64%, Chapter 13 (Diseases of the musculoskeletal system and connective tissue) with 46.05%, Chapter 14 (Diseases of the genitourinary system) with 40.29%, Chapter 10 (Diseases of Respiratory System), 35.52%, Chapter 1 (Infectious and Parasitic diseases) with 32.88%, Chapter 12 (Diseases of the skin and subcutaneous tissue) with 32.35%, Chapter 2 (Neoplasms) with 25.45%, Chapter 4 (Endocrine, nutritional and metabolic diseases) with 14.58% and Chapter 17 (Congenital malformations, Deformations, and Chromosomal Abnormalities) with 12.50%. Some of the examples of absent documentation that were found included: Chapter 7 concentrated on the Diseases of Eye and Adnexa and the percentage of absent documentation was reported to be 67.65% (26 diagnoses with absent documentation out of 34 total diagnoses). The sample record numbers obtained for this chapter were relatively smaller than most of the other chapters. Some of the areas that we identified as needing improvement in documentation involved, describing diagnoses of glaucoma, cataracts, conjunctivitis and strabismus. Chapter 8, which concentrated on Diseases of the Ear and Mastoid Process and the percentage of absent documentation, was reported to be 63.64% (7 diagnoses with absent documentation out of 11 total diagnoses). The sample record numbers obtained for this chapter were relatively smaller than most of the other chapters. The main areas that were lacking adequate documentation were in the diagnoses of benign positional vertigo, presbycusis, and mastoiditis. Chapter 13 describes the diseases of the musculoskeletal system and connective tissue and reported an absent documentation rate of 46.05% (99/215). Almost all the cases with the following conditions resulted in absent documentations: Osteoporosis, osteoarthritis, osteomyelitis, gout, arthritis and rheumatoid arthritis. Chapter 14

corresponds to the Diseases of the genitourinary system and reported a rate of 40.29% for absent documentation (112/278).

There were many cases of chronic kidney disease diagnosed, and although the majority of the cases documented the stage of chronic kidney disease, a handful of them did not. Furthermore, in some cases, we came across where end stage renal disease was diagnosed but with no listed documentation of the dialysis status. Another area in, which we would like to see improvement, is in diagnosing urinary tract infections. If the clinician can document the associated infectious agent (causative agent) for the urinary tract infection, it would be beneficial to have complete documentation. Chapter 10 corresponds to the Diseases of Respiratory System and the percentage of absent documentation was reported to be 35.52% (119 diagnoses with absent documentation out of 335 total diagnoses). Multiple records stated variations of respiratory failure that were coded to a 'general' code since documentation for a specific code assignment was absent.

Furthermore, there were several records with asthma as the diagnosis. There are more specific codes one could assign for asthma if the documentation was present. Pneumonia was another problematic diagnosis for our record set, since there were multiple diagnoses with 'pneumonia' as stated without any supporting documentation as to the causative agent. Allergic rhinitis and tonsillitis rounded up the major problematic areas. Chapter 1 concentrates on certain infectious and parasitic diseases and the percentage of absent documentation was reported to be 33% (24 diagnoses with absent documentation/73 total diagnosis). Chapter 12 concentrated on diseases of the skin and subcutaneous tissue and resulted in a rate of 32.35% (11/34) records with absent documentation. Again, this was another chapter where we did not find too many diagnoses. Some of the major areas with documentation issues were in the diagnoses of ulcers;

pressure, sacral decubitus, and in chronic lower extremity and atopic dermatitis. Overall, chapter 2, which was neoplasms, were well documented in terms of sites involved, chemotherapy status and the severity of the condition: however, there were 14 records identified with absent documentation out of total of 55 records, which resulted in 25.45% of absent documentations for this chapter (Figure 8). Of note would be the sample size for this chapter compared to some of the other chapters.

Chapter 4 concentrates on Endocrine, nutritional, and metabolic diseases. There were two specific disease conditions that were coming up as absent documentation for this chapter. The type of diabetes and the presence/absence of insulin use and when diagnosing obesity, failing to mention the associated body mass index (BMI) were the two main deficiencies encountered. Overall, this chapter performed with a 14.58% (135/926) absent documentation rate. We would like to point out that there were a large number of diagnoses for this chapter, and most of the diabetes cases were well documented with the type and insulin usage.

Chapter 17 concentrates on congenital malformations, Deformations, and Chromosomal Abnormalities and reported a rate of 12.50% (1/8). Of the codes that were validated by the ICD-10 certified trainer (expert), a total of 737 diagnoses were coded and 534 diagnoses had a perfect match between the expert and the researcher (73.81%). Of the ones that did not have a perfect match, the difference was within a single sub code within the same section; for example, the expert assigned a code of D50.8 (other iron deficiency anemias) while the researcher assigned a code of D50.9 (iron deficiency anemia, unspecified). Two HIM professionals at the University of Pittsburgh validated 5% of the sample for agreement in rankings between the researcher and experts for the ICD-9 and ICD-10 system. The expert agreed 98.1% on the ICD-10-CM rankings and 92.3% on the ICD-9-CM rankings between the researcher and the expert. When we further

analyzed the data for significance when categorizing the ten chapters with the highest absent documentation percentages, we found the following to be true at  $P < 0.001$  (Table 5). We took individual chapters and compared that specific chapter across all other chapters to evaluate if the differences we see between each chapter were significantly different. For example, we saw that, Diseases of Eye and Adnexa (chapter 7), which was the chapter with the highest absent documentation, was compared with the rest of the chapters: we found the differences between them to be significantly different only on diseases of the blood and blood forming organs, Factors influencing Health Status and contact with Health Services, Symptoms, Signs, and Abnormal Clinical and Laboratory Findings, Mental and Behavioral disorders, Diseases of the digestive system, Diseases of Circulatory System, Injury, Poisoning, and Certain Other Consequences of External Causes, Diseases of the nervous system and Sense Organs, Endocrine, nutritional and metabolic diseases, Neoplasms and Diseases of Respiratory System.

The next step within the coding study involved ranking the two coding systems: ICD-9-CM and vs.ICD-10-CM, to evaluate how well each of the codes was captured by the listed diagnoses. We ranked how well the diagnosis was captured by the code(s) from a scale of five (when the diagnosis was fully captured) to one (when the diagnosis was not captured at all). Each of the diagnoses from every chapter was given a rank and the mean rank for every chapter was calculated and listed on Table 6.

5=Diagnosis (documentation) is fully captured by the code(s) and their description(s) (All codes, specificity, description is found)

4=Diagnosis (documentation) is almost fully captured by the code(s) and their description(s) (minor detail is absent)

3=Diagnosis (documentation) is partially captured by the code(s) and their description(s)  
(moderate detail is absent)

2=Diagnosis (documentation) is less than partially captured by the code(s) and their  
description(s) (Major detail is absent)

1=Diagnosis (documentation) is not captured by the code(s) and their description(s)  
(Codes, specificity, description is not found)

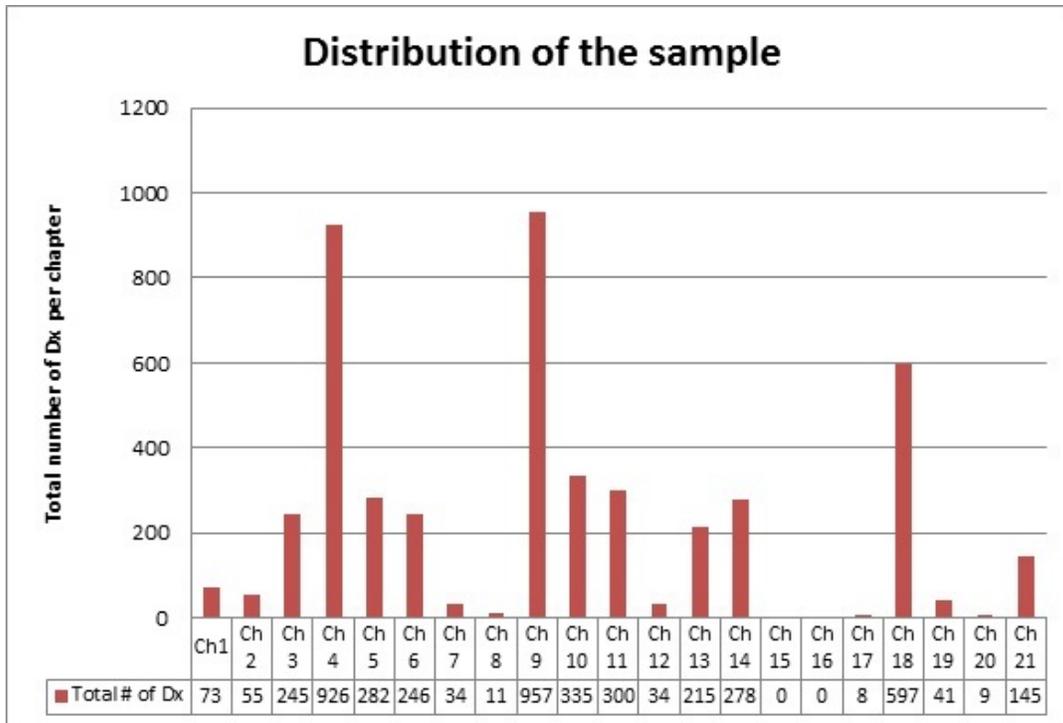
The overall mean rank for ICD-10-CM system was 4.87; while the overall mean rank for the ICD-9-CM system was 4.65. Chapter 3 with a mean rank of 4.87 (diseases of blood and blood forming organs), chapter 8 with a mean rank of 4.89 (diseases of ear), chapter 10 with a mean rank of 4.79 (diseases of respiratory systems), and chapter 17 with a mean rank of 4.75 (congenital malformations), all had the same mean rankings for both ICD-10-CM and ICD-9-CM. All the other chapters had an ICD-10-CM mean rank higher than ICD-9-CM mean rank. In these chapters (1, 2, 4, 5, 6, 7, 9, 11, 12, 13, 14, 18, 19 and 21) ICD-10-CM code(s) and the description of the code(s) were better able to capture the diagnosis than ICD-9-CM code(s) and its descriptions (Figure 9 and 10)

We performed a Wilcoxon Signed Rank Test to evaluate if the differences we see in each chapter were significant or not. We found that the rankings between ICD-9-CM and ICD-10-CM were significantly different in the following chapters; Endocrine, nutritional and metabolic diseases, Mental and Behavioral disorders, Diseases of the nervous system and Sense Organs, Diseases of Circulatory System, Diseases of the digestive system, Diseases of the skin and subcutaneous tissue, Diseases of the musculoskeletal system and connective tissue, Symptoms, Signs, and Abnormal Clinical and Laboratory Findings, Not Elsewhere Classified, : Injury,

Poisoning, and Certain Other Consequences of External Causes, External causes of Morbidity, Factors influencing Health Status and contact with Health Services.

**Table 3: Distribution of the documents into each of the ICD-10-CM chapters**

ICD-10-CM Chapters	Distribution of records according to the diagnosis codes
Chapter 1: Infectious and Parasitic diseases	73
Chapter 2: Neoplasms	55
Chapter 3: Diseases of the blood and blood forming organs and certain disorders involving the immune mechanism	245
Chapter 4: Endocrine, nutritional and metabolic diseases	926
Chapter 5: Mental and Behavioral disorders	282
Chapter 6: Diseases of the nervous system and Sense Organs	246
Chapter 7: Diseases of Eye and Adnexa	34
Chapter 8: Diseases of Ear and Mastoid Process	11
Chapter 9: Diseases of Circulatory System	957
Chapter 10: Diseases of Respiratory System	335
Chapter 11: Diseases of the digestive system	300
Chapter 12: Diseases of the skin and subcutaneous tissue	34
Chapter 13: Diseases of the musculoskeletal system and connective tissue	215
Chapter 14: Diseases of the genitourinary system	278
Chapter 15: Pregnancy, childbirth, puerperium	0
Chapter 16: Newborn (Perinatal) Guidelines	0
Chapter 17: Congenital malformations, Deformations, and chromosomal Abnormalities	8
Chapter 18: Symptoms, Signs, and Abnormal Clinical and Laboratory Findings, Not Elsewhere Classified	597
Chapter 19: Injury, Poisoning, and Certain Other Consequences of External Causes	41
Chapter 20: External causes of Morbidity	9
Chapter 21: Factors influencing Health Status and contact with Health Services	145



**Figure 7: Distribution of the sample into individual ICD-10-CM chapters**

**Table 4: Percentage of absent documentation per ICD-10-CM chapter**

<b>ICD-10-CM Chapters</b>	<b>Distribution of records according to the diagnosis codes</b>	<b>Number of diagnosis with absent documentation</b>	<b>Percentage absent (%)</b>
Chapter 1: Infectious and Parasitic diseases	73	24	32.88
Chapter 2: Neoplasms	55	14	25.45
Chapter 3: Diseases of the blood and blood forming organs and certain disorders involving the immune mechanism	245	5	2.04
Chapter 4: Endocrine, nutritional and metabolic diseases	926	135	14.58
Chapter 5: Mental and Behavioral disorders	282	22	7.80
Chapter 6: Diseases of the nervous system and Sense Organs	246	26	10.57
Chapter 7: Diseases of Eye and Adnexa	34	23	67.65
Chapter 8: Diseases of Ear and Mastoid Process	11	7	63.64
Chapter 9: Diseases of Circulatory System	957	88	9.20
Chapter 10: Diseases of Respiratory System	335	119	35.52
Chapter 11: Diseases of the digestive system	300	25	8.33
Chapter 12: Diseases of the skin and subcutaneous tissue	34	11	32.35
Chapter 13: Diseases of the musculoskeletal system and connective tissue	215	99	46.05
Chapter 14: Diseases of the genitourinary system	278	112	40.29
Chapter 15: Pregnancy, childbirth, puerperium	0	0	0.00
Chapter 16: Newborn (Perinatal) Guidelines	0	0	0.00
Chapter 17: Congenital malformations, Deformations, and chromosomal Abnormalities	8	1	12.50
Chapter 18: Symptoms, Signs, and Abnormal Clinical and Laboratory Findings, Not Elsewhere Classified	597	18	3.02

Table 4 (Continued)

Chapter 19: Injury, Poisoning, and Certain Other Consequences of External Causes	41	4	9.76
Chapter 20: External causes of Morbidity	9	0	0.00
Chapter 21: Factors influencing Health Status and contact with Health Services	145	3	2.07

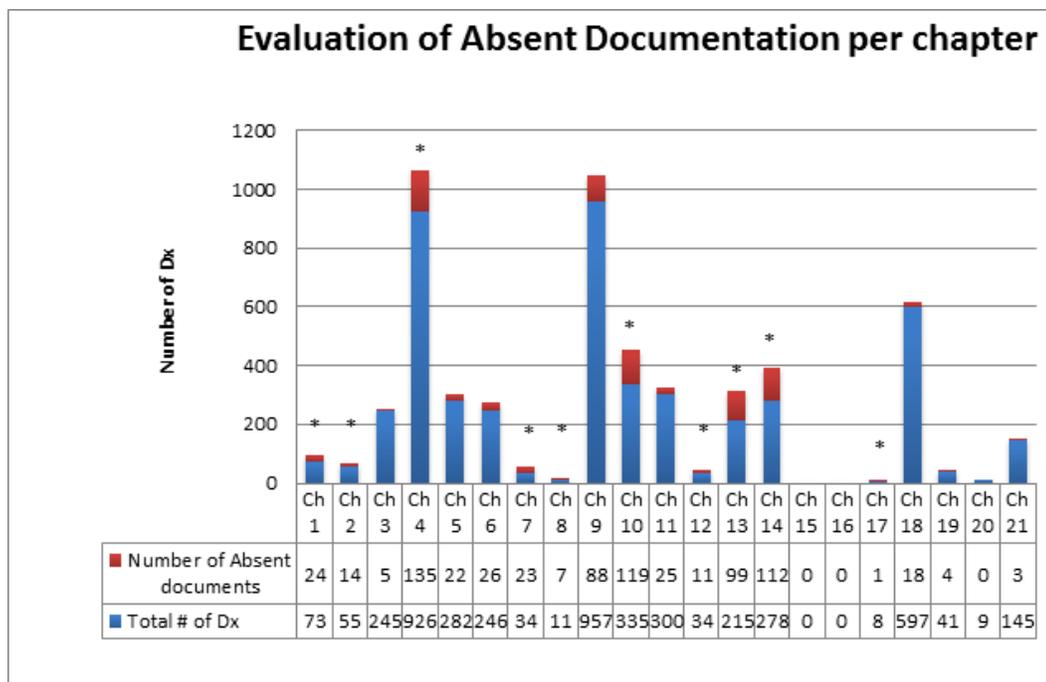


Figure 8: Evaluation of the percentage of absent documentation \*P<0.001 (Mann-Whitney U test)

**Table 5: Significance on the absent documentation \*P<0.001, Post Hoc Analysis**

<b>ICD-10-CM Chapters</b>	<b>Distribution of records according to the Principal diagnosis</b>	<b>Distribution of records according to the diagnosis codes</b>	<b>Number of diagnosis with absent documentation</b>	<b>Percentage absent (%)</b>	<b>P Value</b>
Chapter 7: Diseases of Eye and Adnexa	1	34	23	67.65	<0.001 for Ch. 3,21,18,5,11,9,19,6,4,2,10
Chapter 8: Diseases of Ear and Mastoid Process	2	11	7	63.64	<0.001 for Ch. 3,21,18,5,11,9,19,6,4
Chapter 13: Diseases of the musculoskeletal system and connective tissue	20	215	99	46.05	<0.001 for Ch. 3,21,18,5,11,9,19,6,4
Chapter 14: Diseases of the genitourinary system	26	278	112	40.29	<0.001 for Ch. 3,21,18,5,11,9,19,6,4
Chapter 10: Diseases of Respiratory System	88	335	119	35.52	<0.001 for Ch. 3,21,18,5,11,9,6,4
Chapter 1: Infectious and Parasitic diseases	29	73	24	32.88	<0.001 for Ch. 3,21,18,5,11,9,6,4
Chapter 12: Diseases of the skin and subcutaneous tissue	11	34	11	32.35	<0.001 for Ch. 3,21,18,5,11,9,6
Chapter 2: Neoplasms	2	55	14	25.45	<0.001 for Ch. 3,21,18,5,11,9

**Table 5 (Continued)**

Chapter 4: Endocrine, nutritional and metabolic diseases	17	926	135	14.58	<0.001 for Ch. 3,21,18,11,9
Chapter 17: Congenital malformations, Deformations, and Chromosomal Abnormalities	1	8	1	12.50	not significant from here on down
Chapter 6: Diseases of the nervous system and Sense Organs	35	246	26	10.57	
Chapter 19: Injury, Poisoning, and Certain Other Consequences of External Causes	28	41	4	9.76	
Chapter 9: Diseases of Circulatory System	92	957	88	9.20	
Chapter 11: Diseases of the digestive system	48	300	25	8.33	
Chapter 5: Mental and Behavioral disorders	7	282	22	7.80	
Chapter 18: Symptoms, Signs, and Abnormal Clinical and Laboratory Findings, Not Elsewhere Classified	229	597	18	3.02	

**Table 5 (Continued)**

Chapter 21: Factors influencing Health Status and contact with Health Services	2	145	3	2.07	
Chapter 3: Diseases of the blood and blood forming organs and certain disorders involving the immune mechanism	12	245	5	2.04	
Chapter 20: External causes of Morbidity	6	9	0	0.00	

**Table 6: Mean Rankings for each of the ICD-10-CM Chapters \*P<0.001; Wilcoxon Signed Ranks**

**Test. \*\*P<0.05; Wilcoxon Signed Ranks Test**

<b>ICD-10-CM Chapters</b>	<b>ICD-10-CM Rank (Mean)</b>	<b>ICD-9-CM Rank (Mean)</b>	<b>P Value</b>
Chapter 1: Infectious and Parasitic diseases	4.82	4.80	0.317
Chapter 2: Neoplasms	4.90	4.87	0.317
Chapter 3: Diseases of the blood and blood forming organs and certain disorders involving the immune mechanism	4.87	4.87	1.000
Chapter 4: Endocrine, nutritional and metabolic diseases	4.97	4.96	0.000 *
Chapter 5: Mental and Behavioral disorders	4.90	4.62	0.000*
Chapter 6: Diseases of the nervous system and Sense Organs	4.94	4.88	0.000 *
Chapter 7: Diseases of Eye and Adnexa	4.76	4.71	0.317
Chapter 8: Diseases of Ear and Mastoid Process	4.89	4.89	1.000
Chapter 9: Diseases of Circulatory System	4.90	4.88	0.030 **
Chapter 10: Diseases of Respiratory System	4.79	4.79	0.700
Chapter 11: Diseases of the digestive system	4.84	3.95	0.000*
Chapter 12: Diseases of the skin and subcutaneous tissue	4.81	4.47	0.002*
Chapter 13: Diseases of the musculoskeletal system and connective tissue	4.84	4.77	0.001 **
Chapter 14: Diseases of the genitourinary system	4.90	4.88	0.440
Chapter 15: Pregnancy, childbirth, puerperium	0.00	0.00	N/A
Chapter 16: Newborn (Perinatal) Guidelines	0.00	0.00	N/A
Chapter 17: Congenital malformations, Deformations, and chromosomal Abnormalities	4.75	4.75	1.000
Chapter 18: Symptoms, Signs, and Abnormal Clinical and Laboratory Findings, Not Elsewhere Classified	4.85	4.79	0.000 *
Chapter 19: Injury, Poisoning, and Certain Other Consequences of External Causes	4.83	4.44	0.001 **
Chapter 20: External causes of Morbidity	5.00	4.33	0.046**
Chapter 21: Factors influencing Health Status and contact with Health Services	4.92	3.62	0.000*

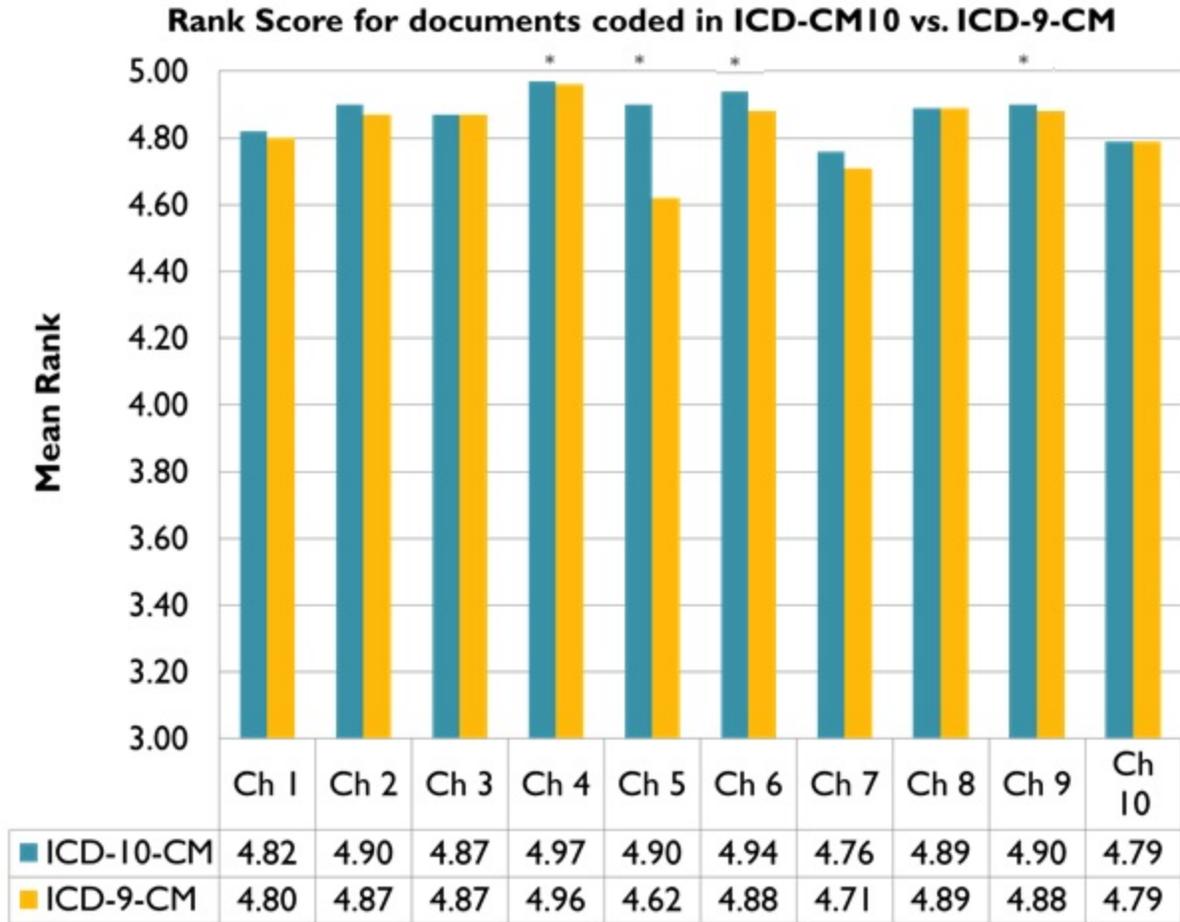
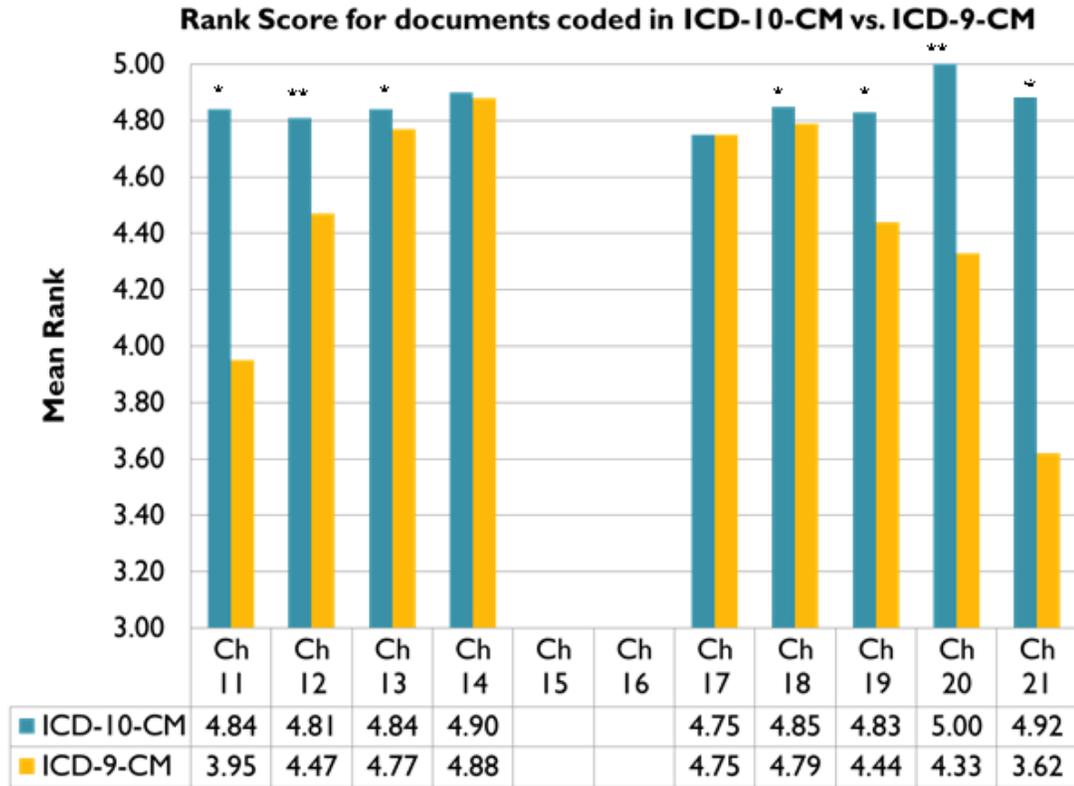


Figure 9: Comparison of Rankings between ICD-9-CM and ICD-10-CM; \*P<0.001 (Wilcoxon Signed Ranks Test)



**Figure 10: Comparison of Rankings between ICD-9-CM and ICD-10-CM; \*P<0.001; \*\*P<0.05; (Wilcoxon Signed Ranks Test)**

## 6.2 REIMBURSEMENT STUDY

We reviewed the same documentation (electronic documents) for evaluation of the potential implications in reimbursement due to absent and incomplete documentation. We found three hundred and eighty two records with the potential for improvement in documentation that could potentially result in a higher DRG weight and reimbursement. We ran these documents through the ICD-10 grouper software and obtained the DRG weight. We then adjusted the code(s) that were absent in documentation to a more specific and complex code and re-ran the adjusted code through the grouper software and compared the two different DRG weights. Since there was no reimbursement amount specified on the ICD-10 grouper version used, a ‘hypothetical’ figure was generated, to represent a typical inpatient acute care facility. The amount used was \$3800. After re-running the 382 documents with the adjusted code, 54 records returned with a difference in the MS-DRG weight and corresponding difference in reimbursement amount (Table 7). The analysis was conducted in such a way that for the documents that were absent documentation, the next specific code from the same section was assigned for the entire data set, in order to capture the most complex and specific code. Although this is a subjective process, the integrity of the data set remained the same as only the researcher conducted the entire analysis. For example, we found multiple instances in which, the clinician would list a ‘congestive heart failure’ as a diagnoses, and after review, we were not able to gather any additional information in the document that would lead us to a more specific code than the ICD-10-CM code of I50.9 (heart

failure, unspecified). Therefore, in order to evaluate the maximum potential for reimbursement for a healthcare organization, we selected the code within the same section that reflects the highest level of specificity and complexity. In this instance, we selected the ICD-10-CM code of I50.43 (heart failure, both systolic and diastolic with acute and chronic). We ran both of these codes through the ICD-10 grouper to evaluate the differences in the two different code selections. The purpose of this analysis was to identify and highlight the importance of having accurate, detailed, and specific documentation in the patient records. Table 8 further breaks down the 54 records according to the DRG weight and reimbursement according to the codes that were on the document (this was labeled as before) and the DRG weight and reimbursement according to the adjusted code set(s). For example, for a record with a diagnosis of ‘congestive heart failure’ – an ICD-10-CM code of I50.9 (heart failure, unspecified) was selected. This resulted in a DRG weight of 1.1667 and reimbursement amount of \$2169.42. After we adjusted the code to reflect the most complex and specific scenario and gave it an ICD-10-CM code of I50.43 (congestive heart failure, systolic and diastolic and acute on chronic) we obtained a DRG weight of 1.8674 and reimbursement amount of \$7096.12. The potential difference for this single adjustment resulted in \$2662.66. We calculated the total reimbursement amount for the entire 54 records with the current codes on the document (before) and calculated the total reimbursement of reimbursement after the codes have been adjusted (after). The potential gain for the 54 records with absent documentation was \$86,792.00, which is significant amount considering the fact that we only looked at 656 patient documents. This could be half a months or one month’s patient population for a typical acute care facility.

We also broke the data set according to the ten highest records that rendered the highest differences in reimbursement (Table 8). We conducted a Wilcoxon signed ranks test to evaluate

the absent documentation, before and after the code adjustment and found the overall differences to be significant ( $P < 0.001$ ). We also performed a T-Test comparison on the documents that returned a difference in reimbursement and found the reimbursement values were significantly different as well ( $P < 0.001$ ).

**Table 7: Reimbursement analysis for the electronic documents with absent documentation**

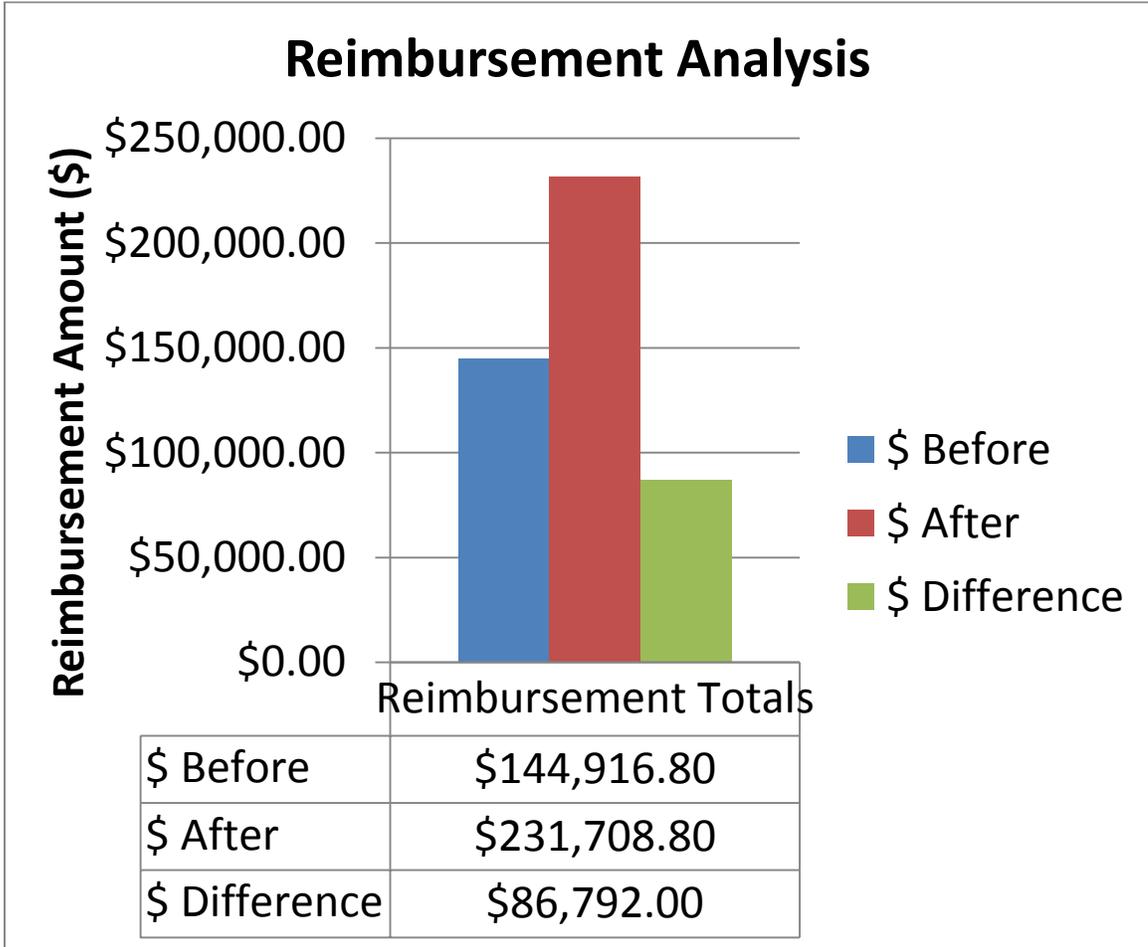
Record #	MS-DRG Weight (Before)	Reimbursement amount (\$)	MS-DRG Weight (After)	Reimbursement amount (\$)	Difference in Reimbursement (\$)	Adjusted Codes
1	00.7775	\$2,954.50	01.9521	\$7,417.98	\$4,463.48	M10.9/M10.09; I50.9/I50.43
2	01.0152	\$3,857.76	02.0667	\$7,853.46	\$3,995.70	E66.9/Z68.45; M19.90/M19.011; M10.9/M10.11
3	00.8064	\$3,064.32	01.8503	\$7,031.14	\$3,966.82	N18.9/N18.5; I50.9/I50.43; M19.90/M19.011
4	00.7096	\$2,696.48	01.4887	\$5,657.06	\$2,960.58	J18.9/J15.0; M10.9/M10.311; E66.9/Z68.45
5	01.1545	\$4,387.10	01.9074	\$7,248.12	\$2,861.02	A41.9/A41.0; N31.9/B95.0; L89.95/L89.004; G82.20/G82.21;
6	01.1545	\$4,387.10	01.9074	\$7,248.12	\$2,861.02	L89.95/L89.004
7	01.0274	\$3,904.12	01.7541	\$6,665.58	\$2,761.46	B19.9/B19.0
8	01.1667	\$4,433.46	01.8674	\$7,096.12	\$2,662.66	I50.9/I50.43
9	00.5709	\$2,169.42	01.2339	\$4,688.82	\$2,519.40	I50.9/I50.43
10	00.7191	\$2,732.58	01.3527	\$5,140.26	\$2,407.68	I50.40/I50.43; Z79.4
11	00.7191	\$2,732.58	01.3527	\$5,140.26	\$2,407.68	I50.40/I50.43
12	01.0243	\$3,892.34	01.6407	\$6,234.66	\$2,342.32	N39.0/B95.0; I50.30/I50.33
13	01.0243	\$3,892.34	01.6407	\$6,234.66	\$2,342.32	I50.30/I50.33

**Table 7 (Continued)**

14	01.4796	\$5,622.48	02.0667	\$7,853.46	\$2,230.98	J18.9/J15.0; H40.9/H40.11; M10.9/M10.11
15	01.4796	\$5,622.48	02.0667	\$7,853.46	\$2,230.98	J30.89/J30.1
16	01.4796	\$5,622.48	02.0667	\$7,853.46	\$2,230.98	J18.9/J15.0
17	01.4796	\$5,622.48	02.0667	\$7,853.46	\$2,230.98	J18.9/J15.0; I50.9/I50.43
18	01.4887	\$5,657.06	02.0667	\$7,853.46	\$2,196.40	N18.9/N18.5; I50.9/I50.43
19	01.4887	\$5,657.06	02.0667	\$7,853.46	\$2,196.40	I95.9/I95.0; I50.9/I50.43; N18.9/N18.5; M10.9/M10.311
20	00.7575	\$2,878.50	01.2972	\$4,929.36	\$2,050.86	N39.0/B95.0; I50.9/I50.43; C18.9/C18.2; E11.8/Z79.4
21	01.0706	\$4,068.28	01.6096	\$6,116.48	\$2,048.20	I26.99/I26.09;J30.2/J3 0.1
22	01.0152	\$3,857.76	01.4887	\$5,657.06	\$1,799.30	J18.9/J5.0; M19.90/M19.011
23	01.0152	\$3,857.76	01.4887	\$5,657.06	\$1,799.30	J18.9/J15.0; M45.9/M45.0
24	01.0152	\$3,857.76	01.4887	\$5,657.06	\$1,799.30	J18.9/J15.0; N18.9/N18.5; H40.9/H40.223; M19.90/M19.011; D23.9/D21.20
25	01.0152	\$3,857.76	01.4887	\$5,657.06	\$1,799.30	J18.9/J15.0
26	00.7220	\$2,743.60	01.1924	\$4,531.12	\$1,787.52	I50.9/I50.43
27	00.6568	\$2,495.84	01.0954	\$4,162.52	\$1,666.68	I50.9/I50.43
28	00.7173	\$2,725.74	01.1550	\$4,389.00	\$1,663.26	I50.9/I50.43; N18.9/N18.5; Z79.4; B95.0
29	00.7173	\$2,725.74	01.1550	\$4,389.00	\$1,663.26	I50.9/I50.41
30	00.9776	\$3,714.88	01.4072	\$5,347.36	\$1,632.48	I50.20/I50.23
31	00.6865	\$2,608.70	01.0952	\$4,161.76	\$1,553.06	N18.9/N18.5; Z68.45; I50.20/I50.23

Table 7 (Continued)

32	00.6865	\$2,608.70	01.0952	\$4,161.76	\$1,553.06	I50.9/I50.43
33	00.6865	\$2,608.70	01.0952	\$4,161.76	\$1,553.06	J06.9/J05.0; H40.9/H40.213; I50.9/I50.43
34	00.8064	\$3,064.32	01.1912	\$4,526.56	\$1,462.24	N18.9/N18.5
35	00.6587	\$2,503.06	01.0243	\$3,892.34	\$1,389.28	F32.9/F32.0; F41.9/F41.1
36	00.8198	\$3,115.24	01.1667	\$4,433.46	\$1,318.22	J45.909/J45.52
37	00.6853	\$2,604.14	01.0302	\$3,914.76	\$1,310.62	J45.909/J45.52; I50.30/I50.33
38	00.6853	\$2,604.14	01.0302	\$3,914.76	\$1,310.62	I50.9/I50.43; E66.9/Z68.45; E08.65/E11.8
39	00.6853	\$2,604.14	01.0302	\$3,914.76	\$1,310.62	N18.9/N18.5
40	00.6290	\$2,390.20	00.9584	\$3,641.92	\$1,251.72	I50.9/I50.43
41	00.6615	\$2,513.70	00.9776	\$3,714.88	\$1,201.18	M06.00/M06.09; N18.9/N18.5; E13.8/E11.8 and Z79.4
42	00.7146	\$2,715.48	01.0274	\$3,904.12	\$1,188.64	M19.90/M19.91; E66.9/Z68.45
43	00.6369	\$2,420.22	00.9344	\$3,550.72	\$1,130.50	N18.9/N18.5
44	00.7096	\$2,696.48	00.9861	\$3,747.18	\$1,050.70	J18.9/J15.0; H81.10/H81.13; M19.90/M19.011
45	00.7096	\$2,696.48	00.9861	\$3,747.18	\$1,050.70	J18.9/J15.0
46	00.7096	\$2,696.48	00.9861	\$3,747.18	\$1,050.70	J18.9/J15.0; J45.909/J45.50
47	00.5709	\$2,169.42	00.8387	\$3,187.06	\$1,017.64	E66.9/Z68.45
48	00.5709	\$2,169.42	00.8387	\$3,187.06	\$1,017.64	G62.9/G62.81; K57.90/K57.00
49	00.6827	\$2,594.26	00.9404	\$3,573.52	\$979.26	M34.9/M34.81
50	00.7220	\$2,743.60	00.9735	\$3,699.30	\$955.70	N18.9/N18.5
51	00.7220	\$2,743.60	00.9735	\$3,699.30	\$955.70	N18.9/N18.5
52	00.6081	\$2,310.78	00.8424	\$3,201.12	\$890.34	J45.901/J45.51
53	00.6827	\$2,594.26	00.9404	\$3,573.52	\$979.26	E66.9/Z68.45; M10.9/M10.011; M19.90/M19.011
54	00.9735	\$3,699.30	01.1924	\$4,531.12	\$831.82	I50.9/I50.43; I20.9/I20.1



**Figure 11: Differences in Reimbursement for combined documents with absent documentation**

**Table 8: The 10 records with the highest reimbursement differences**

MS-DRG Weight (Before)	Reimbursement amount (\$)	MS-DRG Weight (After)	Reimbursement amount (\$)	Difference in Reimbursement (\$)	Adjusted Codes
00.7775	\$2,954.50	01.9521	\$7,417.98	\$4,463.48	M10.9/M10.09; I50.9/I50.43
01.0152	\$3,857.76	02.0667	\$7,853.46	\$3,995.70	E66.9/Z68.45; M19.90/M19.011; M10.9/M10.11
00.8064	\$3,064.32	01.8503	\$7,031.14	\$3,966.82	N18.9/N18.5; I50.9/I50.43; M19.90/M19.011
00.7096	\$2,696.48	01.4887	\$5,657.06	\$2,960.58	J18.9/J15.0; M10.9/M10.311; E66.9/Z68.45
01.1545	\$4,387.10	01.9074	\$7,248.12	\$2,861.02	A41.9/A41.0; N31.9/B95.0; L89.95/L89.004; G82.20/G82.21;
01.1545	\$4,387.0	01.9074	\$7,248.12	\$2,861.02	L89.95/L89.004
01.0274	\$3,904.12	01.7541	\$6,665.58	\$2,761.46	B19.9/B19.0
01.1667	\$4,433.46	01.8674	\$7,096.12	\$2,662.66	I50.9/I50.43
00.5709	\$2,169.42	01.2339	\$4,688.82	\$2,519.40	I50.9/I50.43
00.7191	\$2,732.58	01.3527	\$5,140.26	\$2,407.68	I50.40/I50.43; Z79.4

### 6.3 DOCUMENTATION IMPROVEMENT STUDY

As part of the documentation improvement study, we developed an educational tool kit for the physician, coder and information technology team (involved in CAC development) that would enable them to capture accurate documentation as we moved towards the documentation specificity needed for ICD-10. From our research, we identified the top 10 codes with the highest amount of absent documentation that corresponded to the following six ICD-10-CM chapters:

- 1) Certain Infectious and Parasitic Diseases (Chapter 1); with 32.88% absent documentation
- 2) Diseases of the Eye and Adnexa (Chapter 7) ; with 67.65% absent documentation
- 3) Diseases of the Ear and Mastoid Process (Chapter 8); with 63.64% absent documentation
- 4) Diseases of the Respiratory System (Chapter 10); with 35.52% absent documentation
- 5) Diseases of the Musculoskeletal System and Connective Tissue (Chapter 13) ; with 46.05% absent documentation
- 6) Diseases of the Genitourinary System (Chapter 14) ; with 40.29% absent documentation

The Ten ICD-10-CM codes identified, as having the highest amount of documentation deficiencies were: A41.9 which belongs to the chapter of Certain infectious and Parasitic Diseases and is the diagnosis of Sepsis (unspecified); E11.8/E13.8/E66.9 which belongs to the chapter of endocrine, nutritional, metabolic diseases and is the diagnoses for type 2 diabetes mellitus with unspecified complications, other diabetes mellitus with unspecified complications and obesity (unspecified) respectively. The remaining codes consisted of the ICD-10-CM code J18.9 which belonged to the diseases of the respiratory system and is the diagnosis for pneumonia (unspecified organism); M10.9/M19.90 belongs to the chapter of diseases of musculoskeletal system and connective tissue and is the diagnosis for gout (unspecified) and

unspecified osteoarthritis, unspecified site; and finally we came across the ICD-10-CM code of N18.9/N39.0 both of which belonged to the chapter of diseases of genitourinary system with a diagnosis of chronic kidney disease (unspecified) and urinary tract infection (site not specified) respectively (Figure 11).

Although we have highlighted the above chapters with the highest amount of documentation deficiencies, we visited each of the ICD-10-CM chapters to discuss some of the major areas of deficiencies in each of the chapters and recommendations for improvement. After the development of the recommendations, we invited a physician (P), coding professional (C), health information management professional (HIM), and an informational technology professional (HIT) responsible in developing an inpatient CAC, to review the documentation improvement tool kit and make suggestions and recommendations for improving documentation according to their expertise. For example, the suggestions and feedback that was received by the physician relates to how the ICD-10 coding system could be improved from what they are currently seeing in coding at their respective clinics.

### **6.3.1 Analysis and Recommendations for Chapter 1**

Chapter 1 concentrates on certain infectious and parasitic diseases. All the records were coded according to the ICD-10-CM Official complete draft code set for 2011 and according to the general coding guidelines that were developed by the four organizations that are involved with the approval of the ICD-10-CM: American Hospital Association (AHA), the American Health Information Management Association (AHIMA) Centers for Medicare and Medicaid Services (CMS) the National Center for Health Statistics (NCHS). The percentage of absent

documentation was reported to be 32.88% (24 diagnoses with absent documentation/73 total diagnosis)

Some of the areas that we identified as needing improvement in documentation involved the documentation of:

sepsis; often times the records were lacking the infectious agent or the causative nature of the disease. There are multiple codes providers can choose from depending on the accurate documentation which would result in a specific code {sepsis due to a streptococcus group A, Streptococcus group B, streptococcus pneumonia, streptococcus aureus, hemophilus influenza or gram negative organisms}

The feedback we received from the physician (P) specifically highlighted the many different choices that the physician is presented with when coding for sepsis. There seems to be an information overload on the ICD-9-CM system for this particular diagnosis. Moving forward, it would be beneficial if the ICD-10-CM coding system, when implemented along with the Electronic Health Record, were to generate fewer and more specific choices for the physician to select from. This would greatly reduce their time in locating the current code and increase their time spent with the patient. This is just one example of how we can improve physician coding and documentation.

-viral hepatitis; often times the records which included this diagnosis failed to document whether or not the condition is considered chronic or indicate the presence/absence of a hepatic coma. There are specific codes that state chronic hepatitis and every code states either with/without hepatic coma. Therefore, the clinician should include the presence/absence of the hepatic coma when diagnosing hepatitis.

Recommendations:

1) When diagnosing a condition of Sepsis - Prompt the clinician at the point of documenting the patient chart, to review the condition further as to:

a. Sepsis



Identify the type of organism and/or infection; make sure to document the name of the organism



Documentation should be able to distinguish between severe sepsis, sepsis due to post procedural infection, septic shock, and septic shock complicating pregnancy or birth

### **6.3.2 Analysis and Recommendations for Chapter 2-6**

The majority of documentation for chapters 2 through chapter 6 revealed no major documentation deficiencies, except for a few areas that were absent in its specificity in diagnoses. It would be beneficial to point out some of the specificity in documentation and coding that was observed along with the areas that needed attention

Chapter 2- neoplasm

Overall, the neoplasms were well documented in terms of sites involved, chemotherapy status and the severity of the condition. However, there were 14 records identified with absent documentation out of total of 55 records, which resulted in 25.45% of absent

documentations for this chapter. Of note would be the sample size for this chapter compared to some of the other chapters.

Recommendations:

- 1) When diagnosing malignant neoplasm of the esophagus



Identify the exact location of the esophagus {upper third, middle third or lower third}

- 2) When diagnosing malignant neoplasm of the colon



Identify the exact part within the colon for more of an accurate and specific code

{ascending, hepatic, transverse, splenic, descending or sigmoid}

- 3) When diagnosing malignant neoplasm of the bladder



Identify the part of the bladder {trigone, dome, lateral wall, anterior wall, posterior wall, bladder of neck}

Chapter 3- Diseases of the blood and blood forming organs and certain disorders involving the immune mechanism

According to our data set, the diagnoses falling under the above chapter were well documented except for a few cases, where we found that the type of anemia was not documented as well as it should be. The overall percentage of absent documentation was 2.04%. We would encourage the clinician's to continue with their current line of thinking and documentation for this chapter. Some examples of areas where the documentation was considered complete, adequate, and consistent were in identifying various anemic conditions such as anemia in chronic kidney disease, iron-deficiency anemia, pancytopenia, thrombocytopenia, and sickle cell anemia.

#### Chapter 4- Endocrine, nutritional and metabolic diseases

There were two specific disease conditions for this chapter whose documentation came up as absent. The type of diabetes and the presence/absence of insulin use when diagnosing obesity and, failing to mention the associated body mass index (BMI) were the two main deficiencies encountered. Overall, this chapter performed with a 14.58% (135/926) absent documentation rate. We would like to point out that there were a large number of diagnoses for this chapter, and most of the diabetes cases were well documented with the type and insulin usage.

##### Recommendations:

- 1) When diagnosing any type of diabetes



Identify the type of diabetes along with any insulin use, which is an additional code that needs to be coded along with the diabetes

- 2) When diagnosing Obesity



Identify the associated body mass index, which is an additional code that needs to be coded along with the obesity. There are Z codes and identified BMI of 19 through 70 or greater for adults and separate BMI codes for pediatrics are available as well.

#### Chapter 5- Mental and Behavioral disorders

The overall rate of absent documentation for the chapter was 7.80%, with the majority of the documentation being adequately captured according to the diagnosis. The documentation deficiencies were assigned to the diagnoses of bipolar disorder, depression, anxiety and dementia.

Recommendations:

- 1) When diagnosing bipolar disorder



Identify if the condition is a current episode or is in remission {remission, partial remission or full remission} along with the extent of the condition {mild, moderate or severe}

- 2) When diagnosing depression



Identify the condition to mild/moderate or severe and document as a single vs. recurrent event as there are specific codes detailing each of these multiple variations.

- 3) When diagnosing anxiety



Identify the nature of the anxiety; is it phobic vs. panic in nature and if associated depression is present

## Chapter 6- Diseases of the nervous system and Sense Organs

The overall rate of absent documentation that resulted for this chapter was 10.57% with the majority of the documentation being adequately captured according to the diagnosis (26/246). The documentation deficiencies were assigned to the diagnoses of pain, cerebral palsy, migraines, Alzheimer's disease, and paraplegia.

Recommendations:

- 1) When assigning a code for the diagnosis of Pain



Identify the nature of the pain as either acute vs. chronic followed by if the condition is due to trauma, post-thoracotomy or post procedural pain

- 2) When assigning a code for cerebral palsy



Identify the specificity and complexity of the disorder and if applicable choose from a more specific diagnosis {spastic quadriplegic, spastic diplegic, spastic hemiplegic, athetoid, and ataxic}

- 3) When diagnosing paraplegia or quadriplegia



Identify the paraplegia as complete vs. incomplete and when documenting a diagnosis of quadriplegia, document if C1-C4 complete vs. incomplete and C5-C7 complete vs. incomplete

- 4) When diagnosing Alzheimer's disease



Identify if the condition would be documented with early onset vs. late onset

### **6.3.3 Analysis and Recommendations for Chapter 7**

Chapter 7 concentrates on the Diseases of Eye and Adnexa and the percentage of absent documentation was reported to be 67.65% (23 diagnoses with absent documentation out of 34

total diagnoses). The sample record numbers obtained for this chapter were relatively smaller than most of the other chapters.

Some of the areas that we identified as needing improvement in documentation involved:

-Glaucoma – When describing the degree of glaucoma, ICD-10-CM chapter guides the clinician to pick from a number of different related codes. Some of the options include: open-angle vs. primary angle closure glaucoma, and within the section of open angle the selections are further divided into, low-tension, pigmentary, and residual stage glaucoma, while the primary angle closure is further divided into acute vs. chronic angle closure. Further, if the patient was diagnosed with glaucoma secondary to other eye disorders, there are specific codes to identify and document accordingly.

-Cataracts – When documenting cataract conditions, there is again an extensive list of different codes that a clinician could pick from depending on the patient's diagnosis. Some of the options include: age-related cataract and specification of the exact location followed by the designation of laterality, infantile or juvenile cataract, traumatic cataract, and complicated or drug-induced cataract.

-Conjunctivitis - When documenting conjunctivitis conditions, there are a number of different and specific codes to choose from. Some of the details of the specificity include: mucopurulent vs. acute atopic conjunctivitis, chronic vs. acute conjunctivitis, follicular, vernal along with laterality of the eye for each of these possible conditions.

-Strabismus – again, this section is divided into multiple subsections. Some of the options include but are not limited to (depending on the condition of the patient): paralytic strabismus (with which nerve palsy involved), monocular esotropia, exotropia, vertical (including laterality), intermittent, heterophoria and mechanical strabismus.

Recommendations:

- 1) When diagnosing glaucoma



Identify if the condition is open-angle (low tension, pigmentary or capsular)



Identify laterality of the glaucoma (right eye/left eye or bilateral)



Identify if the glaucoma is secondary to another condition (eye trauma, eye disorder or due to drugs)

- 2) When diagnosing cataract



Identify if the condition is age-related (cortical, anterior, posterior along with laterality, complicated, traumatic, secondary or drug induced cataracts have their own codes as well)



If applicable, note to document infantile and juvenile cataract (cortical, anterior, and posterior along with laterality)

- 3) When diagnosing conjunctivitis



Identify if the conditions is: mucopurulent (acute or chronic), follicular, blepharoconjunctivitis along with laterality

- 4) When diagnosing strabismus



If applicable, identify if it is 3<sup>rd</sup>/4<sup>th</sup>/6<sup>th</sup> or total nerve palsy which all fall under paralytic strabismus. Further,

The clinician might in addition want to consider the following subsection (if applicable): esotropia, exotropia, vertical strabismus and intermittent heterotropia along with the laterality

### 6.3.4 Analysis and Recommendations for Chapter 8

Chapter 8 concentrates on the Diseases of the Ear and Mastoid Process and the percentage of absent documentation was reported to be 63.64% (7 diagnoses with absent documentation out of 11 total diagnoses). The sample record numbers obtained for this chapter were relatively smaller than most of the other chapters. The main areas that were lacking adequate documentation were in the diagnoses of benign positional vertigo, presbycusis, and mastoiditis.

Recommendations:

- 1) When diagnosing benign positional vertigo/ vertigo



Identify the specific ear that was involved (right, left or bilateral)

- 2) When diagnosing presbycusis



Again, make sure to document laterality of ear (right, left or bilateral)

- 3) When diagnosing mastoiditis



Identify if the condition is acute vs. chronic and if any complications are present.  
Also, note the laterality of the ear.

### **6.3.5 Analysis and Recommendations for Chapter 9**

Chapter 9 concentrates on the Diseases of the Circulatory System and the rate of absent documentation was reported at 9.20% (88/957). Considering the amount of documentation specificity available, this chapter performed better than expected. Some of the areas that showed absent documentation were congestive heart failure and hypotension. Having a more specific code for congestive heart failure resulted in a potential increase in reimbursement.

Recommendations:

- 1) When diagnosing congestive heart failure



Review and identify the following options (if applicable) - - systolic, diastolic, combined systolic and diastolic along with being acute and/or chronic.

- 2) When diagnosing hypotension



Identify if the condition is: idiopathic, orthostatic, hypotension due to drugs or hypotension of hemodialysis.

### 6.3.6 Analysis and Recommendations for Chapter 10

Chapter 10 corresponds to the Diseases of Respiratory System and the percentage of absent documentation was reported to be 35.52% (119 diagnoses with absent documentation out of 335 total diagnoses). This chapter returned with one of the highest percentages of absent documentation. We came across multiple records which stated variations of respiratory failure which were coded to a 'general' code since documentation for a specific code assignment were absent. Further, there were several records with asthma as the diagnosis. There are more specific codes one could assign for asthma if the documentation was present. Pneumonia was another problematic diagnosis for our record set, since there were multiple diagnoses with 'pneumonia' as stated without any supporting documentation as to the causative agent. Allergic rhinitis and tonsillitis rounded up the major problematic areas.

Recommendations:

- 1) When diagnosing respiratory failure related condition



Review the condition for acute (with hypoxia or hypercapnia), chronic (with hypoxia or hypercapnia) and/or both acute and chronic (with hypoxia or hypercapnia)

- 2) When diagnosing pneumonia



When reviewing for this condition, make sure to state the causative infectious agent; pneumonia as a result of various bacterial agents, also document for influenza if present, bronchopneumonia, lobar and hypostatic pneumonia.

3) When diagnosing allergic rhinitis



Identify if it is related to vasomotor rhinitis, due to pollen, due to food or any other allergen such as animal hair and dander

4) When diagnosing tonsillitis



Identify the organism if possible and document if it is acute or not.

### **6.3.7 Analysis and Recommendations for Chapter 11**

Chapter 11 corresponds to the Diseases of the digestive system with the rate of absent documentation reported at 8.33% (25/300). Some of the areas that had absent documentation were: diagnosing diverticulosis, crohn's disease, acute pancreatitis, cholecystitis and peptic ulcer disease. In general, it is important to distinguish between acute or chronic conditions along with identification of the specific part of the intestine involved.

Recommendations:

1) When diagnosis of Diverticulosis appears



Identification and documentation of the specific part of the intestine and if any abscess or bleeding was present would lead to a more specific code (small intestine, large intestine, both small and large intestine, with/without abscess or bleeding)

2) When diagnosis of crohn's disease appears



Identify the specific part of the intestine (large intestine, small intestine or both small and large intestine) along with any complications present (rectal bleeding, intestinal obstruction, fistula, abscess or any other complication)

- 3) When diagnosis of pancreatitis appears



Specifying the condition to (acute, idiopathic, biliary acute or drug induced) would lead to a more specific code.

### **6.3.8 Analysis and Recommendations for Chapter 12**

Chapter 12 concentrated on Diseases of the skin and subcutaneous tissue and resulted in a rate of 32.35% (11/34) records with absent documentation. Again, this was another chapter where we did not find too many diagnoses. Some of the major areas with documentation issues were in the diagnoses of ulcers, pressure, sacral decubitus and in chronic lower extremity and atopic dermatitis.

Recommendations:

- 1) When diagnosing a pressure ulcer



Identify the specific location of the ulcer {elbow(right/left), back (upper/lower), sacral, hip (right/left), buttock (right/left), ankle (right/left), heel (right/left), head} along with the specific stage (stage 1-4)

Of note, these designations (along with several before) have already been captured by ICD-9-CM codes: however, in the diagnosis of pressure ulcer in ICD-10-

CM, there is a combination code that identifies the location and stage (you are forced to identify the stage) and if the stage is not listed, the coder could select the unspecified stage

- 2) When diagnosing atopic dermatitis



Identify the type of dermatitis (neurodermititis, flexural eczema, infantile eczema or intrinsic eczema)

### **6.3.9 Analysis and Recommendations for Chapter 13**

Chapter 13 describes the diseases of the musculoskeletal system and connective tissue and reported an absent documentation rate of 46.05% (99/215), which is one of the highest reported for our data set. Almost all the cases with the following conditions resulted with absent documentations: Osteoporosis, osteoarthritis, osteomyelitis, gout, arthritis, and rheumatoid arthritis.

Recommendations:

- 1) Collectively, when coding for osteoporosis, osteoarthritis, osteomyelitis, arthritis and rheumatoid arthritis



Identify and describe the condition by the site (which body system is involved), laterality, acute vs. chronic and would it be considered a primary vs. secondary condition

- 2) When diagnosing a condition of gout



There are multiple codes to choose from: Idiopathic gout (site with laterality), lead induced gout (site with laterality), drug induced gout (site with laterality), gout due to renal impairment (site and laterality), other secondary gout conditions. As one could imagine, this involves much more detail and information from both the patient and clinician to accurately locate the correct code for the condition. There are much more specific codes that are listed in ICD-10-CM than ICD-9-CM.

### **6.3.10 Analysis and Recommendations for Chapter 14**

Chapter 14 corresponds to the Diseases of the genitourinary system and reported a rate of 40.29% for absent documentation (112/278). There were many cases of chronic kidney disease diagnosed, and although the majority of the cases documented the stage of chronic kidney disease, a handful of them did not. Further in some cases, we came across, where end stage renal disease was diagnosed with no documentation of the dialysis status. Another area, which we would like to see improvement, is in diagnosing urinary tract infections. If the clinician can document the associated infectious agent (causative agent) for the urinary tract infection, it would be beneficial for having complete documentation.

Recommendations:

- 1) When diagnosing chronic kidney disease and end stage renal disease



Identify the stage of the chronic kidney disease (stage 1-5; where stage 2 is considered mild, stage 3 moderate and stage 4 severe). When documenting a case of end stage renal disease, an additional code is needed for the dialysis status.

- 2) When diagnosing a case of urinary tract infection



Identify the causative infectious agent (bacterial, viral). Additionally, if the site of the infection is known, a more specific code could be selected

### **6.3.11 Analysis and Recommendations for Chapters 17-21**

Overall, chapters 17 through 21 performed at 20% below for absent documentation. The exact rates were as follows: chapter 17 concentrates on congenital malformations, Deformations, and Chromosomal Abnormalities and reported a rate of 12.50% (1/8). For chapter 18, which concentrates on Symptoms, Signs, and Abnormal Clinical and Laboratory Findings, Not Elsewhere Classified reported a rate of 3.02% (18/597). For chapter 19, which concentrates on Injury, Poisoning, and Certain Other Consequences of External Causes reported a rate of 9.76% (4/41). Chapter 20, which concentrates on External causes of Morbidity, did not have absent documentation (0/9), and for chapter 21, which concentrates on Factors influencing Health Status and contact with Health Services reported a rate of 2.07% (3/145).

Recommendations:

- 1) When encountered with a case of spina bifida



Identify the specific region involved (cervical, thoracic, lumbar, sacral) with/without hydrocephalus. Also, use additional code for paraplegia is present

- 2) When encountered with a condition of hematuria



Identify the type of hematuria as either gross or benign essential microscopic hematuria

- 3) When encountered with dysphagia



Identify the condition with the following phases of the condition: oral, oropharyngeal, pharyngeal, pharyngoesophageal, or other

- 4) When documenting pain in general



Identify the location/body system involved if possible; as the pain associated with different body system have codes from different chapters.

### 6.3.12 Summary of the Recommendations

Diagnosis/Condition	Recommendation
Sepsis	Identify the type of organism and/or infection; make sure to document the name of the organism
Sepsis	Documentation should be able to distinguish between severe sepsis, sepsis due to post procedural infection, septic shock, and septic shock complicating pregnancy or birth
malignant neoplasm of the esophagus	Identify the exact location of the esophagus {upper third, middle third or lower third}
malignant neoplasm of the colon	Identify the exact part within the colon for more of an accurate and specific code {ascending, hepatic, transverse, splenic, descending or sigmoid}
malignant neoplasm of the bladder	Identify the part of the bladder {trigone, dome, lateral wall, anterior wall, posterior wall, bladder of neck}
diabetes	Identify the type of diabetes along with any insulin use, which is an additional code that needs to be coded along with the diabetes
Obesity	Identify the associated body mass index, which is an additional code that needs to be coded along with the obesity. There are Z codes and identified BMI of 19 through 70 or greater for adults and separate BMI codes for pediatrics are available as well

bipolar disorder	Identify if the condition is a current episode or is in remission {remission, partial remission or full remission} along with the extent of the condition {mild, moderate or severe}
Depression	Identify the condition to mild/moderate or severe and document as a single vs. recurrent event as there are specific codes detailing each of these multiple variations.
Anxiety	Identify the nature of the anxiety; is it phobic vs. panic in nature and if associated depression is present
Pain	Identify the nature of the pain as either acute vs. chronic followed by if the condition is due to trauma, post-thoracotomy or post procedural pain
Pain	Identify the location/body system involved if possible; as the pain associated with different body system have codes from different chapters.
cerebral palsy	Identify the specificity and complexity of the disorder and if applicable choose from a more specific diagnosis {spastic quadriplegic, spastic diplegic, spastic hemiplegic, athetoid, and ataxic}
paraplegia or quadriplegia	Identify the paraplegia as complete vs. incomplete and when documenting a diagnosis of quadriplegia, document if C1-C4 complete vs. incomplete and C5-C7 complete vs. incomplete
Alzheimer's disease	Identify if the condition would be documented with early onset vs. late onset
Glaucoma	Identify if the condition is open-angle (low tension, pigmentary or capsular)
Glaucoma	Identify laterally of the glaucoma (right eye/left eye or bilateral)
Glaucoma	Identify if the glaucoma is secondary to another condition (eye trauma, eye disorder or due to drugs)

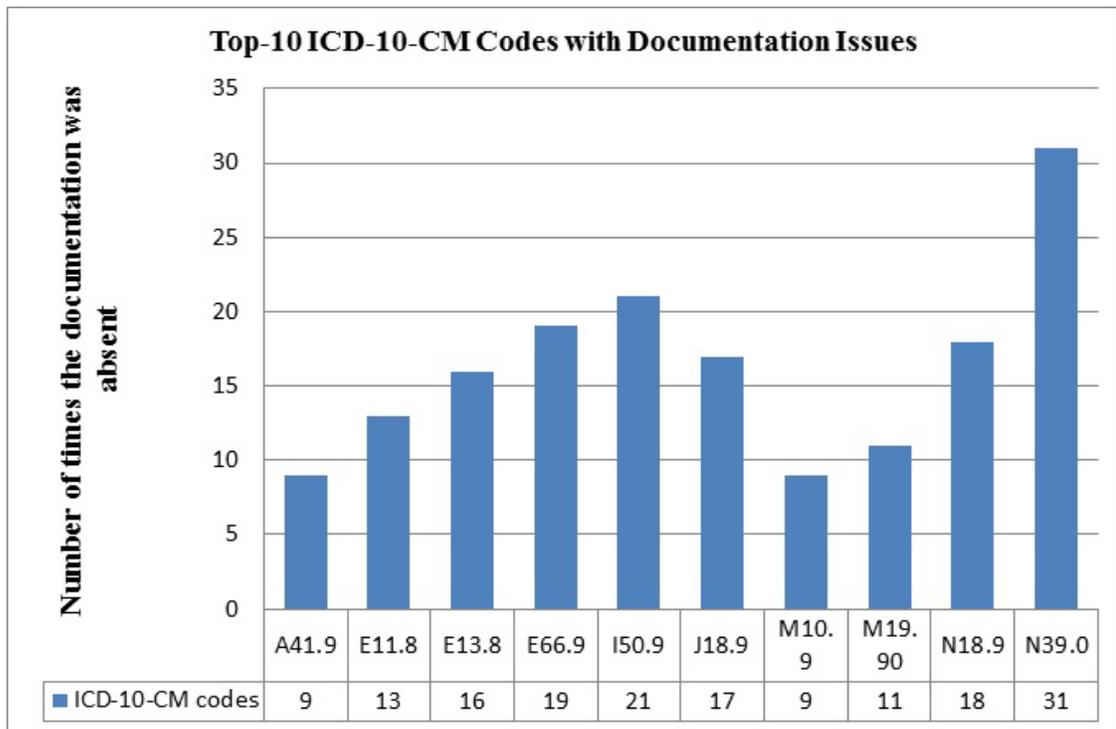
Cataract	Identify if the condition is age-related (cortical, anterior, posterior along with laterality, complicated, traumatic, secondary or drug induced cataracts have their own codes as well)
Cataract	If applicable, note to document infantile and juvenile cataract (cortical, anterior, and posterior along with laterality)
Conjunctivitis	Identify if the conditions is: mucopurulent (acute or chronic), follicular, blepharoconjunctivitis along with laterality
Strabismus	If applicable, identify if it is 3 <sup>rd</sup> /4 <sup>th</sup> /6 <sup>th</sup> or total nerve palsy which all fall under paralytic strabismus.
strabismus	The clinician might in addition want to consider the following subsection (if applicable): esotropia, exotropia, vertical strabismus and intermittent heterotropia along with the laterality
benign positional vertigo/ vertigo	Identify the specific ear that was involved (right, left or bilateral)
Presbycusis	make sure to document laterality of ear (right, left or bilateral)
Mastoiditis	Identify if the condition is acute vs. chronic and if any complications are present. Also, note the laterality of the ear.
congestive heart failure	Review and identify the following options (if applicable) - - systolic, diastolic, combined systolic and diastolic along with being acute and/or chronic.
Hypotension	Identify if the condition is: idiopathic, orthostatic, hypotension due to drugs or hypotension of hemodialysis.
respiratory failure related condition	Review the condition for acute (with hypoxia or hypercapnia), chronic (with hypoxia or hypercapnia) and/or both acute and chronic (with hypoxia or hypercapnia)

Pneumonia	When reviewing for this condition, make sure to state the causative infectious agent; pneumonia as a result of various bacterial agents, also document for influenza if present, bronchopneumonia, lobar and hypostatic pneumonia.
allergic rhinitis	Identify if it is related to vasomotor rhinitis, due to pollen, due to food or any other allergen such as animal hair and dander
Tonsillitis	Identify the organism if possible and document if it is acute or not
Diverticulosis	Identification and documentation of the specific part of the intestine and if any abscess or bleeding was present would lead to a more specific code (small intestine, large intestine, both small and large intestine, with/without abscess or bleeding)
Crohn's disease	Identify the specific part of the intestine (large intestine, small intestine or both small and large intestine) along with any complications present (rectal bleeding, intestinal obstruction, fistula, abscess or any other complication)
Pancreatitis	Specifying the condition to (acute, idiopathic, biliary acute or drug induced) would lead to a more specific code.
pressure ulcer	Identify the specific location of the ulcer {elbow(right/left), back (upper/lower), sacral, hip (right/left), buttock (right/left), ankle (right/left), heel (right/left), head} along with the specific stage (stage 1-4)
atopic dermatitis	Identify the type of dermatitis (neurodermatitis, flexural eczema, infantile eczema or intrinsic eczema)
osteoporosis, osteoarthritis, osteomyelitis, arthritis and rheumatoid arthritis	Identify and describe the condition by the site (which body system is involved), laterality, acute vs. chronic and would it be considered a primary vs. secondary condition

Gout	There are multiple codes to choose from: Idiopathic gout (site with laterality), lead induced gout (site with laterality), drug induced gout (site with laterality), gout due to renal impairment (site and laterality), other secondary gout conditions. As one could imagine, this involves much more detail and information from both the patient and clinician to accurately locate the correct code for the condition.
chronic kidney disease and end stage renal disease	Identify the stage of the chronic kidney disease (stage 1-5; where stage 2 is considered mild, stage 3 moderate and stage 4 severe). When documenting a case of end stage renal disease, an additional code is needed for the dialysis status.
urinary tract infection	Identify the causative infectious agent (bacterial, viral) also if the site of the infection is known, a more specific code could be selected
spina bifida	Identify the specific region involved (cervical, thoracic, lumbar, sacral) with/without hydrocephalus. Also, use additional code for paraplegia is present
Hematuria	Identify the type of hematuria as either gross or benign essential microscopic hematuria
Dysphagia	Identify the condition with the following phases of the condition: oral, oropharyngeal, pharyngeal, pharyngoesophageal or other

The above summary is our overall suggestions and recommendations of all the ICD-10-CM chapters according to the findings from our studies. As the coding professional (C) who reviewed the document suggested, most of these recommendations are not specific to ICD-10 alone, but rather data that should have been collected in ICD-9-CM as well. This highlights the importance of having accurate documentation (regardless of the coding system) and the fact that

the data are not being captured at the current level, raises concern and warns us of how crucial it is for clinicians to document the patient encounters accurately as we move forward to a highly specific ICD-10 coding system. If the data that was supposed to be collected already are not been collected, having an educational/refresher session in that area or specialty of coding might be beneficial. One of the major areas that require more specificity in ICD-10, for example, is in the coding of diabetic conditions. In the ICD-10-CM system, diabetes is classified according to type and cause along with additional classification for complications and the body system involved.



**Figure 12: The codes with the highest amount of documentation deficiencies**

## 7.0 DISCUSSION

As the complexity and specificity of the documentation requirements for all areas of healthcare entities increase, it is crucial to plan for implementation of accurate and timely documentation capture technology and having accurate documentation for proper reimbursement. This will greatly aid as we move towards the e-HIM arena and ICD-10 coding system. As the United States transitions to the new ICD-10 coding system, it is important for both the healthcare professionals and organizations to realize the depth (specificity and detail) that is built into the ICD-10 system. Many organizations have already taken a proactive approach and started the implementation of ICD-10 in multiple phases. As a healthcare professional, it is exciting to be part of the emerging new generation of health reform initiatives and health information technology initiatives (Health informatics, 2012). It was recently announced that the US Olympic team would be using an Electronic Medical Record from General Electric for the first time during the 2012 Olympic Games (<http://www.teamusa.org/News/2012/May/24/USOC-to-use-GE-Electronic-Medical-Record-Technology-May-24-2012.aspx>) It would give the opportunity for the clinicians who are responsible for the well-being of the athletes, to coordinate and manage each individual's complete health status.

## 7.1 CODING STUDY

There were a total of six hundred and fifty six electronic documents that were coded. Every ICD-10-CM chapter was represented except for the pregnancy and newborn chapters. There were a total of 736 diagnoses that resulted in having absent documentation out of the 4,791 diagnoses that were coded, although, overall, this seems to be a lower percentage (15.4%) when broken down into individual ICD-10-CM chapters. Some are in need of better documentation than others. When extrapolating across the United States, according to the National Hospital Discharge Survey (2009), there were approximately, 36.1 million inpatient discharges that occurred annually across the US. We attempted to evaluate the entire ICD-10-CM chapters in order to obtain the extent of the documentation requirements that are needed for the capture of ICD-10 codes. We found the Diseases of Eye and Adnexa and Diseases of Ear and Mastoid Process chapters with the highest amount of absent documentation (67.65% and 63.64% respectively). Of note, is the small sample size (a combined 45 diagnoses for both chapters). It is interesting to consider that out of that small size, most of the documents were deficient in their documentation capture. This could be due to multiple reasons: the physicians, who treated patients with these conditions, might not have had the exposure to these conditions and might not be aware of the documentation requirements for these conditions. Some of the ICD-10-CM chapters with the most coding changes are in obstetrics (Chapter 15), fracture treatment (Chapter 19), external causes (Chapter 20). These chapters require more training and education for HIM professionals as the documentation that is needed to capture the code is extensive. (Buenos, 2012). In fracture treatment and external causes, a 7<sup>th</sup> character is required in ICD-10 and there are additional places to capture more detail via the place of occurrence, activity, and external

cause agents. Other common areas where there is the capacity for additional documentation requirements are in the areas of diabetes and asthma (Dimmick, 2011 and AHIMA tool kit, 2012). Some of the new additions for Diabetes include codes that require the coder to identify secondary conditions due to diabetes and combination codes of diabetes with hypotension and chronic kidney disease. Some of the areas that were found to have documentation deficiencies were in Diseases of Eye and Adnexa, Diseases of Ear and Mastoid Process, Diseases of the musculoskeletal system and connective tissue, Diseases of the genitourinary system, Diseases of Respiratory System, Infectious and Parasitic diseases, Diseases of the skin and subcutaneous tissue, Neoplasms, Endocrine, nutritional and metabolic diseases and Congenital malformations, Deformations, and Chromosomal Abnormalities. Although there were new codes added in the ICD-10-CM system compared to ICD-9-CM, we found that most of the deficiencies in documentation resulted even for ICD-9-CM codes. Data that should have been collected in the ICD-9-CM system were absent in addition to the ICD-10-CM, which raises concerns and the need to educate the clinicians as the importance of collecting the data elements and clinical data needed for that specific condition as with the implementation of ICD-10-CM.

It is important that we learn some of the challenges that arose from the implementation of ICD-10 in other countries around the world. One of the major challenges that the ICD-10-CA (the Canadian version) came across were the fact that the entire coding system transformed from paper to electronic mode, which meant that all the coders needed to be proficient in the Windows environment of computing (Roop, 2008). Some of the other challenges were on educating the coders on all the rule changes and the lack of professional coders. (Roop, 2008). In another study, ICD-10 implementation in Australia (ICD-10-AM) identified similar attributes for a smooth implementation; education, taking time to educate the coder's and clinicians plan and

prepare early with workgroups (Innes et al, 2000). Both of these studies found that it took approximately 4-6 months for coders to regain the pre-ICD-10 coding productivity. From our findings of evaluating the ICD-10-CM chapters for documentation specificities, we find that educating the clinician is vital to maintaining accurate documentation as the first point of contact. Further, having frequent refresher sessions for clinician's and coders, possibly looking at chapter by chapter or a specific areas (if the facility is a specialty facility) would help in understanding the depth and specificity that is required in ICD-10-CM codes.

## **7.2 REIMBURSEMENT STUDY**

As we move towards implementation of the new coding system and concentrating on the expanded code set and the documentation requirements in order to capture the codes, not only does it provide us with a better clinical encounter, it effects reimbursement as well. Accurate reimbursement would be met only if the documentation is present in the medical records to justify the treatment plan. It is important to realize that all Health Insurance Portability and Accountability Act of 1996 (HIPAA) covered entities must use ICD-10 for HIPAA covered transactions to be reimbursed for the diagnoses or hospital inpatient procedures (Federal Register, Volume 74, Number 11, Jan 16, 2009). Diagnosis Related Group (DRG) method is the primary source of reimbursement for inpatient hospital settings for government and private payers. DRG is calculated based on the ICD-9-CM diagnosis and procedure codes; it is also used for Utilization Review reporting (knowing the top DRGs and the LOS). DRG assignment is based on certain criteria such as: principal and secondary diagnoses and procedure codes, sex,

age, discharge status, presence or absence of complications and comorbidities (CCs) and birth weight for neonates. An example of how a hospital might calculate the DRG reimbursement would be, by considering the hospital's Standard Base Rate (each hospital has a standard base rate) along The DRG grouper (each case is categorized into a DRG grouper based on utilization of resources and the discharge diagnosis.).

In our study, we evaluated all the electronic documents that were categorized as containing absent documentation, and ran them using ICD-10 grouper software purchased through CMS. The ICD-10 grouper would group the episode according to the DRG weight and the Major Diagnostic Category (MDC). Each record would be assigned to a MDC category along with a DRG-weight. According to the ICD-10 grouper software, there were twenty- five listed MDC categories (Table 9), and the DRG weight ranges from 0.0000 (ungroupable) to a weight of 26.3441 (Heart transplant or implant of heart assist system w MCC).

For our research purposes, we assigned the reimbursement amount of \$3800 as a 'hypothetical' amount and calculated the reimbursement amount accordingly. We found that fifty four records resulted in changes in the DRG weight after we adjusted the code to a more specific and complex code for the documents that were deficient in its documentation. The documents that resulted in the highest difference in the reimbursement amount were in the coding of 'congestive heart failure'. Most of the records that were reviewed had a diagnosis of congestive heart failure without a further explanation of the presence/absence of systolic/diastolic/acute/chronic condition. Therefore, once we adjusted the code to reflect all these conditions, the DRG weight in one of our records jumped from 00.5709 to 01.2339. This reflects the 'reimbursement potential' and importance of having accurate documentation. As we move towards, ICD-10, it is important to evaluate the reimbursement differences that are

forthcoming and to have a plan in place to deal with initial stage (learning curve) of reimbursement losses that might occur. Having accurate documentation and the increased specificity in ICD-10 will enable the healthcare organization to obtain the appropriate reimbursement in a timely manner, as the codes are more specific. It provides a clearer picture of the patient's condition and therefore could reduce the chances of returned bills (Sullivan, 2010).

**Table 9: List of MDC's for ICD-10**

<b>MDC</b>	<b>Description</b>
01	Diseases & Disorders of the Nervous System
02	Diseases & Disorders of the Eye
03	Diseases & Disorders of the Ear, Nose, Mouth and Throat
04	Diseases & Disorders of the Respiratory System
05	Diseases & Disorders of the Circulatory System
06	Diseases & Disorders of the Digestive System
07	Diseases & Disorders of the Hepatobiliary System & Pancreas
08	Diseases & Disorders of the Musculoskeletal System & Conn Tissue
09	Diseases & Disorders of the Skin, Subcutaneous Tissue & Breast
10	Endocrine, Nutritional & Metabolic Diseases & Disorders
11	Diseases & Disorders of the Kidney & Urinary Tract
12	Diseases & Disorders of the Male Reproductive System
13	Diseases & Disorders of the Female Reproductive System
14	Pregnancy, Childbirth & the Puerperium
15	Newborns & Other Neonates with condtn orig in Perinatal Period
16	Diseases & Disorders of Blood, Blood Forming Organs, Immunolog Disord
17	Myeloproliferative Diseases & Disorders, Poorly Differentiated Neoplasm
18	Infectious & Parasitic Diseases, Systemic or Unspecified Sites
19	Mental Diseases & Disorders
20	Alcohol/drug Use & Alcohol/drug induced Organic Mental Disorders

**Table 9 (continued)**

21	Injuries, Poisonings & Toxic Effects of Drugs
22	Burns
23	Factors influencing Hlth Stat & Other Contacts With Hlth Serves
24	Multiple Significant Trauma
25	Human Immunodeficiency Virus Infections

### **7.3 DOCUMENTATION IMPROVEMENT STUDY**

Documentation is the core for healthcare and often times it is the most ‘challenging’ entity as well. As we have described above, with the increased code sets and documentation requirements with ICD-10, it is vital that healthcare settings review and evaluate their current methods of handling documentation in order to be able to transition smoothly to ICD-10. What we found in our coding study was that, most of the absent documentation came from the data that should have been collected already. Therefore it would be beneficial to have an educational/refresher session in that area or specialty of coding to highlight the importance of maintaining accurate documentation.

One of the major areas that require more specificity in ICD-10, for example, is in the coding of diabetes conditions. In the ICD-10-CM system, diabetes is classified according to type and cause along with additional classification for complications and the body system involved (Smith, 2012). Our education tool kit eluted to such codes as well as, gave providers an overview of our findings in all areas of ICD-10-CM. We summarized the recommendations in a table format. Although we were not able to represent the pregnancy and newborn chapters, AHIMA

has published an ICD-10-CM/PCS tool kit (2012) that focuses on a couple of chapters including the ones on pregnancy.

We provided the above tool kit and recommendations that we generated to a Physician, coding professional, and a Health Information Technology expert for their review, recommendations, and suggestions in order to make the tool kit as efficient and useful as possible. We have tried to incorporate the comments received into our tool kit. In addition to the valuable input provided by the physician, we were able to gather some valid concerns they had. One suggestion was when using an Electronic Medical Record; it is useful to have an integrated display in one screen in order to avoid having to navigate through multiple tabs. Further, it was made aware to us that, the current EHR system they currently use, offers an extensive list of recommended codes for a certain diagnosis that are, for the most part, not relevant to the physician. Therefore, it would stand to save time and effort, when moving to ICD-10-CM that, the technology is such that it only gives a limited number of choices when a certain diagnosis is entered. By obtaining this limited list, the clinician's would have more time to spend with the patient and provide a better quality of care and provide an administrative simplification for the physician.

Another suggestion offered by the physician was the facts that if we could somehow incorporate the patient and let them tell their family/social history and history of present illness, which would pave the way for a more complete and enriching patient encounter. This brings up the usefulness of the Personal Health Record (PHR). With the emergence of technology in healthcare, the patient maintaining a PHR would facilitate the collection of certain background information and history, which would yield more time for the physician to care for the patient and document accordingly to capture the ICD-10 codes, which in turn would yield more

appropriate reimbursement. We have forwarded this recommendation over to the Health Information technology experts who are currently designing an inpatient CAC tool. After reviewing the recommendations, the health information technology professionals commended that the tool kit we developed (table of deficiencies we found and how to overcome them) were quite helpful for them in designing their interphase as our recommendations directly correspond to the initial point of contact between the physician and the patient. Having been able to capture the needed data at the first point of contact saves a lot of time and money down stream.

Although the initial intention when designing the study, was to implement an educational tool kit for the physician, after the results and interview with the physician's it was evident that providing the summary table with our recommendations, were more useful for both the physician and the IT group. As the tool kit that we generated could be used as a 'reference guide/sheet' which could be easily accessible for the physician as well as the technology team. The physician can incorporate the reference guide on his day-to-day activities and use it at the initial point of documenting the patient's diagnosis module. The technology team is currently working on inserting the reference guide onto the front end of the technology module that is being currently working on.

Several limitations include the fact that we had access to electronic document and not a complete electronic medical record. All possible conditions were coded. When looking for documentation specificity, we designated the term 'absent' to reflect the missing documentation, as it might have been possible for us to have encountered limited or no access to the full record, and the record may have possibly had that documentation at the initial point of contact with the clinician and the patient (in the full medical record). Therefore, we define absent documentation as: the documentation that was not present at the time and availability of the record review and

also the second scenario would be that the patient might have never had the condition and therefore the clinician did not document it in the record.

When analyzing the data for the Second aim (reimbursement analysis), we assigned the most appropriate code that would be more specific for the documents that had absent information. Although this is a subjective process, the integrity of the data set remained the same as only the researcher conducted the entire analysis. The analysis was conducted in such a way that for the documents that were absent information, the next specific code from the same section was assigned for the entire data set.

This research could be further expanded to evaluate the documentation requirements for ICD-10-PCS which is coding of procedures. The specificity and complexity that is required for coding procedures in ICD-10-PCS is vital for accurate collection of data as well as for obtaining accurate reimbursement. With the development of CAC technologies in inpatient settings, it would be interesting to find out how well the merger between usages of the electronic health record along with the usage of CAC would occur in ICD-10-CM. The documentation improvement tool kit was implemented as a guideline for physicians to locate the correct codes in a timely manner. As more of a dataset become available, it will then be possible to build upon the current tool kit with additional information that could guide the physician in their code selection.

## 8.0 CONCLUSION

The first study evaluated the documentation specificity of the electronic documents in coding diagnoses in an inpatient hospital setting. We looked at documentation that was absent in the electronic document when coded in ICD-10-CM and ICD-9-CM. We compared the two coding systems for how well the documentation and the diagnoses were captured by the code(s). We created a ranking scale in order to determine this. We found that the absent documentation varied from 0% to (External causes of Morbidity) to 67.65% (Diseases of Eye and Adnexa). The ranking scale ranges from a perfect 5.0 (External causes of Morbidity) to 4.75 for both ICD-10-CM and ICD-9-CM. Overall, ICD-10-CM was able to capture the code(s) and the description better than ICD-9-CM.

Following the detection of the records with the absent documentation, we found 382 records with absent documentation. We ran the records through the ICD-10 grouper and re-ran them with the adjusted code through the ICD-10 grouper and compared the DRG weight at each of the two scenarios. We found 54 records that generated a difference in reimbursement (14.1%). The potential gain in reimbursement for these 54 documents amounted to \$86,792.00. Of course this amount is considering the fact that we adjusted the code to reflect the most complex case and took a 'hypothetical' figure of \$3800. The fact still remains that if we are able to capture the data

that is required in ICD-10-CM, we could be confident in obtaining the appropriate reimbursement in a timely manner.

We were able to locate some of the documentation deficiency areas in all ICD-10-CM chapters (except the pregnancy and newborn chapters), and suggested recommendations in order to overcome the deficiencies and produce accurate documentation. Included in the study was a summary table with the deficient areas that we came across and tools/recommendations to guide the physician. Some of the chapters were lacking documentation that needs to be collected in the ICD-10-CM while most of the documentation that was lacking were items that should have been collected even at the ICD-9-CM level.

**APPENDIX A**

**SUBSET OF WORKSHEETS USED FOR CODING STUDY**

Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal DX: -Intractable nausea and vomiting	R11.2	nausea with vomiting, unspecified	787.01	Nausea with vomiting	No	5	5	
Secondary Dx:								

Diabetic gastroparesis	E11.43	Type 2 diabetes mellitus with diabetic autonomic (poly) neuropathy/ Type 2 diabetes mellitus with diabetic gastroparesis	250.6 with 536.3	Diabetes mellitus with neurological manifestations type 2 or unspecified type not stated as uncontrolled with Gastroparesis	No	5	5	
Hyponatremia.	E87.1	Hypo-osmolarity and hyponatremia	276.1	Hyposmolality and/or hyponatremia	No	5	5	
Hypertension	I10	Essential (primary) hypertension	401.9	Unspecified essential hypertension	No	5	5	
Gastroesophageal reflux disease	K21.9	Gastroesophageal reflux disease without esophagitis	530.81	Esophageal reflux	No	5	3	
Anxiety and depression	F41.9 and F32.9	Anxiety disorder, unspecified and Major depressive disorder, single episode, unspecified	300.00 and 311	Anxiety state, unspecified and Depressive disorder, not elsewhere classified	No	5	4	
Hyperlipidemia.	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidem	No	5	5	

				ia				
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Left upper extremity severe cellulitis (compartment syndrome)	L03.114 ; T79.a12 A	Cellulitis of left upper limb; Traumatic compartment syndrome of left upper extremity (initial encounter)	682.3; 958.91	Cellulitis and abscess of upper arm and forearm; Traumatic compartment syndrome of upper extremity	No	5	5	
Secondary Dx								
Polysubstance abuse	F14.10; F12.10	cocaine abuse, uncomplicated; cannabis abuse, uncomplicated	305.6; 305.20	Nondependent cocaine abuse unspecified use; Nondependent cannabis abuse unspecified use	No	5	5	

Severe protein malnutrition	E43	Unspecified severe protein calorie malnutrition	262	Other severe protein-calorie malnutrition	No	5	5	
Normocytic anemia	D64.9	Anemia, unspecified	285.9	Anemia unspecified	No	3	3	
Status post rhabdomyolysis	M62.82	Rhabdomyolysis	728.88	Rhabdomyolysis	No	5	5	
Transudative effusion	J90	Pleural effusion, not elsewhere classified	511.1	Pleurisy with effusion with a bacterial cause other than tuberculosis	No	5	5	
Left small apical pneumothorax	J95.81	Postprocedural pneumothorax	512.1	Iatrogenic pneumothorax	No	3	3	
hyperkalemia	E87.5	Hyperkalemia	276.7	Hyperpotassemia	No	5	5	
Pain control	G89.18	other acute post procedural pain	338.18	Other acute postoperative pain	Yes	5	5	did not specify the origin of the pain
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								

Non-ST segment elevation myocardial infarction	I21.4	Non-ST elevation (NSTEMI) myocardial infarction	410.71	Subendocardial infarction initial episode of care	No	5	4	
Secondary Dx								
Allergic rhinitis	J30.89	other allergic rhinitis	477.8	Allergic rhinitis due to other allergen	yes	5	5	the document is not specific for what type of allergen it is, only states patient has nasal congestion, and may continue Flonase
Chronic obstructive pulmonary disease	J44.9	Chronic Obstructive Pulmonary disease, unspecified	496	Chronic airway obstruction not elsewhere classified	No	5	5	
Personal History of paroxysmal atrial fibrillation,	I48.0 9	Atrial Fibrillation	427.31	Atrial fibrillation	No	5	5	
Personal History of chronic prostatitis	N41.10	chronic prostatitis without hematuria	601.1	Chronic prostatitis	No	5	5	
Atelectasis.	J98.11	Atelectasis	518	Pulmonary collapse	No	5	4	

Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Sepsis (E.Coli)	A41.51	Sepsis due to Escherichia coli (E.Coli); Sepsis due to anaerobes	038.42	Septicemia due to escherichia coli [e. coli]	No	5	5	
Secondary Dx								
Paraplegia secondary to trauma.	G82.20	Paraplegia, unspecified	344.1	Paraplegia	yes	5	5	documents does not list if the paraplegia is considered complete vs. incomplete
Traumatic brain injury	S06.9x9S	Unspecified intracranial injury with loss of consciousness of unspecified duration	907.0	Late effect of intracranial injury without skull fracture	yes	4	4	the documentation is absent for the duration of loss of consciousness
Thoracolumbar spine injury.	M48.25	Kissing Spine, thoracolumbar region	721.5	Kissing spine	No	5	4	

Severe protein calorie malnutrition	E43	Unspecified severe protein calorie malnutrition	262	Other severe protein-calorie malnutrition	No	5	5	
Diagnoses	I CD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Cardiac arrest	I46.9	Cardiac arrest, unspecified	427.5	Cardiac arrest	No	5	5	
Secondary Dx								
Respiratory failure (patient was anoxic)	J96.91	Respiratory failure, unspecified, with hypoxia	518.81	Acute respiratory failure	No	5	5	
Hypotension	I95.9	Hypotension, unspecified	458.9	Hypotension unspecified	yes	5	5	failed to reveal if it is idiopathic vs. Orthostatic hypotension

Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
left hand cellulitis secondary to cat bite	L03.114 ; W55.01xA	Cellulitis of left upper limb; Bitten by cat	682.3; E906.3	Cellulitis and abscess of upper arm and forearm; Bite of other animal except arthropod	No	5	4	
Secondary Dx								
Diabetes (diet controlled)	E11.9	Type 2 diabetes mellitus without complication	250.00	Diabetes mellitus without complication type 2 or unspecified type not stated as uncontrolled	Yes	5	5	documentation is lacking for the type of diabetes and the cause of it. Therefore coded to general diabetes
Osteoporosis.	M81.0	Age-related osteoporosis without current pathological fracture	733	Osteoporosis unspecified	No	5	5	

Osteoarthritis.	M19.90	Unspecified osteoarthritis, unspecified site	715.9	Osteoarthrosi s unspecified whether generalized or localized involving unspecified site	Yes	5	5	documentation is lacking on specifics of the condition therefore coded for as general
Hypertension.	I10	Essential (primary) hypertension	401.9	Unspecified essential hypertension	No	5	5	
Hyperlipidemia.	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No			
Necrotizing fasciitis	M72.6; B96.89	Necrotizing fasciitis; Other specified bacterial agents as the cause of diseases classified elsewhere	728.86; 041.89	Necrotizing fasciitis; Other specified bacterial infections in conditions classified elsewhere and of unspecified site other specified bacteria	No	5	5	

Diagnoses (Principal and Secondary)	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
Principal Dx								
Dehydration secondary to diarrhea	R19.7	Diarrhea, Unspecified	787.91	Diarrhea	No	5	5	
Secondary Dx								
Pneumothorax (new small right apical pneumothorax)	J93.8	Other Pneumothorax	512.89	Other pneumothorax	No	5	5	
Congestive heart failure exacerbation	I50.9	Heart Failure, unspecified	428	Congestive heart failure unspecified	Yes	4	5	The documents do not specify if heart failure is systolic vs.diastolic
Chronic atrial fibrillation	I48.0	Atrial Fibrillation	427.31	Atrial fibrillation	No	4	4	
Diabetes type 2	E11.9	Type 2 diabetes mellitus	250.00	Diabetes mellitus without mention of complication, type II or unspecified type, not stated as uncontrolled	Yes	5	5	no mention of any insulin use

Hypertension	I10	Essential (primary) hypertension	401.9	Unspecified essential hypertension	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Leaking J-tube ( leak was within the jejunum)	K94.13	Enterostomy malfunction	569.62	Mechanical complication of colostomy and enterostomy	No	5	5	
Secondary Dx								
Iron-deficiency anemia	D50.9	Iron deficiency anemia, unspecified	280.9	Iron deficiency anemia unspecified	No	5	5	
Nutrition	E63.9	Nutritional deficiency, unspecified	269.9	Unspecified nutritional deficiency	No	5	5	
Nausea	R11.0	Nausea	787.02	Nausea alone	No	5	5	

Diagnoses (Principal and Secondary)	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
Principal Dx								
Perforated prepyloric gastric ulcer	K25.1	Acute gastric ulcer with perforation	531.1	Acute gastric ulcer with perforation without obstruction	Yes	5	5	No mention if the ulcer is acute vs. Chronic also no mention of alcohol dependence (F10. - )
Secondary Dx								
Acute respiratory failure, this is resolved	J96.00	Acute respiratory failure, unspecified whether with hypoxia or hypercapnia	518.81	Acute respiratory failure	Yes	5	5	No mention if hypoxia or hypercapnia are present
Severe protein calorie malnutrition	E43	Unspecified severe protein-calorie malnutrition	262	Other severe protein-calorie malnutrition	No	5	5	
Acute kidney injury	N17.9	Acute kidney failure, unspecified (Acute kidney injury)	584.9	Acute kidney failure, unspecified	No	5	5	

Microangiopathic hemolytic anemia.	D59.4	Other nonautoimmune hemolytic anemias (microangiopathic hemolytic anemia)	283.19	Other non-autoimmune hemolytic anemias	No	5	4	
Suspected thrombocytopenic thrombotic purpura.	D69.3	Immune thrombocytopenic purpura	287.31	Immune thrombocytopenic purpura	No	4	4	
Non-ST-elevation myocardial infarction.	I21.4	Non-ST elevation (NSTEMI) myocardial infarction	410.71	Subendocardial infarction initial episode of care	No	5	4	
Gram-negative rod urinary tract infection.	N39.0; B96.89	Urinary tract infection, site not specified; Other specified bacterial agents as the cause of diseases classified elsewhere	599.0; 041.89	Urinary tract infection site not specified; Other specified bacterial infections in conditions classified elsewhere and of unspecified site other specified bacteria	Yes	5	5	the name of the bacterial agent is absent on the document

Suspected gram-negative rod healthcare-associated pneumonia	J15.6	Pneumonia due to other aerobic Gram-negative bacteria	482.83	Pneumonia due to other gram-negative bacteria	No	5	5	
Hypokalemia	E87.6	Hypokalemia	276.8	Hypopotassemia	No	5	4	
Hyperglycemia	R73.9	Hyperglycemia, unspecified	790.29	Other abnormal glucose	No	5	4	
Hyperbilirubinemia.	E80.6	Other disorders of bilirubin metabolism	277.4	Disorders of bilirubin excretion	No	4	4	
severe Debilitation.	R54.81	Other malaise (Debility NOS)	799.3	Debility unspecified	No	5	5	
Diagnoses	I CD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								

Moraxella catarrhalis pneumonia (community-acquired pneumonia.)	J15.6	Pneumonia due to other aerobic Gram-negative bacteria	482.83	Pneumonia due to other gram-negative bacteria	No	4	4	
Secondary Dx								
Chronic obstructive pulmonary disease	J44.9	Chronic obstructive pulmonary disease, unspecified	496	Chronic airway obstruction not elsewhere classified	No	5	5	
Atrial fibrillation.	I48.0	Atrial Fibrillation	427.31	Atrial fibrillation	No	5	5	
Hypertension	I10	Essential (primary) Hypertension (high blood pressure)	401.9	Unspecified essential hypertension	No	5		
Peripheral vascular disease	I73.9	Peripheral vascular disease, unspecified	443.9	Peripheral vascular disease unspecified	No	5	5	
Hematuria	R31.9	Hematuria, unspecified	599.7	Hematuria, unspecified	Yes	5	5	a more specific code would have been selected if the condition was stated as gross or benign

Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Left acetabular fracture	S32.402A	Unspecified fracture of left acetabulum, initial encounter for closed fracture	808.0	Closed fracture of acetabulum	No	5	4	if not specified you code for closed fracture
Secondary Dx								
Leukocytosis.	D72.829	Elevated White blood cell count, unspecified (Leukocytosis)	288.6	Leukocytosis, unspecified	No	5	5	
suspicious urinary tract infection	N39.0	Urinary tract infection, site not specified	599.0	Urinary tract infection site not specified	Yes	5	5	the infectious agent is absent
Type 2 Diabetes mellitus	E11.9	Type 2 diabetes mellitus without complications	250.00	Diabetes mellitus without complication type 2 or unspecified type not	Yes	5	5	no mention of insulin use; therefore code is absent for it.

				stated as uncontrolled				
Chronic kidney disease.	N18.9	Chronic kidney disease, unspecified	585.9	Chronic kidney disease, unspecified	Yes	5	5	documentation is lacking for mentioning of the stage for CKD
Hypertension	I10	Essential (Primary) Hypertension	401.9	Unspecified essential hypertension	No	5	5	
Benign prostatic hypertrophy	N40.0	Enlarged prostate without lower urinary tract symptoms (Benign prostatic hypertrophy)	600.00	Hypertrophy (benign) of prostate without urinary obstruction and other lower urinary tract symptoms (luts)	No	5	5	
Diastolic dysfunction	I51.89	Other ill-defined heart diseases	429.89	Other ill-defined heart diseases	No	5	5	
Dyslipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Myelofibrosis	D75.81	Myelofibrosis	289.83	Myelofibrosis	No	5	5	

Diagnoses (Principal and Secondary)	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
<b>Principal Dx</b>								
Right tibial fracture	M84.46 1A	Pathological fracture, right tibia, initial encounter for fracture	733.16	Pathologic fracture of tibia or fibula	No	5	4	
<b>Secondary Dx</b>								
Acute respiratory failure	J96.00	Acute respiratory failure, unspecified whether with hypoxia or hypercapnia	518.81	Acute respiratory failure	No	5	5	
Acute on chronic systolic and diastolic heart failure with bilateral pleural effusions	I50.43	Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure	428.43	Combined systolic and diastolic heart failure, acute on chronic	No	5	5	

Acute renal failure on stage 4 chronic kidney disease	N18.4	Chronic kidney disease, stage 4 (severe)	585.4	Chronic kidney disease, stage iv (severe)	No	5	5	
Dysphagia to thin liquids	R13.10	Dysphagia, unspecified	787.2	Dysphagia, unspecified	No	5	5	
pulmonary embolism	I26.99	Other pulmonary embolism without acute cor pulmonale	415.19	Other pulmonary embolism and infarction	No	5	5	
Fever with elevated white count.	R50.9 ; D72.829	Fever, unspecified ;Elevated white blood cell count, unspecified	288.60	Leukocytosis , unspecified	No	5	5	
Protein calorie malnutrition	E46	Unspecified protein-calorie malnutrition	263.9	Unspecified protein-calorie malnutrition	No	5	5	
Possible gram-negative pneumonia.	J15.6	Pneumonia due to other aerobic Gram-negative bacteria	482.83	Pneumonia due to other gram-negative bacteria	No	5	5	
Known coronary artery disease	I25.10	Atherosclerotic heart disease of native coronary artery	414.01	Coronary atherosclerosis of native coronary artery	No	5	5	

Urinary tract infection,	N39.0	Urinary tract infection, site not specified	599.0	Urinary tract infection site not specified	Yes	5	5	infectious agent is absent, would have used additional code if known
Stage II decubitus ulcer (right upper thigh and hip area )	L89.212	Pressure ulcer of right hip, stage 2	707.04 with 707.22	Pressure ulcer, hip with Pressure ulcer, stage ii	No	5	5	
Anemia of chronic disease	D63.1	Anemia in chronic kidney disease	285.21	Anemia in chronic kidney disease	No	5	5	
Stroke in the past.	Z86.73	Personal history of transient ischemic attack (TIA), and cerebral infarction without residual deficits (•Personal history of stroke NOS without residual deficits)	V12.54	Personal history of other diseases, of circulatory system, transient ischemic attack (tia), and cerebral infarction without residual deficits	No	5	5	
Osteoporosis	M81.0	Age-related osteoporosis without current pathological fracture	733.01	Senile osteoporosis	Yes	5	5	The documentation does not specify if the condition is age related or due to a fracture. However the code defaults to age related

Metabolic acidosis.	E87.2	Acidosis (Metabolic acidosis)	276.2	Acidosis	No	5	4	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
CHF, acute exacerbation.	I50.21	Acute systolic (congestive) heart failure	428.21	Systolic heart failure, acute	No	5	4	
Secondary Dx								
Worsening dyspnea	R06.02	Shortness of breath	786.05	Shortness of breath	No	5	5	
history significant for multiple pneumonias in the past	Z87.01	Personal history of pneumonia (recurrent)	V12.61	Personal history, pneumonia (recurrent)	No	5	5	
Cough	R05	Cough	786.2	Cough	No	5	5	
Hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	

Hypothyroidism	E03.9	Hypothyroidism, unspecified	244.9	Unspecified acquired hypothyroidism	Yes	5	5	documentation is lacking for the cause of the hypothyroidism
Chronic renal disease	N18.9	Chronic kidney disease, unspecified	585.9	Chronic kidney disease, unspecified	Yes	5	5	a more specific code would have been assigned if the documentation specified the stage of the disease
Chronic obstructive pulmonary disease.	J44.9	Chronic obstructive pulmonary disease, unspecified	493.2	Chronic obstructive asthma unspecified	No	5	5	
History of prostate cancer status post prostatectomy	Z85.46	Personal history of malignant neoplasm of prostate	V10.46	Personal history of malignant neoplasm of prostate	No	5	5	
Hyperlipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Diffuse vascular disease.	I73.9	Peripheral vascular disease, unspecified	443.9	Peripheral vascular disease unspecified	Yes	5	5	more specific codes are available if the type or condition of the vascular disease was noted

Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
hemoptysis	R04.2	Hemoptysis	786.3	Hemoptysis, unspecified	No	5	5	
Secondary Dx								
radiation therapy for adenocarcinoma of the lung that is metastatic to his cervical spine	Z51.0; C34.90 (From neoplasm table)	Encounter for antineoplastic radiation therapy; Malignant neoplasm of unspecified part of unspecified bronchus or lung	V58.0; 162.9	Encounter for radiotherapy; Malignant neoplasm of bronchus and lung unspecified	No	5	5	
Aspiration pneumonia	J69.8	Pneumonitis due to inhalation of other solids and liquids (Pneumonia due to aspiration of blood)	507.8	Pneumonitis due to other solids and liquids	No	5	5	
possible partial small bowel obstruction.	K56.60	Unspecified intestinal obstruction	560.9	Unspecified intestinal obstruction	No	4	4	

Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Chronic obstructive pulmonary disease acute exacerbation	J44.1	Chronic obstructive pulmonary disease with (acute) exacerbation	491.21	Obstructive chronic bronchitis with (acute) exacerbation	No	5	5	
Secondary Dx								
Coronary artery disease	I25.10	Atherosclerotic heart disease of native coronary artery; Old myocardial infarction	414.01	Coronary atherosclerosis of native coronary artery	No	5	5	
Congestive heart failure	I50.9	Heart failure, unspecified	428.0	Congestive Heart failure unspecified	Yes	4	5	documentation is absent as to systolic vs. diastolic
Hyperlipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	

Hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Atrial fibrillation.	I48.0	atrial fibrillation	427.31	Atrial fibrillation	No	5	5	
Gout.	M1A.9XX0	Chronic gout, unspecified, without tophus (tophi)	274.02	Chronic gouty arthropathy without mention of tophus (tophi)	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Left neck and arm pain, burning in nature	M79.602 and M54.2	Pain in left arm; Cervicalgia	729.5 and 723.1	Pain in limb ; Cervicalgia	No	5	5	
Secondary Dx								

Hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
congestive heart failure,	I50.9	Heart failure, unspecified	428.0	Congestive Heart failure unspecified	Yes	4	5	documentation is absent as to systolic vs. diastolic
History of atrial flutter	I48.1	Atrial flutter	427.32	Atrial flutter	No	5	5	
Type 2 diabetes.	E11.22 ; N18.3	Type 2 diabetes mellitus with diabetic chronic kidney disease; Chronic kidney disease, stage 3 (moderate)	250.4 ; 585.3	Diabetes mellitus with renal manifestations type 2 or unspecified type not stated as uncontrolled; Chronic kidney disease, stage iii (moderate)	No	5	5	
Coronary artery disease.	I25.10	Atherosclerotic heart disease of native coronary artery	414.01	Coronary atherosclerosis of native coronary artery	No	5	5	
Hyperlipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	

mild dementia	F03	Unspecified dementia	294.2	Dementia, unspecified, without behavioral disturbance	No	4	4	
Diagnoses	I CD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Staphylococcus bacteremia.	A41.2	Sepsis due to unspecified staphylococcus	038.10 with 995.91	Staphylococcal septicemia unspecified with Systemic inflammatory response syndrome (sirs) due to infectious process without acute organ dysfunction	No	5	5	
Secondary Dx								

Debilitation	R54	Age-related physical debility	797	Senility without psychosis	No	5	5	
Hypotension.	I95.9	Hypotension, unspecified	458.9	Hypotension unspecified	Yes	5	5	no mention of if hypotension is idiopathic vs. orthostatic
Acute kidney failure	N17.9	Acute kidney failure, unspecified (•Acute kidney injury (nontraumatic))	584.9	Acute kidney failure, unspecified	No	5	5	
Hypertension.	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Quadriplegia.	G82.53	Quadriplegia, C5-C7 complete	344.03	Quadriplegia c5-c7 complete	No	5	5	
Gastroesophageal reflux disease	K21.9	Gastro-esophageal reflux disease without esophagitis	530.81	Esophageal reflux	No	5	3	
Spasticity.	R25.2	Cramp and spasm	729.82	Cramp of limb	No	5	5	
Anemia. (iron-deficiency)	D50.9	Iron deficiency anemia, unspecified	280.9	Iron deficiency anemia unspecified	No	5	5	

osteomyelitis ( Pseudomonas)	M86.00; B96.5	Acute hematogenous osteomyelitis, unspecified site; Pseudomonas (aeruginosa) (mallei) (pseudomallei) as the cause of diseases classified elsewhere	730. 00	Acute osteomyelitis site unspecified	Yes	5	5	no mention of if osteomyelitis is acute vs. chronic and the site of infection
Obstructive sleep apnea	G47.33	Obstructive sleep apnea (adult) (pediatric)	327. 23	Obstructive sleep apnea (adult)(pedia tric)	No	5	5	
Neurogenic bladder	N31.9	Neuromuscular dysfunction of bladder, unspecified	596. 54	Neurogenic bladder nos	No	5	5	
Sacral decubitus ulcer and bilateral heel stage II ulcer.	L89.612 and L89.622	Pressure ulcer of right heel, stage 2 and Pressure ulcer of left heel, stage 2	707. 07 with 707. 22	Pressure ulcer, heel with Pressure ulcer, stage ii	No	5	4	
Diagnoses	ICD- 10-CM code (s) assignm	Description of the code assignments (ICD-10-CM)	ICD- 9- CM Code	Description of the code assignments (ICD-9-CM)	Absent documen tation in ICD-10-	Ranki ngs ICD- 10-	Rankings ICD-9-CM	Remarks

(Principal and Secondary)	ent				CM	CM		
Principal Dx								
upper respiratory tract infection	J06.9	Acute upper respiratory infection, unspecified	465.9	Acute upper respiratory infections of unspecified site	No	5	5	
Secondary Dx								
CHF.	I50.9	Heart failure, unspecified	428.0	Congestive Heart failure unspecified	Yes	4	5	documentation is absent as to systolic vs. diastolic
Hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Stage IV chronic kidney disease	N18.4	Chronic kidney disease, stage 4 (severe)	585.4	Chronic kidney disease, stage iv (severe)	No	5	5	
Normocytic anemia.	D64.9	Anemia, unspecified	285.9	Anemia unspecified	No	4	4	
Diabetes.	E08.8	Diabetes mellitus due to underlying condition with unspecified complications	249.90	Secondary diabetes mellitus with unspecified complication , not stated as uncontrolled, or	Yes	5	5	no mention of the type and/or insulin use

				unspecified				
History of COPD	J44.9	Chronic obstructive pulmonary disease, unspecified	493.20	Chronic obstructive asthma unspecified	No	5	5	
Hypothyroidism.	E03.9	Hypothyroidism, unspecified	244.9	Unspecified acquired hypothyroidism	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
acute on chronic hypoxic respiratory failure	J96.20	Acute and chronic respiratory failure, unspecified whether with hypoxia or	518.84	Acute and chronic respiratory failure	Yes	5	4	as the code states, documentation is absent if present for hypoxia and/or hypercapnia

		hypercapnia						
Secondary Dx								
Chronic obstructive pulmonary disease.	J44.9	Chronic obstructive pulmonary disease, unspecified	493.2	Chronic obstructive asthma unspecified	No	5	5	
Long-standing tobacco abuse.	F17.210	Nicotine dependence, cigarettes, uncomplicated	305.1	Nondependent tobacco use disorder	No	4	4	
Obstructive sleep apnea.	G47.33	Obstructive sleep apnea (adult) (pediatric)	327.23	Obstructive sleep apnea (adult)(pediatric)	No	4	4	
Escherichia coli urinary tract infection	B96.2; N39.0	Escherichia coli [E. coli] as the cause of diseases classified elsewhere; Urinary tract infection, site not specified	041.49; 599.0	Other and unspecified escherichia coli [e. coli]; Urinary tract infection site not specified	No	5	5	

Hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Morbid obesity with BMI greater than 40	Z68.41; E66.9	Body mass index (BMI) 40.0-44.9, adult; Obesity, unspecified	278.00; V85.4	Obesity unspecified ; Body mass index 40 and over, adult	No	5	5	
Dyslipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Hypercalcemia.	E83.52	Hypercalcemia	275.42	Hypercalcemia	No	5	5	
acute psychosis.	F29	Unspecified psychosis not due to a substance or known physiological condition	298.9	Unspecified psychosis	No	4	4	
Bipolar disorder, Schizophrenia, Depression, Anxiety disorder, Cluster B personality traits.	F31.9; F20.9; F32.8; F41.9; F60.9	Bipolar disorder, unspecified; Schizophrenia, unspecified; Other depressive episodes; Anxiety disorder, unspecified; Personality	296.80 ; 295.90; 296.82; 300.00; 301.9	Bipolar disorder, unspecified; Unspecified schizophrenia, unspecified; Atypical depressive disorder; Anxiety state,	yes to all of these conditions	5	4	documentation is lacking on the details of these conditions

		Disorder, unspecified		unspecified; Unspecified personality disorder				
Diagnoses	I CD- 10-CM code (s) assignm ent	Description of the code assignments (ICD-10-CM)	ICD- 9- CM Code	Description of the code assignments (ICD-9-CM)	Absent documen tation in ICD-10- CM	Ranki ngs ICD- 10- CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Chronic paranoid schizophrenia.	F20.0	Paranoid schizophrenia	295. 30	Paranoid type schizophre nia un specified state	No	4	4	
Secondary Dx								

End-stage renal disease (dialysis)	N18.6; Z99.2	End stage renal disease; Dependence on renal dialysis	585.6; V45.11	End stage renal disease; Renal dialysis status	No	5	5	
Hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Dyslipidemia.	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Gastroesophageal reflux disease.	K21.9	Gastro-esophageal reflux disease without esophagitis	530.81	Esophageal reflux	No	5	3	
Tobacco abuse	Z72.0	Tobacco use	V15.82	Other problems related to lifestyle	No	5	1	
Chronic constipation	K59.00	Constipation, unspecified	564.00	Unspecified constipation	No	4	4	
Diagnoses	I CD-10-CM code (s) assignm	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-	Rankings ICD-10-	Rankings ICD-9-CM	Remarks

(Principal and Secondary)	ent				CM	CM		
Principal Dx								
Chest pain.	R07.9	Chest pain, unspecified	786.5	Unspecified chest pain	No	5	5	
Secondary Dx								
Hypothyroidism	E03.9	Hypothyroidism, unspecified	244.9	Unspecified acquired hypothyroidism	No	5	5	
Chronic leg pain	M79.606	Pain in leg, unspecified	729.5	Pain in limb	No	4	4	
Depression	F32.8	Other depressive episodes	296.82	Atypical depressive disorder	No	5	5	
Anemia	D64.9	Anemia, unspecified	285.9	Anemia unspecified	No	5	5	
History of Hip osteoarthritis	M16.9	Osteoarthritis of hip, unspecified	715.35	Osteoarthrosis localized not specified whether primary or secondary involving pelvic region and thigh	Yes	5	5	No mention if it is bilateral vs. unilateral and primary vs. secondary

Diagnoses (Principal and Secondary)	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
Principal Dx								
Transient ischemic attack	G45.9	Transient cerebral ischemic attack, unspecified	435.9	Unspecified transient cerebral ischemia	No	5	5	
Secondary Dx								
Accelerated hypertension.	I10	Essential (primary) hypertension	401.9	Unspecified essential hypertension	No	5	5	
Right greater than left lower extremity edema.	R60.9	Edema, unspecified	782.3	Edema	Yes	3	3	no mention if localized vs. generalized
ETOH abuse	F10.19	Alcohol abuse with unspecified alcohol-induced disorder	291.9	Unspecified alcohol-induced mental disorders	No	5	5	
Obstructive sleep apnea -	G47.33	Obstructive sleep apnea (adult) (pediatric)	327.23	Obstructive sleep apnea (adult)(pediatric)	No	5	5	

Genitourinary symptoms.	R39.9	Unspecified symptoms and signs involving the genitourinary system	788.99	Other symptoms involving urinary system	No	5	5	
irritable bowel syndrome (with diarrhea) and radiation proctitis	K58.0 ; K62.7	Irritable bowel syndrome with diarrhea ; Radiation proctitis	564.1; 569.49	Irritable bowel syndrome ; Other specified disorders of rectum and anus	Yes	5	5	absent the type of radiation
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Respiratory failure	J96.90	Respiratory failure, unspecified, unspecified whether with hypoxia or hypercapnia	518.81	Acute respiratory failure	Yes	5	5	no documentation on whether hypoxia or hypercapnia were present
Secondary Dx								

Severe protein-calorie malnutrition	E43	Unspecified severe protein-calorie malnutrition	262	Other severe protein-calorie malnutrition	No	5	5	
Morbid obesity.	E66.9	Obesity, unspecified	278.00	Obesity unspecified	Yes	5	5	absent BMI
Diabetes type 2.	E11.8	Type 2 diabetes mellitus with unspecified complications	250.90	Diabetes mellitus with unspecified complication type 2 or unspecified type not stated as uncontrolled	No	5	5	
Chronic systolic and diastolic dysfunction	I50.42	Chronic combined systolic (congestive) and diastolic (congestive) heart failure	428.42	Combined systolic and diastolic heart failure, chronic	No	5	5	
Urinary tract infection	N39.0	Urinary tract infection	599.0	Urinary tract infection site not specified	Yes	5	5	absent infectious agent
Diagnoses	ICD-10-CM code (s) assignm	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-	Rankings ICD-10-	Rankings ICD-9-CM	Remarks

(Principal and Secondary)	ent				CM	CM		
Principal Dx								
VRE bacteremia.	R78.81	Bacteremia	790.7	Bacteremia	No	5	5	
Secondary Dx								
Healthcare-acquired pneumonia. (influenza A)	J09.X; J16.8	Influenza due to identified novel influenza A virus; Pneumonia due to other specified infectious organisms	483.8	Pneumonia due to other specified organism	No	5	5	
Severe protein calorie malnutrition	E43	Unspecified severe protein-calorie malnutrition	262	Other severe protein-calorie malnutrition	No	5	5	
Acute hypoxic respiratory failure	J96.01	Acute respiratory failure with hypoxia	518.81	Acute respiratory failure	No	5	4	
Anemia.	D64.9	Anemia, unspecified	285.9	Anemia unspecified	No	5	5	
Status post gastrostomy tube placement.	Z93.1	Gastrostomy status	V44.1	Gastrostomy status	No	5	5	

Electrolyte imbalances	E87.8	Other disorders of electrolyte and fluid balance, not elsewhere classified	276.9	Electrolyte and fluid disorders not elsewhere classified	No	5	5	
Thrombocytopenia.	D69.6	Thrombocytopenia.	287.5	Thrombocytopenia unspecified	No	5	5	
Seizure disorder.	G40.909	Epilepsy, unspecified, not intractable, without status epilepticus	345.90	Epilepsy unspecified without intractable epilepsy	No	5	5	
Cerebral palsy.	G80.9	Cerebral palsy, unspecified	343.9	Infantile cerebral palsy unspecified	Yes	5	5	no mention of spastic nor quadriplegic vs. hemiplegic
Pain.	R52	Pain, unspecified	780.96	Generalized pain	No	5	5	
anorexia	R63.0	Anorexia	783.0	Anorexia	No	5	5	
Diagnoses	ICD-10-CM code (s) assignm	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-	Rankings ICD-10-	Rankings ICD-9-CM	Remarks

(Principal and Secondary)	ent				CM	CM		
Principal Dx								
Pain.	R52	Pain, unspecified	780.96	Generalized pain	No	5	5	
Secondary Dx								
Leukocytosis.	D72.829	Elevated white blood cell count, unspecified (•Leukocytosis, unspecified)	288.60	Leukocytosis, unspecified	No	5	5	
Tachycardia.	R00.0	Tachycardia, unspecified	785.0	Tachycardia unspecified	No	5	5	
Anemia. This is likely secondary to acute blood loss.	D50.0	Iron deficiency anemia secondary to blood loss (chronic)	280.0	Iron deficiency anemia secondary to blood loss (chronic)	No	5	5	
Diagnoses	I CD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)	ent							
Principal Dx								

Pulmonary embolism with nonocclusive portal venous thrombosis	I26.99 ; I81	Pulmonary embolism (Pulmonary Thrombosis) and Portal vein thrombosis	415.19; 452	Other pulmonary embolism and infarction ; Portal vein thrombosis	No	5	5	
Secondary Dx								
Diabetes mellitus type 2, currently uncontrolled	E11.8	Type 2 diabetes mellitus with unspecified complications	250.90	Diabetes mellitus with unspecified complication type 2 or unspecified type not stated as uncontrolled	No	5	5	
Hypertension.	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Hepatocellular carcinoma,	C22.0	Liver cell carcinoma	155.0	Malignant neoplasm of liver primary	No	5	5	
Gastroesophageal reflux disease.	K21.9	Gastro-esophageal reflux disease without esophagitis	530.81	Esophageal reflux	No	5	3	

Seasonal allergies.	J30.2	Other seasonal allergic rhinitis	477.8	Allergic rhinitis due to other allergen	yes	5	5	no description of the allergy therefore coded to Allergic Rhinitis
Chronic anemia	D50.9	Iron deficiency anemia, unspecified	280.9	Iron deficiency anemia unspecified	No	4	4	
Hyperlipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Cirrhosis.	K74.60	Unspecified cirrhosis of liver	571.5	Cirrhosis of liver without alcohol	No	5	5	
Right pleural effusion.	J90	Pleural effusion, not elsewhere classified	511.89	Pleural effusion, not elsewhere classified	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								

Hypercapnic respiratory failure	J96.92	Respiratory failure, unspecified with hypercapnia	518.81	Respiratory failure, unspecified with hypercapnia	Yes	5	5	No mention whether the heart failure was acute vs. chronic
Secondary Dx								
Urinary tract infection	N39.0	Urinary tract infection	599.0	Urinary tract infection site not specified	Yes	5	5	absent infectious agent
Hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Diabetes mellitus type 2.	E11.8	Type 2 diabetes mellitus with unspecified complications	250.90	Diabetes mellitus with unspecified complication type 2 or unspecified type not stated as uncontrolled	No	5	5	
Hypothyroidism	E03.9	Hypothyroidism, unspecified	244.9	Unspecified acquired hypothyroidism	No	5	5	

Diagnoses (Principal and Secondary)	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
Principal Dx								
Neutropenic fever secondary to palliative chemotherapy.	D70.9;; Z51.5	Neutropenia, unspecified; Fever presenting with conditions classified elsewhere; Encounter for palliative care	288.00; 780.61; V66.7	Neutropenia, unspecified; Fever presenting with conditions classified elsewhere; Encounter for palliative care	No	5	5	
Secondary Dx								
History of pulmonary embolus	Z86.71	Personal history of venous thrombosis and embolism	V12.55	Personal history of pulmonary embolism	No	5	5	
Constipation.	K59.00	Constipation, unspecified	564.00	Unspecified constipation	No	5	5	

Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Acute upper gastrointestinal bleed with history of pancolonic diverticulosis	K57.93	Diverticulitis of intestine, part unspecified, without perforation or abscess with bleeding	562.13	Diverticulitis of colon with hemorrhage	No	4	4	
Secondary Dx								
Acute blood loss anemia.	D50.0	Iron deficiency anemia secondary to blood loss (chronic)	280.0	Iron deficiency anemia secondary to blood loss (chronic)	No	4	4	
COPD	J44.9	Chronic obstructive pulmonary disease, unspecified	493.20	Chronic obstructive asthma unspecified	No	5	5	

Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Bilateral pulmonary nodules with a left-sided pleurisy	R91	Abnormal finding on diagnostic imaging of lung	793.19	Other nonspecific abnormal finding of lung field	No	3	3	
Secondary Dx								
none								
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Alcohol withdrawal	F10.239	Alcohol dependence with withdrawal, unspecified	291.81	Alcohol withdrawal	Yes	5	5	no mention of if it is uncomplicated/delirium/perceptual disturbance
Secondary Dx								

Acute kidney injury.	N17.9	Acute Kidney Failure, unspecified	866.00	Unspecified injury to kidney without open wound into cavity	No	5	5	
Metabolic acidosis	E87.2	Acidosis	276.2	Acidosis	No	5	5	
hypovolemia	E86.1	Hypovolemia	276.52	Hypovolemia	No	5	5	
Hypokalemia	E87.6	Hypokalemia	276.8	Hypopotasemia	No	5	5	
Hearing loss secondary to motor vehicle accident	H91.8X9 ; V89.0X XD	Other specified hearing loss, unspecified ear; Person injured in unspecified motor-vehicle accident, nontraffic, subsequent encounter	389.8; E825.9	Other specified forms of hearing loss; Other motor vehicle nontraffic accident of other and unspecified nature injuring unspecified person	Yes	5	5	missing the laterality
Diagnoses	ICD-10-CM code (s) assignm	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-	Rankings ICD-10-	Rankings ICD-9-CM	Remarks

(Principal and Secondary)	ent				CM	CM		
Principal Dx								
Hypercapnic and hypoxic respiratory failure.	J96.92; J96.91	Respiratory failure, unspecified with hypercapnia; Respiratory failure, unspecified with hypoxia	518.81	Acute respiratory failure	Yes	5	4	no mention of whether heart failure is acute or chronic
Secondary Dx								
Sepsis	A41.9	Sepsis, unspecified organism	038.9	Unspecified septicemia	No	5	5	
Chronic obstructive pulmonary disease exacerbation	J44.1	Chronic obstructive pulmonary disease with (acute) exacerbation	491.21	Obstructive chronic bronchitis with (acute) exacerbation	No	5	5	
Leukocytosis.	D72.82 9	Elevated white blood cell count, unspecified	288.60	Leukocytosis, unspecified	No	5	5	
Nausea.	R11.0	Nausea	787.02	Nausea alone	No	5	5	
Accelerated hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	

Abnormal blood glucose.	R73.09	Other abnormal glucose	790.29	Other abnormal glucose	No	5	5	
Protein calorie malnutrition	E46	Unspecified protein-calorie malnutrition	263.9	Unspecified protein-calorie malnutrition	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Pneumonia	J13	Pneumonia due to Streptococcus pneumoniae	481	Pneumococcal pneumonia [streptococcus pneumoniae pneumonia]	No	5	5	
Secondary Dx								
Past history of Arthritis.	Z87.39	Personal history of other diseases of the musculoskeletal system and connective tissue	V13.59	Personal history of other musculoskeletal disorders	No	5	5	

past history of Osteoporosis	Z87.310	Personal history of (healed) osteoporosis fracture	V13.51	Personal history of pathologic fracture	No	5	5	
Diagnoses	I CD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Acute-on-chronic hypoxic and hypercapnic respiratory failure (diastolic congestive heart failure exacerbation.)	J96.21	Acute and chronic respiratory failure with hypoxia	518.84	Acute and chronic respiratory failure	No	5	4	
Secondary Dx								
COPD history	J44.9	Chronic obstructive pulmonary disease, unspecified	493.20	Chronic obstructive asthma unspecified	No	5	5	

positive urine Strep pneumoniae antigen - community-acquired pneumonia.	J13	Pneumonia due to Streptococcus pneumoniae	481	Pneumococcal pneumonia [streptococcus pneumoniae pneumonia]	No	5	5	
patient's tobacco abuse	Z72.0	Tobacco use	V69.8	Other problems related to lifestyle	No	5	1	
anxiety	F41.9	Anxiety disorder, unspecified	300.00	Anxiety state unspecified	Yes	5	4	specified name for the anxiety disorder would have given a more specific code
hepatitis C	B19.20	Unspecified viral hepatitis C without hepatic coma	070.70	Unspecified viral hepatitis c without hepatic coma	Yes	5	5	documentation is absent as to the description (Chronic vs. Acute) and presence/absence of a hepatic coma
Morbid obesity with BMI of 39	E66.01; Z68.39	Morbid (severe) obesity due to excess calories; Body mass index (BMI) 39.0-39.9, adult	278.01; V85.39	Morbid obesity; Body mass index 39.0-39.9, adult	No	5	5	

Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Recent non-ST-elevation myocardial infarction.	I21.4	Non-ST elevation (NSTEMI) myocardial infarction	410.71	Subendocardial infarction initial episode of care	No	5	5	
Secondary Dx								
acute kidney injury	N17.9	acute Kidney Failure, unspecified	584.9	Acute kidney failure, unspecified	No	5	5	
Recent complete heart block status	I44.2	Atrioventricular block, complete	426.0	Atrioventricular block complete	No	5	5	
Bilateral carotid stenoses	I65.23	Occlusion and stenosis of bilateral carotid arteries	433.10	Occlusion and stenosis of carotid artery without cerebral infarction	No	5	4	
pneumonia	J18.9	Pneumonia, unspecified organism	486	Pneumonia organism unspecified	yes	5	5	absent associated organism

Complicated urinary tract infection.	N39.0	Urinary tract infection, site not specified	599.0	Urinary tract infection site not specified	yes	3	3	additional code is required for infectious agent; which is absent
History of bladder cancer	Z85.51; C67.9	Personal history of malignant neoplasm of bladder; Malignant neoplasm of bladder, unspecified	V10.51	Personal history of malignant neoplasm of bladder	No	5	5	
Dysphagia.	R13.1	Dysphagia	787.20	Dysphagia, unspecified	No	5	5	
Hypernatremic hyperchloremia	E87.8	Other disorders of electrolyte and fluid balance), not elsewhere classified (•Hyperchloremia	276.9	Electrolyte and fluid disorders not elsewhere classified	No	3	3	
Mild bilateral hydronephrosis.	N13.30	Unspecified hydronephrosis	591	Hydronephrosis	No	3	3	
Paroxysmal atrial fibrillation.	I48.0	Atrial fibrillation	427.31	Atrial fibrillation	No	5	5	
Chronic obstructive pulmonary disease	J44.9	Chronic obstructive pulmonary disease, unspecified	493.20	Chronic obstructive asthma unspecified	No	5	5	

Hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Dyslipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Hypercalcemia	E83.52	Hypercalcemia	275.42	Hypercalcemia	No	5	5	
Debilitation	R53.81	Other malaise (debility NOS)	799.3	Debility unspecified	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Lower GI bleed	K92.2	Gastrointestinal hemorrhage, unspecified	578.9	Hemorrhage of gastrointestinal tract, unspecified	No	5	5	
Secondary Dx								

Chronic kidney disease.	N18.9	Chronic kidney disease (CKD), unspecified	585.9	Chronic kidney disease, unspecified	Yes	5	5	the stage of the CKD is absent
Diabetes mellitus	E13.8	Other specified diabetes mellitus with unspecified complications	250.90	Diabetes mellitus with unspecified complication type 2 or unspecified type not stated as uncontrolled	Yes	5	5	absent documentation for the type of diabetes along with any complications present/absent
History of pulmonary embolism	Z86.711	Personal history of pulmonary embolism	V12.55	Personal history of pulmonary embolism	No	5	5	
Obstructive sleep apnea.	G47.33	Obstructive sleep apnea (adult) (pediatric)	327.23	Obstructive sleep apnea (adult)(pediatric)	No	5	5	
Hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Gout	M10.9	Gout, unspecified	274.9	Gout unspecified	Yes	5	5	documentation is absent for the cause of the gout
Past Medical History of Benign prostatic hypertrophy	Z86.018	Personal history of other benign neoplasm	V13.89	Personal history of other specified diseases	No	4	3	

past medical history of Chronic anemia (kidney disease)	D63.1	Anemia in chronic kidney disease	285.21	Anemia in chronic kidney disease	No	5	5	
Morbid obesity. BMI greater than 40.	E66.01; Z68.41	Morbid (severe) obesity due to excess calories; Body mass index (BMI) 40.0-44.9, adult	278.01; V85.39	Morbid obesity; Body mass index 39.0-39.9, adult	No	5	5	
History of peptic ulcer disease	Z87.11	Personal history of peptic ulcer disease	V12.71	Personal history of peptic ulcer disease	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Cachexia	R64	Cachexia	799.4	Cachexia	No	5	5	
Secondary Dx								
Dehydration	E86.0	Dehydration	276.51	Dehydration	No	5	5	

Type 2 diabetes, insulin dependent	E11.8; Z79.4	Type 2 diabetes mellitus with unspecified complications; Long term (current) use of insulin	250.90	Diabetes mellitus with unspecified complication type 2 or unspecified type not stated as uncontrolled	No	5	5	
Chronic kidney disease	N18.9	Chronic kidney disease (CKD), unspecified	585.9	Chronic kidney disease, unspecified	Yes	5	5	the stage of the CKD is absent
Depression	F32.9	Major depressive disorder, single episode, unspecified	311	Depressive disorder not elsewhere classified	Yes	5	5	documentation is lacking as to if it is a major episode as well as how many episodes the pt has had
Hypotension	I95.0	Hypotension	458.1	Chronic hypotension	No	5	5	
Diabetic neuropathy	E11.40	Type 2 diabetes mellitus with diabetic neuropathy, unspecified	250.6	Diabetes mellitus with neurological manifestations type 2 or unspecified type not stated as uncontrolled	No	5	5	

Gastroesophageal reflux disease	K21.9	Gastro- esophageal reflux disease without esophagitis (•Esophageal reflux NOS)	530. 81	Esophageal reflux	No	5	3	
Diagnoses	I CD- 10-CM code (s) assignm ent	Description of the code assignments (ICD-10-CM)	ICD- 9- CM Code	Description of the code assignments (ICD-9-CM)	Absent documen tation in ICD-10- CM	Ranki ngs ICD- 10- CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
end-stage chronic obstructive pulmonary disease,	J44.1	Chronic obstructive pulmonary disease with (acute) exacerbation	491. 21	Obstructive chronic bronchitis with (acute) exacerbation	No	4	4	
Secondary Dx								
None								

Diagnoses (Principal and Secondary)	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
Principal Dx								
Acute kidney injury	N17.9	Acute kidney failure, unspecified (•Acute kidney injury (nontraumatic))	584.9	Acute kidney failure, unspecified	No	5	5	
Secondary Dx								
Hypertension.	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Depression	F32.9	Major depressive disorder, single episode, unspecified	311	Depressive disorder not elsewhere classified	Yes	5	5	documentation is lacking as to if is a major episode as well as how many episodes the pt has had
Anxiety.	F41.9	Anxiety disorder, unspecified	300.00	Anxiety state unspecified	No	5	4	
Fibromyalgia	M79.7	Fibromyalgia	729.1	Myalgia and myositis unspecified	No	5	4	

History of recurrent urinary tract infections	Z87.440	Personal history of urinary (tract) infections	V13.02	Personal history, urinary (tract) infection	No	5	5	
some chronic weakness and intermittent exacerbations of abdominal and lower extremity edema.	R53.1; R60.0	Weakness; Localized edema	780.79 ; 782.3	Other malaise and fatigue; Edema	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Wernicke encephalopathy	E51.2	Wernicke's encephalopathy	265.1	Other and unspecified manifestations of thiamine deficiency	No	5	3	
Secondary Dx								
Liver abscesses.	K75.0	Abscess of liver	572.0	Abscess of liver	No	5	5	

Urinary tract infection with E. coli	N39.0; B96.2	Urinary tract infection, site not specified; Escherichia coli [E. coli ] as the cause of diseases classified elsewhere	599.0; 041.49	Urinary tract infection site not specified ;Other and unspecified Escherichia coli [E. coli]	No	5	5	
Right lower lobe pneumonia, with possible gram-negative and anaerobes	J15.6	Pneumonia due to other aerobic Gram-negative bacteria	482.83	Pneumonia due to other gram-negative bacteria	No	4	4	
Leukocytosis	D72.82 9	Elevated white blood cell count, unspecified (•Leukocytosis, unspecified)	288.60	Leukocytosis , unspecified	No	5	5	
Severe protein calorie malnutrition	E43	Unspecified severe protein-calorie malnutrition	262	Other severe protein-calorie malnutrition	No	5	5	
Possible atelectasis	J98.11	Atelectasis	518.0	Pulmonary collapse	No	5	3	
Alcohol withdrawal	F10.231	Alcohol dependence with withdrawal delirium	291.0	Alcohol withdrawal delirium	No	5	5	

Hepatitis	B15.9	Hepatitis A without hepatic coma	070.1	Viral hepatitis a without hepatic coma	Yes	5	5	no mention of hepatic coma or viral status
Diagnoses	I CD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Transient ischemic attack	G45.9	Transient cerebral ischemic attack, unspecified	435.9	Unspecified transient cerebral ischemia	No	5	5	
Secondary Dx								
Uncontrolled Type II -insulin dependent diabetes.	E11.8; Z79.4	Type 2 diabetes mellitus with unspecified complications; Long term (current) use of insulin	250.90	Diabetes mellitus with unspecified complication type 2 or unspecified type not stated as uncontrolled	No	5	5	

Hypertension.	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
History of stroke	Z86.73	Personal history of transient ischemic attack (TIA), and cerebral infarction without residual deficits	V12.54	Personal history of other diseases, of circulatory system, transient ischemic attack (tia), and cerebral infarction without residual deficits	No	5	5	
Coronary artery disease.	I25.10	Atherosclerotic heart disease of native coronary artery	414.01	Coronary atherosclerosis of native coronary artery	No	5	5	
Depression, anxiety	F32.9; F41.9	Major depressive disorder, single episode, unspecified; Anxiety disorder, unspecified	311; 300.00	Depressive disorder not elsewhere classified; Anxiety state unspecified	Yes	5	4	documentation is lacking as to a major episode as well as how many episodes the pt has had

Post stroke seizure disorder.	G40.909	Epilepsy, unspecified, not intractable, without status epileptics (Seizure disorder NOS)	345.90	Epilepsy unspecified without intractable epilepsy	No	5	5	
Posttraumatic stress disorder.	F43.10	Post-traumatic stress disorder, unspecified	309.81	Posttraumatic stress disorder	Yes	5	5	no indication of if acute or chronic
history of sexual abuse	Z62.810	Personal history of physical and sexual abuse in childhood	V61.29	Other parent-child problems	No	5	4	
Obstructive sleep apnea	G47.33	Obstructive sleep apnea (adult) (pediatric)	327.23	Obstructive sleep apnea (adult)(pediatric)	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Aseptic meningitis	A27.81	Aseptic meningitis in leptospirosis	100.81	Leptospiral meningitis (aseptic)	No	5	5	

Secondary Dx								
Asthma	J45.909	Unspecified asthma, uncomplicated	493.90	Asthma unspecified type, unspecified	Yes	4	5	no mention if the asthma is mild/mod/severe and/or with exacerbation or not
Gastroesophageal reflux disease.	K21.9	Gastro-esophageal reflux disease without esophagitis (•Esophageal reflux NOS)	530.81	Esophageal reflux	No	5	3	
Anxiety.	F41.9	Anxiety disorder, unspecified	300.00	Anxiety state unspecified	No	5	4	
Dyslipidemia.	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								

Gastrointestinal bleed	K92.2	Gastrointestinal hemorrhage, unspecified	578.9	Hemorrhage of gastrointestinal tract unspecified	No	5	5	
Secondary Dx								
Anemia secondary to blood loss (iron deficiency)	D50.9	Iron deficiency anemia, unspecified	280.9	Iron deficiency anemia unspecified	No	5	5	
Hepatitis and variceal bleeding.	B19.9	Unspecified viral hepatitis without hepatic coma	070.9	Unspecified viral hepatitis without hepatic coma	Yes	5	5	documentation is absent as to which type of hepatitis it is and also if it is acute vs. chronic
tobacco abuse	Z72.0	Tobacco use	V69.8	Other problems related to lifestyle	No	5	1	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								

Respiratory failure; left-sided pneumonia, likely due to Streptococcus viridans	J96.90; J13	Respiratory failure, unspecified, unspecified whether with hypoxia or hypercapnia; Pneumonia due to Streptococcus pneumoniae	518.81; 481	Acute respiratory failure; Pneumococcal pneumonia [streptococcus pneumoniae pneumonia]	Yes	5	5	no mention if it is acute or chronic and also if hypoxia or hypercapnia was involved
Secondary Dx								
Streptococcus viridans sepsis	A40.3	Sepsis due to Streptococcus pneumoniae	038.0	Streptococcal septicemia	No	5	5	
Corynebacterium bacteremia	R78.81	Bacteremia	790.7	Bacteremia	No	4	4	
Protein calorie malnutrition	E46	Unspecified protein-calorie malnutrition	263.9	Unspecified protein-calorie malnutrition	No	5	5	
Hypokalemia.	E87.6	Hypokalemia	276.8	Hypopotassemia	No	5	5	
Prerenal azotemia	R79.89	Other specified abnormal findings of blood chemistry	790.6	Other abnormal blood chemistry	No	3	3	
Anemia of acute disease process	D50.9	Iron deficiency anemia, unspecified	280.9	Iron deficiency anemia unspecified	No	5	5	

Coronary artery disease with history of non ST-segment elevation myocardial infarction.	I25.10; I25.2	Atherosclerotic heart disease of native coronary artery; Old myocardial infarction	414.01; 412	Coronary atherosclerosis of native coronary artery ; Old myocardial infarction	No	5	5	
Hypercholesterolemia	E78.0	Pure hypercholesterolemia	272.0	Pure hypercholesterolemia	No	5	5	
Glaucoma.	H40.9	Unspecified glaucoma	365.9	Unspecified glaucoma	Yes	5	5	no documentation on the specifics of the glaucoma
Dementia.	F03	Unspecified dementia	294.20	Dementia, unspecified, without behavioral disturbance	No	5	5	
Hypoglycemia	E16.2	Hypoglycemia, unspecified	251.2	Hypoglycemia unspecified	No	5	5	
Debilitation	R53.81	Other malaise (•Debility NOS)	799.3	Debility unspecified	No	5	5	
Diagnoses	I CD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								

Principal Dx								
Recurrent small bowel obstruction	K56.60	Unspecified intestinal obstruction	560.9	Unspecified intestinal obstruction	No	4	4	
Secondary Dx								
Enterocutaneous fistula with intra-abdominal abscesses	K63.2	Fistula of intestine	569.81	Fistula of intestine excluding rectum and anus	No	5	5	
Severe protein calorie malnutrition	E43	Unspecified severe protein-calorie malnutrition	262	Other severe protein-calorie malnutrition	No	5	5	
Hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
C. difficile colitis. C. difficile	A04.7	Enterocolitis due to Clostridium difficile	008.45	Intestinal infection due to clostridium difficile	No	5	5	
Pain control.	R52	Pain, unspecified	338.19	Other acute pain	No	5	5	
Diabetes mellitus.	E11.8	Type 2 diabetes mellitus with unspecified complications	250.90	Diabetes mellitus with unspecified complication type 2 or unspecified type not	Yes	5	5	the type of the diabetes status is not documented, therefore coded to type 2 unspecified

				stated as uncontrolled				
Pseudohypomagnesemia	E20.1	Pseudohypoparathyroidism	275.49	Other disorders of calcium metabolism	No	5	3	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Atrial fibrillation with rapid ventricular response	I48.0	atrial fibrillation	427.31	Atrial fibrillation	No	5	5	
Secondary Dx								
Hypokalemia.	E87.6	Hypokalemia	276.8	Hypopotassemia	No	5	5	
Hypertension.	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	

Gastroesophageal reflux disease	K21.9	Gastro-esophageal reflux disease without esophagitis	530.81	Esophageal reflux	No	5	3	
Dyslipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
History of nephrolithiasis.	Z87.441	Personal history of nephrotic syndrome	V13.03	Personal history, nephrotic syndrome	No	5	5	
Neuropathy.(polyneuropathy)	G62.9	Polyneuropathy, unspecified (•Neuropathy NOS)	357.9	Unspecified inflammatory and toxic neuropathies	Yes	5	5	no documentation of the specifics of the neuropathy. There are several more specific codes available
erectile dysfunction	N52.9	Male erectile dysfunction, unspecified	607.84	Impotence of organic origin	No	5	3	
Nephrolithiasis	N28.83	Nephroptosis	593.0	Nephroptosis	No	5	5	
Diverticulosis	K57.90	Diverticulosis of intestine, part unspecified, without perforation or abscess without bleeding (•Diverticular disease of intestine NOS)	562.10	Diverticulosis of colon (without hemorrhage)	Yes	5	3	no documentation as to the part of the intestine (at all) along with no mention if associated abscess or bleeding was present

Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Urinary tract infection.	N39.0	Urinary tract infection, site not specified	599.0	Urinary tract infection site not specified	Yes	5	5	an additional code is needed to identify the infectious agent, which is not documented
Secondary Dx								
Uncontrolled type 1 diabetes mellitus	E10.8	Type 1 diabetes mellitus with unspecified complications	250.91	Diabetes mellitus with unspecified complication type i not stated as uncontrolled	Yes	5	5	no mention of insulin use or any other complications
Stage 3 chronic kidney disease.	N18.3	Chronic kidney disease, stage 3 (moderate)	585.3	Chronic kidney disease, stage iii (moderate)	No	5	5	

asthma	J45.909	Unspecified asthma, uncomplicated	493.90	Asthma unspecified type, unspecified	Yes	4	5	the state of asthma and any complications are absent
Gastroesophageal reflux disease	K21.9	Gastro-esophageal reflux disease without esophagitis	530.81	Esophageal reflux	No	5	3	
Migraines.	G43.009	Migraine without aura, not intractable, without status migrainosus	346.10	Migraine without aura without mention of intractable migraine without mention of status migrainosus	Yes	5	5	no documentation on if it is intractable or not
Hyperlipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Diagnoses	ICD-10-CM code (s) assignm	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-	Rankings ICD-10-	Rankings ICD-9-CM	Remarks

(Principal and Secondary)	ent				CM	CM		
Principal Dx								
Acute muscular spasm of the left sternocleidomastoid.	R25.2	Cramp and spasm	729.82	Cramp of limb	No	2	2	
Secondary Dx								
Migraines.	G43.009	Migraine without aura, not intractable, without status migrainosus	346.10	Migraine without aura without mention of intractable migraine without mention of status migrainosus	Yes	5	5	no documentation on if it is intractable or not
Polycystic ovarian syndrome	E28.2	Polycystic ovarian syndrome	256.4	Polycystic ovaries	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)	ent							
Principal Dx								

Acute respiratory failure.	J96.00	Acute respiratory failure, unspecified whether with hypoxia or hypercapnia	518.81	Acute respiratory failure	Yes	5	5	no mention if hypoxia/hypercapnia were present
Secondary Dx								
Chronic systolic congestive heart failure.	I50.22	Chronic systolic (congestive) heart failure	428.22	Systolic heart failure, chronic	No	5	5	
Acute on-chronic anemia of chronic disease	D63.1	Anemia in chronic kidney disease	285.21	Anemia in chronic kidney disease	No	4	4	
Coronary artery disease	I25.10	Atherosclerotic heart disease of native coronary artery	414.01	Coronary atherosclerosis of native coronary artery	No	5	5	
Paroxysmal atrial fibrillation.	I48.0	atrial fibrillation	427.31	Atrial fibrillation	No	5	5	
Hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Chronic kidney disease.	N18.9	Chronic kidney disease, unspecified	585.9	Chronic kidney disease, unspecified	Yes	5	5	the stage of the CKD is not documented

Severe malnutrition.	E43	Unspecified severe protein-calorie malnutrition	262	Other severe protein-calorie malnutrition	No	5	5	
Hyperlipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Right lower extremity surgical wound with exposed bone.	S31.103A	Unspecified open wound of abdominal wall, right lower quadrant without penetration into peritoneal cavity	879.4	Open wound of abdominal wall, lateral, without mention of complication	No	5	3	
Secondary Dx								
Stage IV sacral decubitus.	L89.154	Pressure ulcer of sacral region, stage 4	707.24	Pressure ulcer, stage iv	No	5	5	

Pain control.	R52	Pain, unspecified	780.96	Generalized pain	No	5	5	
Protein calorie malnutrition	E46	Unspecified protein-calorie malnutrition	263.9	Unspecified protein-calorie malnutrition		5	5	
compartment syndrome	T79.A0 XS	Compartment syndrome, unspecified, sequela	908.6	Late effect of certain complications of trauma	No	5	3	
Aortoiliac occlusive disease	I73.9	Peripheral vascular disease, unspecified	443.9	Peripheral vascular disease unspecified	No	3	3	
Vitamin D deficiency.	E55.9	Vitamin D deficiency, unspecified	268.9	Unspecified vitamin d deficiency	No	5	5	
Hypothyroid.	E03.9	Hypothyroidism, unspecified	244.9	Unspecified acquired hypothyroidism	No	5	5	
Hypertension.	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Anemia of chronic disease	D63.8	Anemia in other chronic diseases classified elsewhere	285.29	Anemia of other chronic disease	No	5	5	

Dyslipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Acute respiratory failure secondary to pulmonary edema and aspiration pneumonia.	I50.1 ; J69.0	Left ventricular failure ; Pneumonitis due to inhalation of food and vomit	428.1; 507.0	Left heart failure ; Pneumonitis due to inhalation of food or vomitus	No	5	3	
Secondary Dx								
Bilateral chronic pleural effusions.	J90	Pleural effusion, not elsewhere classified	511.89	Other specified forms of effusion, except tuberculosis	No	3	3	
Chronic abdominal pain	R10.9	Unspecified abdominal pain	789.00	Abdominal pain unspecified site	No	4	4	

Accelerated hypertension.	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Protein calorie malnutrition	E46	Unspecified protein-calorie malnutrition	263.9	Unspecified protein-calorie malnutrition	No	5	5	
Severe weakness	R53.1	Weakness	780.79	Other malaise and fatigue	No	5	5	
Dysphagia.	R13.10	Dysphagia, unspecified	787.20	Dysphagia, unspecified	Yes	5	5	the phase of the dysphagia is not documented
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Sepsis.	A41.9	Sepsis, unspecified organism	038.9	Unspecified septicemia	Yes	5	5	the identifiable source of infection is absent
Secondary Dx								

Hypoxic hypercapnic respiratory failure.	J96.91	Respiratory failure, unspecified with hypoxia	518.81	Acute respiratory failure	Yes	4	3	the type of respiratory failure (chronic vs. acute) is not documented
Tachycardia	R00.0	Tachycardia, unspecified	785.0	Tachycardia unspecified	No	5	5	
Hypokalemia.	E87.6	Hypokalemia	276.8	Hypopotassemia	No	5	5	
Atypical chest pain	R07.9	Chest pain, unspecified	786.50	Unspecified chest pain	No	5	5	
Hyponatremia.	E87.1	Hypo-osmolality and hyponatremia	276.1	Hyposmolality and/or hyponatremia	No	5	5	
Chronic obstructive pulmonary disease.	J44.9	Chronic obstructive pulmonary disease, unspecified	496	Chronic airway obstruction not elsewhere classified	No	5	5	
Chronic lymphocytic leukemia history	C91.11	Chronic lymphocytic leukemia of B-cell type in remission	204.11	Lymphoid leukemia chronic in remission	No	5	5	
Protein calorie malnutrition	E46	Unspecified protein-calorie malnutrition	263.9	Unspecified protein-calorie malnutrition	No	5	5	
Weight loss and anorexia.	R63.0	Anorexia	783.0	Anorexia	No	5	5	

type 2 diabetes mellitus insulin dependent	E11.8 ; Z79.4	Type 2 diabetes mellitus with unspecified complications;  Long term (current) use of insulin	250.90; V58.67	Diabetes mellitus with unspecified complication type 2 or unspecified type not stated as uncontrolled; Long-term (current) use of insulin	No	5	5	
Peripheral vascular disease	I73.9	Peripheral vascular disease, unspecified	443.9	Peripheral vascular disease unspecified	No	5	5	
Depression:	F33.8	Other recurrent depressive disorders	296.99	Other specified episodic mood disorder	Yes	5	4	no indication as to if the depression is major vs. minor and how many episodes
Osteoarthritis.	M19.90	Unspecified osteoarthritis, unspecified site	715.90	Osteoarthritis unspecified whether generalized or localized involving unspecified site	Yes	5	5	no documentation as to the site and the location of the osteoarthritis

Diagnoses (Principal and Secondary)	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
Principal Dx								
Nonanginal chest pain	R07.9	Chest pain, unspecified	786.50	Unspecified chest pain	No	3	3	
Secondary Dx								
GERD	K21.9	Gastro-esophageal reflux disease without esophagitis	530.81	Esophageal reflux	No	5	3	
Hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Hyperlipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
History of breast cancer status post bilateral mastectomy	Z85.3; Z90.13	Personal history of malignant neoplasm of breast; Acquired absence of bilateral breasts and nipples	V10.3; V45.71	Personal history of malignant neoplasm of breast; Acquired absence of breast and nipple	No	5	5	

Type 2 Diabetes. (insulin scale)	E11.Z7 9.4	Type 2 diabetes mellitus with unspecified complications;  Long term (current) use of insulin	250.90; V58.67	Diabetes mellitus with unspecified complication type 2 or unspecified type not stated as uncontrolled; Long-term (current) use of insulin	No	5	5	
Fibromyalgia	M79.7	Fibromyalgia	729.1	Myalgia and myositis unspecified	No	5	4	
Arthritis	M19.90	Unspecified osteoarthritis, unspecified site	715.30	Osteoarthrosi s, localized, not specified whether primary or secondary, site unspecified	Yes	4	4	the location and details of the arthritis is absent
Right ankle tendinitis	M77.9	Enthesopathy, unspecified (tendinitis)	726.90	Enthesopath y of unspecified site	No	4	4	
Diagnoses	ICD-10-CM code (s) assignm	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-	Rankings ICD-10-	Rankings ICD-9-CM	Remarks

(Principal and Secondary)	ent				CM	CM		
Principal Dx								
Coagulase-negative Staphylococcus bacteremia.	R78.81 ; A41.1	Bacteremia ; Sepsis due to other specified staphylococcus	790.7; 038.19	Bacteremia ; Other staphylococcal septicemia	No	5	5	
Secondary Dx								
Leukocytosis	D72.829	Elevated white blood cell count, unspecified	288.60	Leukocytosis , unspecified	No	5	5	
Crohn disease	K50.90	Crohn's disease, unspecified, without complications	555.9	Regional enteritis of unspecified site	Yes	5	4	no mention of the site and if any complications associated with it
Hypokalemia	E87.6	Hypokalemia	276.8	Hypopotassemia	No	5	5	
Hypocalcemia	E83.51	Hypocalcemia	275.41	Hypocalcemia	No	5	5	
Nausea and vomiting	R11.2	Nausea with vomiting, unspecified	787.01	Nausea with vomiting	No	5	5	
Gastroesophageal reflux disease	K21.9	Gastroesophageal reflux disease without esophagitis	530.81	Esophageal reflux	No	5	3	
History of tobacco abuse.	Z87.891	Personal history of nicotine dependence	V15.82	Personal history of tobacco use	No	5	5	

Diagnoses (Principal and Secondary)	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
Principal Dx								
Recurrent transient ischemic attack symptoms	G45.9	Transient cerebral ischemic attack, unspecified	435.9	Unspecified transient cerebral ischemia	No	5	5	
Secondary Dx								
Hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Hyperlipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Depression	F32.9	Major depressive disorder, single episode, unspecified	311	Depressive disorder, not elsewhere classified	Yes	5	5	no indication as to if the depression is major vs. minor and how many episodes
Hypothyroidism	E03.9	Hypothyroidism, unspecified	244.9	Unspecified acquired hypothyroidism	No	5	5	

Obstructive sleep apnea	G47.33	Obstructive sleep apnea (adult) (pediatric)	327.23	Obstructive sleep apnea (adult)(pediatric)	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Charcot (charcot boot) arthropathy	A52.16	Charcôt's arthropathy (tabetic)	094.0 with 713.5	Tabes dorsalis with Arthropathy associated with neurological disorders	No	5	5	
Secondary Dx								
Osteomyelitis	M86.9	Osteomyelitis, unspecified	730.20	Unspecified osteomyelitis, site unspecified	No	5	5	

Uncontrolled diabetes mellitus, type 2:	E11.8; Z79.4	Type 2 diabetes mellitus with unspecified complications;  Long term (current) use of insulin	250.90; V58.67	Diabetes mellitus with unspecified complication type 2 or unspecified type not stated as uncontrolled; Long-term (current) use of insulin	No	5	5	
Hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Stage III chronic kidney disease	I12.9; N18.3	Hypertensive chronic kidney disease with stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease; Chronic kidney disease, stage 3 (moderate)	403.90	Hypertensive chronic kidney disease, unspecified, with chronic kidney disease stage i through stage iv, or unspecified	No	5	5	
Anemia	D63.1	Anemia in chronic kidney disease	285.21	Anemia in chronic kidney disease	No	5	5	
Chronic pain syndrome	G89.4	Chronic pain syndrome	338.4	Chronic pain syndrome	No	5	5	

History of Osteoporosis	Z87.310	Personal history of (healed) osteoporosis fracture	V13.51	Personal history of pathologic fracture	No	5	5	
Severe cervical radiculopathy.	M54.12	Radiculopathy, cervical region	723.4	Brachial neuritis or radiculitis nos	No	4	3	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
myasthenia gravis exacerbation	G70.01	Myasthenia gravis with (acute) exacerbation	358.01	Myasthenia gravis with (acute) exacerbation	No	5	5	
Secondary Dx								
Childhood asthma.	J45.909	Unspecified asthma, uncomplicated	493.90	Asthma unspecified type, unspecified	No	4	5	

Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Atrial fibrillation with rapid ventricular response.	I48.0	atrial fibrillation	427.31	Atrial fibrillation	No	5	5	
Secondary Dx								
Acute systolic heart failure.	I50.21	Acute systolic (congestive) heart failure	428.21	Systolic heart failure, acute	No	5	5	
Dyslipidemia.	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Hypertension.	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Tachy-brady syndrome,	Z95.0	Presence of cardiac pacemaker	V45.01	Cardiac pacemaker in situ	No	5	5	
Syncope	R55	Syncope and collapse	780.2	Syncope and collapse	No	5	5	

Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Acute pyelonephritis. (most likely affecting both kidneys)	N10	Acute tubulointerstitial nephritis	590.10	Acute pyelonephritis without lesion of renal medullary necrosis	No	4	5	
Secondary Dx								
Nephrolithiasis.	Q61.5	Medullary cystic kidney (Nephronophthisis)	753.16	Medullary cystic kidney	No	4	4	
Iron-deficiency anemia.	D50.9	Iron deficiency anemia, unspecified	280.9	Iron deficiency anemia unspecified	No	5	5	
Hyperlipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Uncontrolled diabetes mellitus type 2	E11.8	Type 2 diabetes mellitus with unspecified complications	250.90	Diabetes mellitus with unspecified complication type 2 or unspecified	Yes	5	5	no mention of insulin usage

				type not stated as uncontrolled				
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Atypical chest pain	R07.9	Chest pain, unspecified	786.50	Unspecified chest pain	No	5	5	
Secondary Dx								
Knee pain.	M25.569	Pain in unspecified knee	719.46	Pain in joint involving lower leg	Yes	5	4	no mention of which knee
Chronic atrial fibrillation.	I48.0	atrial fibrillation	427.31	Atrial fibrillation	No	4	4	
Hyperlipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	

hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Vitamin B12 deficiency.	E53.8	Deficiency of other specified B group vitamins	266.2	Other b-complex deficiencies	No	4	4	
vitamin D deficiency.	E55.9	Vitamin D deficiency, unspecified	268.9	Unspecified vitamin d deficiency	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Protein calorie malnutrition	E46	Unspecified protein-calorie malnutrition	263.9	Unspecified protein-calorie malnutrition	No	5	5	
Secondary Dx								
Squamous-cell carcinoma, and now neoplasm	C44.520	Squamous cell carcinoma of anal skin	173.52	Squamous cell carcinoma of skin of trunk, except scrotum	No	5	5	



(Principal and Secondary)	W19.X XXA; M62.81		E888 .9; 728. 87	Unspecified accidental fall ; Muscle weakness (generalized)	No	5	4	
Principal Dx								
Acute asthma exacerbation	J45.901	Unspecified asthma with (acute) exacerbation	493. 92	Asthma, unspecified type, with (acute) exacerbation	Yes	5	5	no documentation as to the severity of the asthma (mild/moderate or severe)
Secondary Dx								
dyspnea	R06.00	Dyspnea, unspecified	786. 09	Other dyspnea and respiratory abnormality	No	5	5	
Hypertension	I10	Essential (primary) hypertension	401. 1	Benign essential hypertension	No	5	5	
Hyperlipidemia	E78.5	Hyperlipidemia, unspecified	272. 4	Other and unspecified hyperlipidem ia	No	5	5	
Seasonal allergies	J30.2	Other seasonal allergic rhinitis	477. 8	Allergic rhinitis due to other allergen	No	5	5	

Obstructive sleep apnea	G47.33	Obstructive sleep apnea (adult) (pediatric)	327.23	Obstructive sleep apnea (adult)(pediatric)	No	5	5	
Morbid obesity	E66.9	Obesity, unspecified	278.00	Obesity unspecified	Yes	5	5	The reason for the obesity is not stated (i.e. due to what?)
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Cerebral palsy with quadriplegia	G80.0	Spastic quadriplegic cerebral palsy	343.2	Congenital quadriplegia	No	5	2	
Secondary Dx	F73		318.2	Profound mental	No	5	5	

Profound mental retardation. Seizure precautions,		Profound mental retardation		retardation				
PPD positive history	R76.1	Nonspecific reaction to test for tuberculosis	795. 51	Nonspecific reaction to tuberculin skin test without active tuberculosis	No	5	5	
History of chronic constipation	K59.00	Constipation, unspecified	564. 00	Unspecified constipation	No	4	4	
Gastroesophageal reflux disease history	K21.9	Gastro- esophageal reflux disease without esophagitis	530. 81	Esophageal reflux	No	5	3	
Periodontitis.	K05.4	Periodontosis	523. 5	Periodontosi s	No	5	5	
Osteoporosis.	M81.0	Age-related osteoporosis without current pathological fracture	733. 00	Osteoporosis unspecified	No	5	5	
Kyphosis secondary to osteoporosis.	M40.10	Other secondary kyphosis, site unspecified	737. 41	Kyphosis associated with other conditions	No	5	5	
Dysphagia.	R13.10	Dysphagia, unspecified	787. 20	Dysphagia, unspecified	Yes	5	5	details of the dysphagia is missing (oral/oropharyngeal

								/pharyngoesophageal)
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx	K63.1		569.83	Perforation of intestine	No	5	5	
Contained perforation of the colon	K63.1	Perforation of intestine (nontraumatic)	569.83	Perforation of intestine	No	5	5	
Secondary Dx								
Multiple liver hypodensities suspicious for metastatic disease	C79.9	Secondary malignant neoplasm of unspecified site	198.89	Secondary malignant neoplasm of other specified	no	5	5	

				sites				
Hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Acute kidney injury	N17.9	Acute kidney failure, unspecified	584.9	Acute kidney failure, unspecified	No	5	5	
history of edematous colon polyps	Z86.010	Personal history of colonic polyps	V12.72	Personal history of colonic polyps	No	5	5	
History of CVA with some residual neurological deficits	Z86.73	Personal history of transient ischemic attack (TIA), and cerebral infarction without residual deficits	V12.54	Personal history of other diseases, of circulatory system, transient ischemic attack (tia), and cerebral infarction without residual deficits	No	5	5	
Hyperlipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	

Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
left arm pain	M79.602	Pain in left arm	729.5	Pain in limb	No	5	4	
Secondary Dx	E78.5		272.4	Other and unspecified hyperlipidemia	No	5	5	
hyperlipidemia		Hyperlipidemia, unspecified						
hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Coronary artery disease (status post CABG.)	I25.810	Atherosclerosis of coronary artery bypass graft(s) without angina pectoris	414.05	Coronary atherosclerosis of unspecified bypass graft	No	5	5	
aortic stenosis	I35.0	Nonrheumatic aortic (valve) stenosis	424.1	Aortic valve disorders	No	5	5	

history of CVA	Z86.73	Personal history of transient ischemic attack (TIA), and cerebral infarction without residual deficits	V12.54	Personal history of other diseases, of circulatory system, transient ischemic attack (tia), and cerebral infarction without residual deficits	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)	E78.5		272.4	Other and unspecified hyperlipidemia	No	5	5	

Principal Dx								
Post fasciotomy wound infection with surrounding cellulitis	T81.4X XA	Infection following a procedure, initial encounter	998.59	Other postoperative infection	No	4	4	
Secondary Dx	R52		780.96	Generalized pain	No	5	5	
Pain.	R52 K70.30	Pain, unspecified	780.96	Generalized pain Alcoholic cirrhosis of liver	No	5	5	
alcoholic cirrhosis		Alcoholic cirrhosis of liver without ascites	571.2		No	5	5	
Accelerated Hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
History of alcohol abuse	F10.10	Alcohol abuse, uncomplicated	305.03	Nondependent alcohol abuse in remission	No	5	5	
Protein calorie malnutrition	E46	Unspecified protein-calorie malnutrition	263.9	Unspecified protein-calorie malnutrition	No	5	5	
Anemia.	D64.9	Anemia, unspecified	285.9	Anemia, unspecified	No	5	5	

Thrombocytopenia	D69.6	Thrombocytopenia, unspecified	287.5	Thrombocytopenia unspecified	No	5	5	
Leukopenia	D72.819	Decreased white blood cell count, unspecified	288.50	Leukocytopenia, unspecified	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx	I51.4		429.0	Myocarditis unspecified	No	5	5	
myocarditis	I51.4	Myocarditis, unspecified	429.0	Myocarditis unspecified	No	5	5	

Secondary Dx								
Chest pain	R07.9	Chest pain, unspecified	786.50	Unspecified chest pain	No	5	5	
Hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Tobacco abuse	Z72.0	Tobacco use	V69.8	Other problems related to lifestyle	No	5	1	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)	D64.9		285.9	Anemia, unspecified	No	5	5	
Principal Dx								
generalized anxiety disorder	F41.1	Generalized anxiety disorder	300.02	Generalized anxiety disorder	No	5	5	

Secondary Dx								
panic disorder with agoraphobia	F40.01	Agoraphobia with panic disorder	300.21	Agoraphobia with panic disorder	No	5	5	
Hypertension	I10 J44.9	Essential (primary) hypertension	401.1 496	Benign essential hypertension Chronic airway obstruction not elsewhere classified	No No	5 5	5 5	
chronic obstructive pulmonary disease.	I10 J44.9 M81.0	Chronic obstructive pulmonary disease, unspecified	401.1 496 733.00	Benign essential hypertension Chronic airway obstruction not elsewhere classified Osteoporosis unspecified	No No No	5 5 5	5 5 5	
Osteoporosis		Age-related osteoporosis without current pathological fracture						
Gastroesophageal reflux disease.	K21.9	Gastroesophageal reflux disease without esophagitis	530.81	Esophageal reflux	No	5	3	

Hydrocephalus	G91.9	Hydrocephalus, unspecified	331.4	Obstructive hydrocephalus	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Upper respiratory infection	J06.9; B97.89	Acute upper respiratory infection, unspecified ; Other viral agents as the cause of diseases classified elsewhere	465.9; 079.89	Acute upper respiratory infections of unspecified site; Other specified viral infection	No	5	5	
Secondary Dx	N17.9		584.9	Acute kidney failure,	No	5	5	

Acute kidney injury		Acute kidney failure, unspecified		unspecified				
Urinary tract infection.	N39.0	Urinary tract infection, site not specified	599.0	Urinary tract infection site not specified	No	5	5	
Hypertension.	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)	M81.0		733.00	Osteoporosis unspecified	No	5	5	
Principal Dx								
Likely hyperosmolar hyperglycemic state	R73.9	Hyperglycemia, unspecified	790.29	Other abnormal glucose	No	5	5	

Secondary Dx								
Hypokalemia	E87.6	Hypokalemia	276.8	Hypopotasse mia	No	5	5	
Cough	R05 I10	Cough	786.2 401.1	Cough Benign essential hypertension	No No	5 5	5 5	
Hypertension	R05 I10 R07.9	Essential (primary) hypertension	786.2 401.1	Cough Benign essential hypertension	No No No	5 5 5	5 5 5	
Chest pain		Chest pain, unspecified	786.50	Unspecified chest pain				
Dyslipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Possible obstructive sleep apnea	G47.33	Obstructive sleep apnea (adult) (pediatric)	327.23	Obstructive sleep apnea (adult)(pediatric)	No	5	5	
Panic disorder	F41.0	Panic disorder [episodic paroxysmal anxiety] without agoraphobia	300.01	Panic disorder without agoraphobia	No	5	5	
gastroesophageal reflux disease	K21.9	Gastroesophageal reflux disease	530.81	Esophageal reflux	No	5	3	

		without esophagitis						
gastroparesis	K31.89	Other diseases of stomach and duodenum	537. 5	Gastroptosis	No	3	4	
polyphagia, polydipsia and polyuria	R35.8; R63.2; R63.1	Polyuria; Polyphagia; Polydipsia	788. 42; 783. 6; 783. 5	polyuria; Polyphagia; polyuria	No	5	5	
nocturia (urge incontinence)	N39.41	Urge incontinence	788. 31	Urge incontinence	No	5	5	
Hyperglycemia.	R73.9	Hyperglycemia, unspecified	790. 29	Other abnormal glucose	No	5	3	
	I CD- 10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD- 9- CM Code	Description of the code assignments (ICD-9-CM)	Absent documen tation in ICD-10- CM	Ranki ngs ICD- 10- CM	Rankings ICD-9-CM	Remarks
Diagnoses								
(Principal and Secondary)	R73.9		790. 29	Other abnormal glucose	No	5	5	

Principal Dx								
Acute renal failure	N17.9	Acute kidney failure, unspecified	584.9	Acute kidney failure, unspecified	No	5	5	
Secondary Dx								
Hyperkalemia.	E87.5	Hyperkalemia	276.7	Hyperpotass emia	No	5	5	
Dehydration.	E86.0	Dehydration	276.51	Dehydration	No	5	5	
Leukocytosis.	D72.829	Elevated white blood cell count, unspecified	288.60	Leukocytosis , unspecified	No	5	5	
Hyponatremia.	E87.1	Hypo-osmolality and hyponatremia	276.1	Hyposmolality and/or hyponatremia	No	5	5	
Congestive heart failure. Diastolic	I50.30	Unspecified diastolic (congestive) heart failure	428.30 with 428.0	Diastolic heart failure, unspecified with Congestive heart failure unspecified	Yes	5	5	no mention if the heart failure is acute vs. chronic
Hypertension.	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	

Peripheral neuropathy	G90.09	Other idiopathic peripheral autonomic neuropathy	337.00	Idiopathic peripheral autonomic neuropathy, unspecified	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Pyelonephritis	N10	Acute tubulointerstitial nephritis	590.10	Acute pyelonephritis without lesion of renal medullary necrosis	No	4	5	
Secondary Dx								
Hypokalemia.	E87.6	Hypokalemia	276.8	Hypokalemia	No	5	5	

History of hypertension	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Normocytic anemia	D64.9	Anemia, unspecified	285.9	Anemia unspecified	No	4	4	
Right pleural effusion.	J90	Pleural effusion, not elsewhere classified	511.89	Other specified forms of effusion, except tuberculous	No	4	4	
Chronic obstructive pulmonary disease	J44.9	Chronic obstructive pulmonary disease, unspecified	496	Chronic airway obstruction not elsewhere classified	No	5	5	
Dyslipidemia	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Tobacco use.	Z72.0	Tobacco use	V69.8	Other problems related to lifestyle	No	5	1	
Depression.	F32.9	Major depressive disorder, single episode, unspecified	311	Depressive disorder not elsewhere classified	Yes	5	5	No mention of the specifics of the condition

Osteoporosis.	M81.0	Age-related osteoporosis without current pathological fracture	733.00	Osteoporosis unspecified	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx	R11.2		787.01	Nausea with vomiting	No	3	3	
Acute-on-chronic intractable nausea and vomiting		Nausea with vomiting, unspecified						
Secondary Dx								
Hypertensive urgency	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Uncontrolled type 2 diabetes,	E11.8	Type 2 diabetes mellitus with	250.90	Diabetes mellitus with	Yes	5	5	no mention of associated

		unspecified complications		unspecified complication type 2 or unspecified type not stated as uncontrolled				complications and no mention of insulin usage
Hyperlipidemia.	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Coronary artery disease	I25.10	Atherosclerotic heart disease of native coronary artery	414.01	Coronary atherosclerosis of native coronary artery	No	5	5	
Tobacco abuse.	Z72.0	Tobacco use	V69.8	Other problems related to lifestyle	No	5	1	
Chronic gastroesophageal reflux disease.	K21.9	Gastroesophageal reflux disease without esophagitis	530.81	Esophageal reflux	No	5	3	

Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Left femoral neck fracture	S72.002 A	Fracture of unspecified part of neck of left femur, initial encounter for closed fracture	820.8	Fracture of unspecified part of neck of femur closed	No	5	4	
Secondary Dx								
hypertensive heart disease	I11.9	Hypertensive heart disease without heart failure	402.90	Unspecified hypertensive heart disease without heart failure	No	5	5	
Leukocytosis	D72.829	Elevated white blood cell count, unspecified	288.60	Leukocytosis, unspecified	No	5	5	
Anemia	D64.9	Anemia, unspecified	285.9	Anemia unspecified	No	5	5	
Thrombocytopenia.	D69.6	Thrombocytopenia, unspecified	287.5	Thrombocytopenia unspecified	Yes	5	5	no mention if primary vs. secondary

Coronary artery disease.	I25.10	Atherosclerotic heart disease of native coronary artery	414.01	Coronary atherosclerosis of native coronary artery	No	5	5	
Hypertension.	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
history of peptic ulcer disease	Z87.11	Personal history of peptic ulcer disease	V12.71	Personal history of peptic ulcer disease	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
metabolic encephalopathy	G93.41	Metabolic encephalopathy	348.31	Metabolic encephalopathy	No	5	5	

Secondary Dx								
Hypoglycemia	E16.2	Hypoglycemia, unspecified	251.2	Hypoglycemia unspecified	No	5	5	
Urinary tract infection	N39.0	Urinary tract infection, site not specified	599.0	Urinary tract infection site not specified	Yes	5	5	additional code needed to identify the agent, which is absent in the documentation
Non ST-elevation myocardial infarction	I21.4	Non-ST elevation (NSTEMI) myocardial infarction	410.71	Subendocardial infarction initial episode of care	No	5	5	
Diabetes mellitus type 2.	E11.8	Type 2 diabetes mellitus with unspecified complications	250.90	Diabetes mellitus with unspecified complication type 2 or unspecified type not stated as uncontrolled	Yes	5	5	no mention of associated complications and no mention of insulin usage
Benign prostatic hypertrophy	N40.1	Enlarged prostate with lower urinary tract symptoms	600.01	Hypertrophy (benign) of prostate with urinary obstruction and other lower urinary tract	No	4	5	Urinary tract infection coded above

				symptoms (luts)				
Hypertension.	I10	Essential (primary) hypertension	401. 1	Benign essential hypertension	No	5	5	
Gastroesophageal reflux disease.	K21.9	Gastro- esophageal reflux disease without esophagitis	530. 81	Esophageal reflux	No	5	3	
Debilitation and advanced age	R54	Age-related physical debility	797	Senility without psychosis	No	5	5	
Chronic kidney disease.	N18.9	Chronic kidney disease, unspecified	585. 9	Chronic kidney disease, unspecified	Yes	5	5	no documentation on the stage of the CKD
Probable volume depletion.	E86.9	Volume depletion, unspecified	276. 50	Volume depletion, unspecified	No	5	5	

Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Syncope ( vasovagal syncope )	R55	Syncope and collapse	780.2	Syncope and collapse	No	5	5	
Secondary Dx								
Hypertension.	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	
Diabetes mellitus type 2.	E11.8	Type 2 diabetes mellitus with unspecified complications	250.90	Diabetes mellitus with unspecified complication type 2 or unspecified type not stated as uncontrolled	Yes	5	5	no mention of associated complications and no mention of insulin usage
Alzheimer disease.	G30.9	Alzheimer's disease, unspecified	331.0	Alzheimer's disease	Yes	5	5	no mention if early or late onset

Osteoporosis.	M81.0	Age-related osteoporosis without current pathological fracture	733.01	Senile osteoporosis	Yes	5	5	The documentation does not specify if the condition is age related or due to a fracture. However the code defaults to age related
Bladder neck obstruction.	N32.0	Bladder-neck obstruction	596.0	Bladder neck obstruction	No	5	5	
GERD.	K21.9	Gastro-esophageal reflux disease without esophagitis	530.81	Esophageal reflux	No	5	3	
Hyperlipidemia.	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks

(Principal and Secondary)								
Principal Dx								
Chronic obstructive pulmonary disease	J44.9	Chronic obstructive pulmonary disease, unspecified	496	Chronic airway obstruction not elsewhere classified	No	5	5	
Secondary Dx								
Pneumonia.	J18.9	Pneumonia, unspecified organism	486	Pneumonia organism unspecified	Yes	5	5	no documentation on the organism
Dehydration.	E86.0	Dehydration	276.51	Dehydration	No	5	5	
Severe protein calorie malnutrition	E43	Unspecified severe protein-calorie malnutrition	262	Other severe protein-calorie malnutrition	No	5	5	
Hyperlipidemia.	E78.5	Hyperlipidemia, unspecified	272.4	Other and unspecified hyperlipidemia	No	5	5	
Hypertension.	I10	Essential (primary) hypertension	401.1	Benign essential hypertension	No	5	5	

Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx								
Sickle cell crisis	D57.419	Sickle-cell thalassemia with crisis, unspecified	282.42	Sickle-cell thalassemia with crisis	No	5	5	
Secondary Dx								
Systemic inflammatory response syndrome	R65.10 J18.9	Systemic inflammatory response syndrome (SIRS) of non-infectious origin without acute organ dysfunction	995.93 486	Systemic inflammatory response syndrome (sirs) due to non-infectious process without acute organ dysfunction Pneumonia organism unspecified	No Yes	5 5	5 5	no documentation on the organism
Recent hospitalization on for healthcare-acquired pneumonia		Pneumonia, unspecified organism						
Leukocytosis.	D72.829	Elevated white blood cell count,	288.60	Leukocytosis, unspecified	No	5	5	

		unspecified						
Chronic hemolytic anemia	D59.9	Acquired hemolytic anemia, unspecified	283.9	Acquired hemolytic anemia unspecified	No	4	4	
Asthma	J45.909	Unspecified asthma, uncomplicated	493.90	Asthma unspecified type, unspecified	Yes	4	5	no mention of the severity of the asthma
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)	I10		401.1	Benign essential hypertension	No	5	5	
Principal Dx								
Stage IV adenocarcinoma of the lung	C34.92	Malignant neoplasm of unspecified part of left bronchus or lung	162.9	Malignant neoplasm of bronchus and lung, unspecified	No	3	3	
Secondary Dx								

An ascending aortic aneurysm	I71.9 M19.90	Aortic aneurysm of unspecified site, without rupture	441.9 715.90	Aortic aneurysm of unspecified site without rupture Osteoarthritis unspecified whether generalized or localized involving unspecified site	No Yes	5 5	5 5	no documentation of if it is primary vs. secondary and the location
Osteoarthritis.		Unspecified osteoarthritis, unspecified site						
Severe protein-calorie malnutrition	E43	Unspecified severe protein-calorie malnutrition	262	Other severe protein-calorie malnutrition	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks

(Principal and Secondary)	D72.82 9		288. 60	Leukocytosis , unspecified	No	5	5	
Principal Dx								
Anemia secondary to blood loss.	D50.0	Iron deficiency anemia secondary to blood loss (chronic)	280. 0	Iron deficiency anemia secondary to blood loss (chronic)	No	5	5	
Secondary Dx								
healthcare-associated pneumonia	J18.9	Pneumonia, unspecified organism	486	Pneumonia organism unspecified	Yes	5	5	no documentation on the organism
Sepsis	A41.9 D72.82 9	Sepsis, unspecified organism	038. 9 with 995. 91 288. 60	Unspecified septicemia with Systemic inflammator y response syndrome (sirs) due to infectious process without acute organ	Yes No	5 5	5 5	absent organism and the specifics of the sepsis

				dysfunction Leukocytosis , unspecified				
Leukocytosis	A41.9 D72.82 9 E43	Elevated white blood cell count, unspecified	038. 9 with 995.	Unspecified septicemia with Systemic inflammator y response syndrome (sirs) due to infectious process without acute organ dysfunction Leukocytosis , unspecified Other severe protein- calorie malnutrition	Yes No No	5 5 5	5 5 5	absent organism and the specifics of the sepsis
Severe malnutrition		Unspecified severe protein- calorie malnutrition	91 288. 60 262					
Nausea and vomiting	R11.2	Nausea with vomiting, unspecified	787. 01	Nausea with vomiting	No	5	5	
Cirrhosis of the liver	K74.60	Unspecified cirrhosis of liver	571. 5	Cirrhosis of liver without alcohol	No	5	5	
Edema of the lower extremities.	R60.0	Localized edema	782. 3	Edema	No	4	4	
Hyponatremia.	E87.1	Hypo- osmolality and hyponatremia	276. 1	Hyposmolali ty and/or hyponatremi	No	5	5	

				a				
Hypocalcemia	E83.51	Hypocalcemia	275.41	Hypocalcemia	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)								
Principal Dx	D57.419		282.42	Sickle-cell thalassemia with crisis	No	5	5	
Vaso-occlusive sickle cell pain crisis		Sickle-cell thalassemia with crisis, unspecified						
Secondary Dx								
Chronic hemolytic anemia	D59.9	Acquired hemolytic anemia, unspecified	283.9	Acquired hemolytic anemia unspecified	No	4	4	
Seizure disorder.	G40.909	Epilepsy, unspecified, not	345.90	Epilepsy unspecified	No	5	5	

		intractable, without status epilepticus		without intractable epilepsy				
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)	K74.60		571.5	Cirrhosis of liver without alcohol	No	5	5	
Principal Dx								
Anemia, most likely secondary to an acute gastrointestinal bleed	D50.0	Iron deficiency anemia secondary to blood loss (chronic)	280.0	Iron deficiency anemia secondary to blood loss (chronic)	No	5	5	
Secondary Dx								
Altered mental status.	R41.82	Altered mental status, unspecified	780.97	Altered mental status	No	5	5	

Non-ST-elevation myocardial infarction.	I21.4	Non-ST elevation (NSTEMI) myocardial infarction	410.71	Subendocardial infarction initial episode of care	No	5	4	
Supposed diarrhea.	R19.7 I10	Diarrhea, unspecified	787.91 401.1	Diarrhea Benign essential hypertension	No No	5 5	5 5	
Hypertension.	R19.7 I10 F53	Essential (primary) hypertension	787.91 401.1	Diarrhea Benign essential hypertension	No No No	5 5 5	5 5 3	
Psychosis.		Puerperal psychosis	293.89	Other specified transient organic mental disorders due to conditions classified elsewhere				
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)	G40.909		345.90	Epilepsy unspecified without intractable	No	5	5	

				epilepsy				
Principal Dx								
Chest pain.	R07.9	Chest pain, unspecified	786.50	Unspecified chest pain	No	5	5	
Secondary Dx	I10		401.1	Benign essential hypertension	No	5	5	
Hypertension.	E78.5	Essential (primary) hypertension	401.1	Benign essential hypertension Other and unspecified hyperlipidemia	No	5	5	
Dyslipidemia.		Hyperlipidemia, unspecified	272.4		No	5	5	
Chronic pain	R52	Pain, unspecified	338.19	Other acute pain	No	4	4	
Depression.	F32.9	Major depressive disorder, single episode, unspecified	311	Depressive disorder not elsewhere classified	No	5	5	

Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)	I10		401.1	Benign essential hypertension	No	5	5	
Principal Dx								
Likely chronic blood-loss anemia.	D50.0	Iron deficiency anemia secondary to blood loss (chronic)	280.0	Iron deficiency anemia secondary to blood loss (chronic)	No	5	5	
Secondary Dx								
Gastric carcinoma, stage IV.	C16.9 I25.10	Malignant neoplasm of stomach, unspecified	151.9 414.01	Malignant neoplasm of stomach, unspecified site Coronary atherosclerosis of native	Yes No	4 5	4 5	Specific region of the stomach is absent

				coronary artery				
Coronary artery disease	C16.9 I25.10 N18.9	Atherosclerotic heart disease of native coronary artery	151.9 414.01	Malignant neoplasm of stomach, unspecified site	Yes No Yes	4 5 5	4 5 5	Specific region of the stomach is absent
Chronic kidney disease		Chronic kidney disease, unspecified	585.9	Coronary atherosclerosis is of native coronary artery Chronic kidney disease, unspecified				
Chronic systolic congestive heart failure.	I50.22	Chronic systolic (congestive) heart failure	428.22	Systolic heart failure, chronic	No	5	5	
Diagnoses	ICD-10-CM code (s) assignment	Description of the code assignments (ICD-10-CM)	ICD-9-CM Code	Description of the code assignments (ICD-9-CM)	Absent documentation in ICD-10-CM	Rankings ICD-10-CM	Rankings ICD-9-CM	Remarks
(Principal and Secondary)	R52		338.19	Other acute pain	No	4	4	

Principal Dx								
Diabetic ketoacidosis.	E10.10	Type 1 diabetes mellitus with ketoacidosis without coma	250.11	Diabetes mellitus with ketoacidosis type i not stated as uncontrolled	No	5	5	
Secondary Dx								
Asthma	J45.909	Unspecified asthma, uncomplicated	493.90	Asthma unspecified type, unspecified Other acute pain	Yes	4	5	no mention of the severity of the asthma
Chronic pain. .	R52 M94.20	Pain, unspecified	338.19 733.92	Asthma unspecified type, unspecified Other acute pain Chondromalacia	Yes	4	5	no mention of the severity of the asthma  no mention of the site and details
Chondroplasia.		Chondromalacia, unspecified site			No	4	4	
Hypophosphatemic rickets.	E55.0	Rickets, active	268.0	Rickets active	No	4	4	

**APPENDIX B**

**SUBSET OF WORKSHEETS FOR REIMBURSEMENT STUDY**

Record #	ICD-10-CM Code	Absent Documentation (Y/N)	Cost Weight (Before)	Cost Weight (After)	Difference in Cost Weight
1	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			01.1912	01.1912	0
	I21.4	no			
	J30.89	yes	J30.1or J30.5		
	J44.9	no			
	I48.0 9	no			
	N41.10	no			
	J98.11	no			
	Z79.899	no			
2	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			

				01.9074	01.9074	0
	A41.51;	A41.4	no			

	G82.20	yes	G82.21 or G82.22		
	S06.9x9S	yes	S06.9x4S		
	M48.25	yes			
	E43	no			
3	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			01.1692	01.1692	0
	I46.9	no			
	J96.91	no			
	I95.9	yes	I95.0		
	Z79.01	no			
4	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			01.4748	01.4748	0
	L03.114; W55.01xA	no			
	E11.9	yes	additional code of Z79.4		
	M81.0	no			

	M19.90	yes	M16.0		
	I10	no			
	E78.5	no			
	M72.6; B96.89	no			
5	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			00.7173	01.1550	0.4377
	R19.7	no			
	J93.8	no			
	I50.9	yes	I50.41		
	I48.0	no			
	E11.9	no			
	I10	no			
	Z79.899	no			
	Z79.01	no			
6	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			01.9656	01.9656	0
	K25.1	yes	K25.5 and F10.10		
	J96.00	yes	J96.01		
	E43	no			
	N17.9	yes	N17.0		

	D59.4	no			
	D69.3	no			
	I21.4	no			
	N39.0; B96.89	yes	B96.0		
	J15.6	no			
	E87.6	no			
	R73.9	no			
	E80.6	no			
	R54.81	no			
7	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			00.9861	00.9861	0
	J15.6	no			
	J44.9	no			
	I48.0	no			
	I10	no			
	I73.9	no			
	R31.9	yes	R31.0		
8	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			00.7191	00.7191	0
	S32.402A	no			
	D72.829	no			
	N39.0	no			
	E11.9	no			

	N18.9	yes	N18.5		
	I10	no			
	N40.0	no			
	I51.89	no			
	E78.5	no			
	D75.81	no			
9	ICD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			01.9521	01.9521	0
	M84.461A	no			
	J96.00	no			
	I50.43	No			
	N18.4	No			
	R13.10	No			
	I26.99	No			
	D72.829	No			
	E46	No			
	J15.6	No			
	I25.10	No			
	N39.0	yes	B95.0		
	L89.212	No			
	D63.1	No			
	Z86.73	No			
	M80.861A	No			
	E87.2	No			

10	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			00.6853	01.0302	0.3449
	I50.21	No			
	R06.02	No			
	Z87.01	No			
	R05	No			
	I10	No			
	E03.9	No			
	N18.9	Yes	N18.5		
	J44.9	No			
	Z85.46	No			
	E78.5	No			
	I73.9	No			
11	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			00.7220	01.1924	0.4704
	J44.1	No			
	I25.1; I25.2	No			
	I50.9	Yes	I50.43		
	E78.5	No			
	I10	No			
	I48.0	No			
	M1A.9XX0	No			

12	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			00.6568	01.0954	0.4386
	M79.602	No			
	I10	No			
	I50.9	yes	I50.43		
	I48.1	No			
	E11.22; N18.3	No			
	I25.10	No			
	E78.5	No			
	F03	No			
13	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			01.9074	01.9074	0
	A41.2	No			
	R54	No			
	I95.9	yes	I95.0		
	N17.9	No			
	I10	no			
	G82.53	no			
	K21.9	no			
	R25.2	no			
	D50.9	no			

	M86.00; B96.5	no			
	G47.33	no			
	N31.9	no			
	L89.612 and L89.622	no			
14	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			00.6290	00.9584	0.3294
	J06.9	no			
	I50.9	yes	I50.43		
	I10	no			
	N18.4	no			
	D64.9	no			
	E08.8	yes			
	J44.9	no			
	E03.9	no			
15	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			01.2809	01.2809	0
	J96.20	yes	J9621		
	J44.9	no			
	F17.210	no			

	G47.33	no			
	B96.2; N39.0	no			
	I10	no			
	Z68.41; E66.9	no			
	E78.5	no			
	E83.52	no			
	F29	no			
	F31.9; F20.9; F32.8; F41.9; F60.9	yes to all of these conditions	F31.30, F20.0, F41.0, F60.0		
16	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			00.5499	00.5499	0
	R07.9	no			
	E03.9	no			
	M79.606	no			
	F32.8	no			
	D64.9	no			
	M16.9	yes	M16.0		
17	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			00.7311	00.7311	0

	G45.9	No			
	I10	No			
	R60.9	yes	R60.0		
	F10.19	No			
	G47.33	No			
	R39.9	No			
	K58.0	No			
18	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			01.2809	01.2809	0
	J96.90	yes	J96.21		
	E43	no			
	E66.9	no			
	E11.8	no			
	I50.42	no			
	N39.0	yes	B95.0		
19	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			01.9074	01.9074	0
	R78.81	no			
	J09.X; J16.8	no			
	E43	no			
	J96.01	no			
	D64.9	no			

	Z93.1	no			
	E87.8	no			
	D69.6	no			
	G40.909	no			
	G80.9	yes	G80.0		
	R52	no			
	R13.10	no			
	R63.0	no			
20	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			01.0706	01.6096	0.539
	I26.99	yes	I26.09		
	E11.8	no			
	I10	no			
	C22.0	no			
	K21.9	no			
	J30.2	yes	J30.1		
	D50.9	no			
	E78.5	no			
	K74.60	no			
	J90	no			
21	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			01.2809	01.2809	0
	J96.92	yes	J96.21		

	N39.0	yes	B95.0		
	I10	no			
	E11.8	no			
	E03.9	no			
22	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			01.2809	01.2809	0
	J96.92; J96.91	yes	J96.21		
	A41.9	no			
	J44.1	no			
	D72.829	no			
	R11.0	no			
	I10	no			
	R73.09	no			
23	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			01.2809	01.2809	0
	J96.21	no			
	J44.9	no			
	J13	no			
	Z72.0	no			
	F41.9	yes	F41.1		
	B19.20	no			

	E66.01; Z68.39	no			
24	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			01.0274	01.0274	0
	K92.2	no			
	N18.9	yes	N18.5		
	E13.8	yes	E11.8		
	Z86.71	no			
	G47.33	no			
	I10	no			
	M10.9	yes	M10.00		
	Z86.018	no			
	D63.1	no			
	E66.01; Z68.41	no			
	Z87.11	no			
25	I CD-10-CM code (s) assignment	Absent documentation in ICD-10-CM			
			00.6865	00.6865	0
	R64	No			
	E86.0	No			
	E11.8; Z79.4	No			
	N18.9	yes	N18.5		

	F32.9	yes	F32.0		
	I10	No			
	E11.40	No			
	K21.9	No			

## BIBLIOGRAPHY

- Abdelhak, M., Sara Grostick, Mary Alice Hanken, Ellen B. Jacobs. Health Information: Management of a Strategic Resource. 2nd ed.
- AHIMA "Clinical Data Specialist." In *Evolving HIM Careers: Seven Roles for the Future*. Chicago: AHIMA, 1999.
- AHIMA "Working Smarter with Computer-Assisted Coding." AHIMA Today, the Convention Daily Newsletter, October 5, 2009. Brouch K. AHIMA Project offers insights into SNOMED, ICD-9-CM mapping process. *J AHIMA* 2003;74:52-5.
- AHIMA e-HIM Work group on Computer Assisted Coding. "Delving into Computer assisted Coding" (AHIMA Practice Brief). *Journal of AHIMA* 75, no.10 (Nov-Dec 2004); 48A-H
- AHIMA. "Automated Coding Workflow and CAC Practice Guidance." *Journal of AHIMA* 81, no. 7 (July 2010): 51–56.
- AHIMA. "Delving into Computer-assisted Coding." *Journal of AHIMA* 75, no. 10 (Nov.–Dec. 2004): 48A–H.
- AHIMA. "Natural Language Processing as a Means to Increase Productivity." Audio seminar, May 13, 2004. Available online at <http://campus.ahima.org/audio/2004seminars.html>.
- Bebb, Jacki, et al. "Computer-Assisted Coding: A Year Later. Proof of Concept Pilot Results, The Department of Veterans Affairs." 2009 AHIMA Convention Proceedings, October 2009.
- Beinborn, Julie. "Automated Coding: the Next Step." *Journal of AHIMA* 70, no. 7 (1999): 38–43.
- Berg L, Campbell J. Mapping SNOMED CT to ICD-10- a joint task of IHTSDO and WHO – FIC, 2008.
- Bertillion J. Classification of the causes of death (abstract). In: *Transactions of the 15th International Congress on Hygiene Demography*. Washington, 1912.
- Boelle, Pierre-Yves, Antoine Flahault, Laurent Letrilliart, and Cecile Viboud. "Automatic Coding of Reasons for Hospital Referral from General Medicine Free-text Reports." *Proceedings of the 2000 AMIA Annual Symposium*, 487–91.

- Bounos, M. "ICD-10-CM: Money Pit or Money Maker? Major Chapters with Changes" (June 2012) ICD10monitor.com
- Bowman, Jim, and Mary Stanfill. "Physicians Cast Wary Eye at Computer-assisted Coding." *Journal of AHIMA* 75, no. 8 (2004): 76–77.
- Bowman, Sue. "Coordination of SNOMED-CT and ICD-10: Getting the Most out of Electronic Health Record Systems." White paper. *Perspectives in Health Information Management*, May 2005.
- Bowman, Sue. "Why ICD-10 is worth the trouble." *Journal of AHIMA* 79, no.3 (March 2008): 24-29.
- Campbell J, Payne T. A comparison of four schemes for codification of problem lists. *Proc Annu Symp Comput Appl Med Care*; Washington DC, 4-7 November 1994:201-5.
- Chen J, Flaitz C, Johnson R. Comparison of accuracy captured by different controlled languages in oral pathology diagnoses. *AMIA Annu Symp Proceeding: Austin, Texas, 30 November-1 December 2005*:918.
- Chiang M, Casper D, Cimino J, et al. Representation of ophthalmology concepts by electronic systems: adequacy of controlled medical terminologies. *Ophthalmology* 2005;112:175-83.
- Chuang, Jen-Hsiang, Carol Friedman, and George Hripcsak. "A Comparison of the Charlson Comorbidities Derived from Medical Language Processing and Administrative Data." *Proceedings of the 2002 AMIA Annual Symposium*, 160–64.
- Chute C, Cohen S, Campbell K, et al. The content coverage of clinical classifications. For the computer-based patient record institute's work group on codes and structures. *J Am Med Inform Assoc* 1996;3:224-33.
- Cimino JJ: Disiderata for controlled medical vocabularies in the twenty-first century. *Methods of information in medicine* 1998;37:551-563.
- Department of Health and Human Services, 45 CFR Part 162 (Jan 16, 2009). HIPAA Administrative simplification. Modifications to medical data code set standards to adopt ICD-10-CM/PCS, *Federal Register*, Volume 74, Number 11.
- Dimick, C. "Top Documentation Issues for ICD-10." (AHIMA Blog Post, AHIMA Journal web site, 2011)
- Elkins, Jacob S., Carol Friedman, Bernadette Boden-Albala, Ralph L. Sacco, and George Hripcsak. "Coding Neuroradiology Reports for the Northern Manhattan Stroke Study: A Comparison of Natural Language Processing and Manual Review." *Computers and Biomedical Research* 33, no. 1 (2000): 1–10.
- Evans, David, John Holbrook, Douglas Stetson, and Homer Warner Jr. "Has Natural Language Processing Finally Arrived? Autocoding and Data Mining Examined." HIMSS panel

- presentation, February 2001.
- First annual report. London, Registrar General of England and Wales, 1839, p99.
- Foundation of Research and Education. "Report on the Use of Health Information Technology to Enhance and Expand Health Care Anti-Fraud Activities." September 2005. Available online at [www.hhs.gov/healthit/documents/ReportOnTheUse.pdf](http://www.hhs.gov/healthit/documents/ReportOnTheUse.pdf).
- Franz, Pius, Udo Hahn, Rudiger Klar, Stefan Schulz, and Albrecht Zaiss. "Automated Coding of Diagnoses—Three Methods Compared." Proceedings of the 2000 AMIA Annual Symposium, 250–54.
- Friedman, Carol, George Hripcsak, and Irina Shablinsky. "An Evaluation of Natural Language Processing Methodologies." Proceedings of the 1998 AMIA Annual Symposium, 855–59.
- Friedman, Carol, Lyudmila Shagina, Yves Lussier, and George Hripcsak. "Automated Encoding of Clinical Documents Based on Natural Language Processing." *Journal of the American Medical Informatics Association* 11, no. 5 (2004): 392–402.
- Garvin, Jennifer, and Valerie Watzlaf. "Current Coding Competency Compared to Projected Competency." *Perspectives in Health Information Management* 1, no. 2 (2004). Available online at [www.ahima.org](http://www.ahima.org).
- Gersenovic M: The ICD family of classifications. *Methods of information in medicine* 1995, 34:172-175.
- Greenwood M. *Medical statistics from Graunt to Farr*. Cambridge, Cambridge University Press, 1948.
- Hagland, Mark. "Revolution in Progress: How Technology Is Reshaping the Coding World." *Journal of AHIMA* 73, no. 7 (2002): 32–35.
- Hasan, M., R. J. Meara, and B. K. Bhowmick. —The Quality of Diagnostic Coding in Cerebrovascular Disease=
- Hasan, M., R. J. Meara, and B. K. Bhowmick. —The Quality of Diagnostic Coding in Cerebrovascular Disease.
- Hieb, Barry. "NLP Basics for Healthcare." Gartner Research, August 16, 2002.
- Hripcsak, George, Carol Friedman, Philip O. Alderson, William DuMouchel, Stephen B. Johnson, and Paul D. Clayton. "Unlocking Clinical Data from Narrative Reports: A Study of Natural Language Processing." *Annals of Internal Medicine* 122, no. 9 (1995):681–88.
- Hripcsak, George, John H. M. Austin, Philip O. Alderson, and Carol Friedman. "Use of Natural Language Processing to Translate Clinical Information from a Database of 889,921 Chest

- Radiographic Reports.” *Radiology* 224, no. 1 (2002): 157–63.
- ICD-10-CM/PCS Implementation Tool Kit, American Health Information Management Association (2012).  
[http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1\\_049431.hcsp?dDocName=bok1\\_049431#c](http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1_049431.hcsp?dDocName=bok1_049431#c) (accessed May 28, 2012)
- Imel M. A Closer look: the SNOMED clinical terms to ICD-9-CM mapping. *J AHIMA* 2002;73:66-9.
- Innes, K., Peasley K., and Roberts, R. "Ten Down Under: Implementing ICD-10 in Australia." *Journal of AHIMA* 71, no. 1 (2000): 52-56.
- Internal classification of diseases for oncology (ICD-0), second ed. Geneva, WHO 1990.
- Johns, Merida. “A Crystal Ball for Coding.” *Journal of AHIMA* 71, no. 1 (2000): 26–33.
- Knibbs G.H. The international classification of Disease and causes of death and its revision. *Medical journal of Australia*, 1929, 1:2-12.
- Longosky, Sean, et al. "Computer-Assisted Coding: A Work in Progress." 2008 AHIMA Convention Proceedings, October 2008.
- Lorence, Daniel P., and Awad Ibrahim. “Disparity in Coding Concordance: Do Physicians and Coders Agree?” *Journal of Health Care Finance* 29, no. 4 (2003): 43.
- O’Malley, K. J., K. F. Cook, M.D. Price, K. R. Wildes, J. F. Hurdle, and C. M. Ashton. *Measuring Diagnoses: ICD Code Accuracy*. Philadelphia: W. B. Saunders, 2001: ICD Code Accuracy.
- Lussier, Yves A., Lyudmila Shagina, and Carol Friedman. “Automating SNOMED Coding Using Medical Language Understanding: A Feasibility Study.” *Proceedings of the 2001 AMIA Annual Symposium*, 418–22.
- Mamlin, Burke W., Daniel T. Heinze, and Clement J. McDonald. “Automated Extraction and Normalization of Findings from Cancer-Related Free-Text Radiology Reports.” *Proceedings of the 2003 American Medical Informatics Association (AMIA) Annual Symposium*, 420–24.
- Manual of the international statistical classification of diseases, and causes of death, Volume 1. Geneva, WHO, 1977.
- Moczygamba, J and Fenton, S. “Lessons learned from an ICD-10-CM Clinical Documentation Pilot Study.” *Perspectives in Health Information Management* (Winter 2012): 1-11 <http://www.teamusa.org/News/2012/May/24/USOC-to-use-GE-Electronic-Medical-Record-Technology-May-24-2012.aspx> (accessed May 28, 2012)
- Morris, William C., Daniel T. Heinze, Homer R. Warner Jr., Aron Primack, Amy E. W. Morsch,

- Ronald E. Sheffer, et al. "Assessing the Accuracy of an Automated Coding System in Emergency Medicine." *Proceedings of the 2000 AMIA Annual Symposium*, 595–99.
- Morsch, Mark, et al. "Software Engineering of NLP-Based Computer-Assisted Coding Applications." *Perspectives in Health Information Management, CAC Proceedings*; Fall 2006.
- Morsch, Mark, Rebecca Kaul, and Scott Briercheck. "Hospital Based Computer Assisted Coding—A New Paradigm." 2008 AHIMA Convention Proceedings, October 2008.
- Morsch, Mark. "Computer Assisted Coding with Standard Documents Types—Advancing Best Practice in Health Information Management." 2009 AHIMA Convention Proceedings, October 2009.
- Nadkarni P, Darer J. Migrating existing clinical content from ICD-0 to SNOMED. *J Am Med Inform Assoc* 2010;17:602-607.
- Nanovic L, Kaplan B. Reliability of Medicare claim forms for outcome studies in kidney transplant recipients: epidemiology in clinical outcome trials. *Clin J Am Soc Nephrol* 2009;4:1156-8.
- O'Malley, K. J., K. F. Cook, M. D. Price, K. R. Wildes, J. F. Hurdle, and C. M. Ashton. Measuring Diagnoses
- Quan, H., G. A. Pearsons, and W. A. Ghali. —Validity of Procedure Codes in International Classification of Diseases, 9th Revision, Clinical Modification Administrative Data.
- RAND Corporation. "The costs and Benefits of Moving to the ICD-10 code sets." March 2004.
- Reid, Mandy. "Computer-assisted Coding: Bridging People, Process, and Technology." 2009 AHIMA Convention Proceedings, October 2009.
- Roop, E. Look North — Canada's Slant on Smooth ICD-10 Strategies. (2008) *For The Record*; Vol. 20 No. 25 P. 20
- Schadow, Gunther, and Clement J. McDonald. "Extracting Structured Information from Free Text Pathology Reports." *Proceedings of the 2003 AMIA Annual Symposium*, 584–88.
- Schnitzer, Gregory L. "Natural Language Processing: A Coding Professional's Perspective." *Journal of AHIMA* 71, no. 9 (2000): 95–98.
- Schnitzer, Gregory L. "Natural Language Processing: A Coding Professional's Perspective." *Journal of AHIMA* 71, no. 9 (2000): 95–98.
- Schnitzer, Gregory L., and Mary H. Stanfill. "Outwit, Outlast, Outcode: Surviving in the Autocoding Era." *Journal of AHIMA* 72, no. 9 (2001): 102–4.
- Servais, Cheryl. Computer Assisted Coding for Inpatients – A case study. *Perspective in Health*

- Information Management, CAC Proceedings; Fall 2006.
- Sherri Alexander, Therese Conner, Teresa Slaughter. Overview of Inpatient Coding. [Am J Health Syst Pharm. 2003 Nov 1;60 \(21 Suppl 6\):S11-4](#) 14619128
- Silfen, E. —Documentation and Coding of ED Patient Encounters: An Evaluation of the Accuracy of an Electronic Medical Record.|| *American Journal of Emergency Medicine* 24, no. 6 (2006): 664–678.
- Smith, Gail; Bronnert, June. “Transitioning to CAC: The skills and tools required to work with CAC.” *Journal of AHIMA* 81, no.7 (July 2010): 60-61.
- Stein H, Nadkarni P, Erdos J, et al. Exploring the degree of concordance of coded and textual data in answering clinical queries from a clinical data repository. *J Am Med Inform Assoc* 2000;7:42-54.
- Steindel, S. “A comparison between a SNOMED-CT Problem list and ICD-10 HIPAA Code sets.” *Perspectives in Health information Management* (Winter 2012): 1-16
- Stollman, Neil, and Matthews, Kathleen. “Positive Productivity, Better Billing.” *Health Management Technology*, August 2002: 22–26.
- Sullivan, T. Major ICD-10 factors in provider reimbursement (2010). ICD10 Watch. <http://www.icd10watch.com/blog/major-icd-10-factors-provider-reimbursement>. (accessed May 29, 2012)
- Surján, G. —Questions on Validity of International Classification of Diseases-Coded Diagnoses.|| *International Journal of Medical Informatics* 54, no. 2 (1999): 77–95.
- Sydney V.Davis. “Preparing for ICD-10-CM/PCS: One Payer’s Experience with General Equivalence Mappings (GEMs)”. *Perspectives in Health Information Management* (Winter 2012): 1-24
- Towers, Adele, Nancy Soso, and Tamara Needham. "Implementation of Inpatient Computer Assisted Coding at the University of Pittsburgh Medical Center." 2009 AHIMA Convention Proceedings, October 2009.
- Towers, Adele; Soso, Nancy; Needham, Tamara. “Implementation of inpatient Computer Assisted Coding at the University of Pittsburgh Medical Center.” 2009 AHIMA Convention Proceedings, Oct 2009.
- Van Walraven, C., and S. V. Demers. —Coding Diagnoses and Procedures Using a High-Quality Clinical Database Instead of a Medical Record Review.
- Vardy D, Gill R, Israeli A, Coding medical information: classification versus nomenclature and implications to the Israeli medical system. *J Med Systems* 1998;22:203-10.
- Warner, Homer, Jr. “Can Natural Language Processing Aid Outpatient Coders?” *Journal of*

- AHIMA* 71, no. 8 (2000): 78–81.
- Warner, Homer, Jr. “Good Isn’t Enough.” *Health Management Technology* 22, no. 6 (2001): 30–31.
- Warner, Homer, Jr. “Will Natural Language Processing Help Coders Any Time Soon?” AHIMA National Convention proceedings, October 2001.
- Warner, Homer, Jr., John Holbrook, David Evans, and Douglas Stetson. “Has Natural Language Processing Finally Arrived? Autocoding and Data Mining Examined.” HIMSS panel presentation, session 49, February 2001.
- Warren J, Collins J, Sorrentino C, et al. Just-in-time coding of the problem list in a clinical environment. *Proc AMIA symp*; Washington DC, 7-11 November 1998:280-4.
- World Health Organization: International statistical classification of diseases and related health problems, tenth revision, Geneva: World Health Organization 1992.
- Zender, Anne. “From Coder to Knowledge Engineer.” *Journal of AHIMA* 74, no. 7 (2003): 104.