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A Business Case Analysis Evaluating the Percentage Types of Lost RVU Workload

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Executive Summary

During Fiscal Year (FY) 2008, Walter Reed Army Medical Center lost approximately \$2.292 million in justifications through the Performance Based Adjustment Model (PBAM) due to incomplete encounters produced in the Standard Ambulatory Data Report (SADR). Though the numbers varied month to month, WRAMC was experiencing an average of 2,010 incomplete outpatient encounters in the categories of Telephone Consults (T-Cons), Kept, Sick Call, and Walk-In appointments. The incomplete encounters are attributed to either a human error or a system error (incomplete note, system, or write-back). What is not known is what percentage of human and/ or system errors is causing the most problems for lost Relative Value Units (RVUs) and how much revenue the facility is losing within identified areas of errors. If we can assess the breakout of lost workload, we can arm decision makers with information to enhance administrative processes and accurately depict and recover lost workload costs. The ability to separate and decipher embedded error data and calculate hidden costs may justify a business case analysis to realign or concentrate resources to have immediate impact for return on investment.

Disclaimer

The views expressed in this study are those of the author and do not reflect the official policy or position of the Department of the Army, Department of Defense, Walter Reed Army Medical Center, or the U.S. Government.

Statement of Ethical Conduct in Research

The author declares there is no conflict of interest or financial incentives in any product or service indicated in this article. The privacy and confidentiality of individuals whose data may have been used in this study were protected at all times and under no circumstances will be discussed or released to outside agencies.

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A Business Case Analysis Evaluating the Percentage Types of Lost RVU Workload

Introduction

Conditions that Prompted the Study

Walter Reed Army Health Care System includes 10 major treatment facilities in a three state region servicing over 150,000 beneficiaries in the National Capital Region. Walter Reed Army Medical Center (WRAMC) is the specialty care clinical center of gravity and trains more than 300 Army physicians in over 40 graduate medical sub-specialties. Focus of clinical efforts is centered on the Mission, Vision, and Legacy in support of Warrior Care (Walter Reed Army Medical Center, 2009).



Figure 1. WRAMC Mission, Vision, and Legacy

Note. From "WRAMC Mission, Vision, and Legacy," 2009, *Walter Reed Army Medical Center Web site*. Retrieved October 1, 2008, from <http://www.wramc.amedd.army.mil/Pages/mission.aspx>.

Maintaining the spotlight for providing Warrior Care and developing efficient business practices is a daily challenge. In order to maximize funding, and justify services, data quality management becomes an essential process for capturing workload. Whether military or civilian, physicians bill for their services using Internal Classification of Diseases-9 (ICD-9), Current Procedural Terminology (CPT), and Evaluation and Management (E&M) codes that are associated with a Relative Value Unit (RVU). RVUs are workload metrics monetarily tied to individualized service fees and ultimately justify a Military Treatment Facility's (MTF) budget.

For Fiscal Year 2008, Walter Reed Army Medical Center was averaging 2,010 incomplete Ambulatory Data Module (ADM) encounters each month and 24,120 outpatient incomplete encounters for the year. Encounters are delineated by four categories: Telephone Consults (T-Cons), Sick Call, Kept, and Walk-ins. The clinical support system used to calculate workload is the Composite Health Care System (CHCS). Once the provider completes his encounter in the Armed Forces Health Longitudinal Technology Application (AHLTA), the military's Electronic Health Record, the information writes to CHCS and calculates codes used for billing. In order for workload to be reported externally via the Standard Ambulatory Data Record (SADR) and ultimately be recorded in MHS Management Analysis and Reporting Tool (M2) and Electronic Information Display System (EIDS)/ TRICARE Management Activity (TMA), it must write back to the Ambulatory Data Module in CHCS. A daily file from the CHCS Patient Appointment File (based on EOD processing) is sent to M2 to project the number of SADR encounters. The SADR Nightly Process runs at 9:30 PM Eastern Standard Time and includes ADM and AHLTA completed encounters as well as ADM updates received from AHLTA and Coding Compliance Editor (CCE). See Figure 2 for flow of SADR information and Appendix for definitions of abbreviations in Figures 2 and 3.

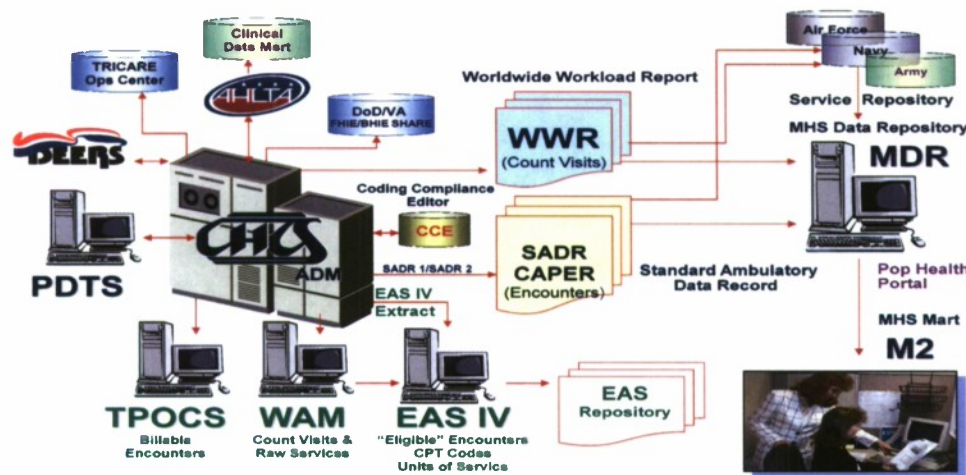


Figure 2. SADR Nightly Process

Note. From "Ambulatory Data Module," by C. Colon, 2009, February, *Office of the Chief Financial Officer Web site*. Retrieved March 2, 2009, from http://www.tricare.mil/ocfo/_docs/09%20FEB%20-%20Colon%20-%20ADM1.ppt.

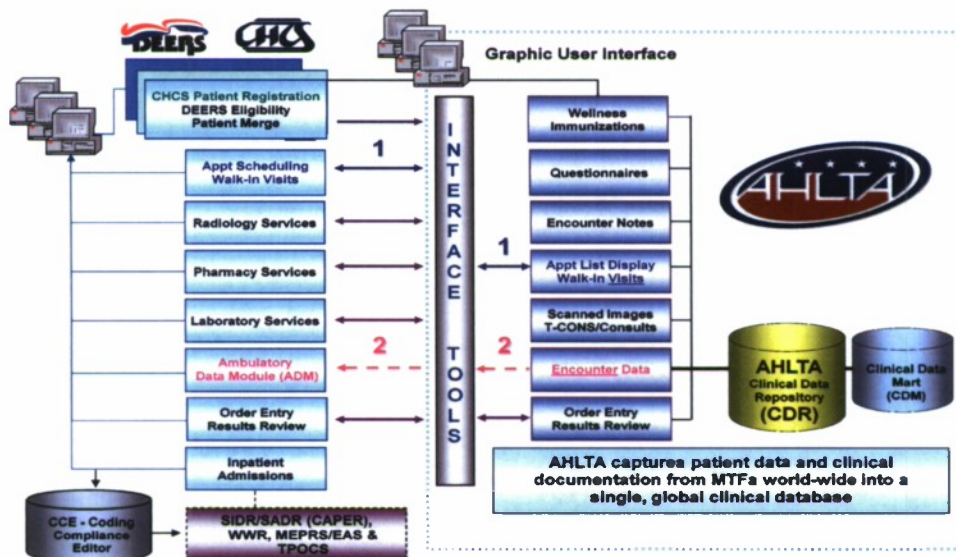


Figure 3. Integrated Capabilities of CHCS and AHLTA

Note. From "Ambulatory Data Module," by C. Colon, 2009, February, *Office of the Chief Financial Officer Web site*. Retrieved March 2, 2009, from http://www.tricare.mil/ocfo/_docs/09%20FEB%20-%20Colon%20-%20ADM1.ppt.

There are several thousand encounters reported as incomplete. Incomplete encounters mean lost workload and unjustified funding. Though encounters may be easily rectified by urging the provider to complete the AHLTA encounter, many encounters remain incomplete due

to an unidentified percentage of associated errors. Non-compliance is associated with two types of errors: system or human. System errors are interface or ADM write-back errors. Human errors are failure to provide or complete the encounter. These system and human errors account for an unknown percentage of lost workload and unnecessarily count against the MTF for PBAM justifications. The problem lies with unidentified percentage types of errors, which contribute to lost or unjustified workload. Assigning percentages to types of errors that contribute to non-compliance would paint a more accurate picture of revenue loss and might create a justification for concentrated efforts and resources.

Purpose and Statement of the Problem

The purpose of this study is to answer a three-part question. 1. What percentage of human and/ or system errors (incomplete note, CHCS system, write-backs) is causing the most problems for lost RVUs? 2. How much revenue is the facility losing? 3. What are recommendations for developing multi-disciplinary approaches that provide increased return on investment?

The method for this study will be to sample, reconcile, and analyze incomplete ADM data to identify which types of errors are contributing to the greatest amount of lost RVU workload. If we can assess the breakout of lost workload, we can arm decision makers with information to enhance administrative processes and accurately depict lost workload costs. Identifying the percentage of errors attributed to irreconcilable write-backs will also assist justifying to MEDCOM/ TMA the reason for potentially writing-off some lost workload costs. The ability to separate and decipher embedded error data and calculate hidden costs may justify a business case analysis to realign or concentrate resources to have immediate impact for return on investment.

Background

Literature Review

The primary clinical support systems that fixed military treatment facilities utilize to document patient encounters and order ancillary services are the Composite Health Care System (CHCS) and the Armed Forces Health Longitudinal Technology Application (AHLTA). Launching and deploying these systems in support of the Department of Defense (DoD) healthcare mission has been invaluable. CHCS is one of the most broadly deployed health information systems globally servicing over 130,000 DoD health care professionals, 70 military hospitals, and over 400 ambulatory care centers. It interfaces with approximately 60 other clinical and administrative systems to include AHLTA, the Defense Eligibility and Enrollment System (DEERS), Expense Assignment System (EAS), Third Party Collections System (TPOCS) and Pharmacy Data Transaction System (PDTS) (Colon, 2009). CHCS facilitates the delivery of quality patient care to over 9.2 million Military Health System (MHS) beneficiaries. Its Computer-based Provider Order Entry (CPOE) system enables providers to electronically order and retrieve laboratory tests, prescriptions, and radiology procedures. In 2007, CHCS supported more than 30 million appointments, 55 million prescriptions, 43 million laboratory tests, and 5 million radiology procedures (Clinical Information Technology Program Office, 2008).

CHCS adheres to healthcare's Iron Triangle model with improved cost, access, and quality by reducing wait time and costly labor, increasing access to medical and professional resources and expediting diagnostic testing, thereby enabling quality care. CHCS supports 14 vital functions for providers and administrative staff. In addition to the order entry and results retrieval systems, CHCS also offers support for Patient Administration (PAD), Patient Appointments and Scheduling (PAS), Managed Care Program (MCP), Quality Assurance (QA),

Workload Accounting Menu (WAM), Medical Services Accounting (MSA), Ambulatory Data Module (ADM), Medical Records Tracking (MRT) and Database Administration (CITPO, 2008).

AHLTA is the military's electronic medical record intended for outpatient care. It is intended to increase quality and streamline costs. According to Chuck Hume, deputy Chief Information Officer and chief of program analysis and evaluation for the Military Health System, it was designed as a centralized database to accommodate the nomadic nature of military personnel and providers (McGee, 2007). It was also deployed as a secondary phase to CHCS I providing additional functionality to health information systems. It generates, maintains, and provides secure online access to patient records. AHLTA is used in 70 DoD Military Treatment Facilities (MTFs) and 400 clinics worldwide. It supports over 55,000 users and documents over 120,000 outpatient encounters per day with over 560,000 encounters each week (CITPO, 2008).

These impressive statistics support leveraging technology to drive quality patient care and enhance the revenue cycle. One article suggests there are five key aspects to technology implementation and benefit sustainability. These aspects allow for process improvement to drive Information Technology design decisions, investing ample time in staff training (especially for providers and coders), communicating leadership support for process changes, tying technology requirements to business needs, and quantifying system benefits (Hoagland, Zar, & Nelson, 2007). In many regards, CHCS and AHLTA were deployed with some of these ideas in mind.

Though health information systems such as CHCS and AHLTA improve quality, access, and costs by expediting order entry, accessing patient information at the point of care and streamlining administrative costs, there is still a consistent problem of revenue loss across the military and civilian industry due to coding and billing errors.

Jack Duffy, author of *Are You Speeding toward Revenue Loss*, suggests that organizations will see substantial benefit to their bottom line by slowing fast billing and emphasizing correctness. His research is based on three and a half years of analytical data gathered from over 100 hospitals earning net annual patient care revenues ranging from \$30 million to \$1.2 billion. Additional characteristics of his data included hospitals with 100 to 750 beds and encompassed more than 30,000 complete medical records as well as comprehensive billing and collection records. What he surmised from his study was that 75% of net new dollars are lost to pre-billing errors associated with documentation, coding, charge description master (a comprehensive listing of billable items), maintenance, charge capture, and billing presentation. The author's data additionally reveals that on average, one percent of total revenue is lost due to documentation, an additional one percent to coding, and another one percent to errors in the CDM or charge captures (Duffy, 2004).

In 2004, the Centers for Medicare and Medicaid Services (CMS) performed a study that calculated nearly a \$104 billion loss related to payment errors due to coding and billing. The FY 2004 Medicare Fee-For-Service (FFS) Payment Report documented a medical coding and reimbursement error rate of nearly 10% for traditional Medicare FFS services. This finding on a small Medicare scale suggests an even greater crisis among non-Medicare sectors. CMS analyzed and identified several errors to include insufficient documentation, incorrect coding, non-response errors, nothing received from provider in response to documentation request, and provider did respond to documentation request, however, information submitted did not support payment of the claim.

Of particular importance, the author suggests that CMS reassess the timing of updates and the regulatory cycle. Currently, regulations are changed several times throughout the year, preventing providers from having adequate time to react and implement solutions for

compliance. Even when hospitals implement regulatory updates in a timely manner, they must wait for the payer or Medicare to implement the same regulations in order to receive reimbursement (Stegman, 2005).

The Military Health System is not entirely different from their civilian industry counterparts regarding frequent coding updates. DoD Military Health System is a client of Medcomp Systems, an organization that supports AHLTA with a product called MEDCIN®. MEDCIN® is an electronic medical record engine that enables rapid entry and retrieval of relevant clinical information at the point of care. According to the MEDCIN Web site, MEDCIN is updated throughout the year by working with the consulting editors. Subsequently, updated files are distributed to licensees, such as DoD, at least twice a year. Therefore, AHLTA and CHCS receive semi-annual coding updates (Medcomp, 2009).

Timeliness and synchronization of updates is extremely important for MTFs. However, synchronization of updates for CHCS is difficult to execute because MTFs receive ICD-9 updates at the start of the Fiscal Year (FY) in October, and CPT updates occur at the start of the calendar year in January. CHCS updates first and automatically eliminates old codes. AHLTA follows a couple months after the CHCS FY and calendar year updates. Therefore, there is an immediate disparity in timely synchronization of updates for both health information systems. For example, new CPT codes went into effect in January 2008 for CHCS at WRAMC. The initial patch for AHLTA occurred in March/April timeframe of 2008. However, the rest of AHLTA was not updated until June 2008. During the third quarter of FY 2008, obsolete codes in AHLTA were writing to the ADM in CHCS causing an understandable spike in write-back errors.

Technological emphasis on incorporating electronic medical records (EMR) into hospital business practices has created a market for competing vendors to provide EMR platforms, product lines, and electronic terminology. MEDCIN is currently the EMR platform that supports

AHLTA. One of its competitors is SNOMED CT. A comparative study was conducted on the efficacy and interface sensitivity of MEDCIN and SNOMED CT in its ability to support entry of general medical data. The study compared the ability of SNOMED CT and MEDCIN to represent concepts and interface terms from a Veterans Affairs (VA) general medical examination template. The methods required the researchers to parse the VA general medical evaluation template and map the resulting expressions into SNOMED CT and MEDCIN. Internists conducted double independent reviews on 864 expressions. Exact concept level and term level matches were used to evaluate reference coverage and interface terms. Results revealed that the sensitivity of SNOMED CT as a reference terminology was 83% versus 25% for MEDCIN ($p < 0.001$). The sensitivity of SNOMED CT as an interface terminology was 53% versus 7% for MEDCIN ($P < 0.001$). These results indicate that the content coverage of SNOMED CT as a reference terminology and as an interface terminology exceeded MEDCIN's performance. Subsequently, this study reveals MEDCIN to be a relatively weak product line in comparison with its competitors. A 7% sensitivity as an interface terminology may support the argument that AHLTA performs and interfaces with other systems like CHCS in a less than optimal manner (Brown, Rosenbloom, Bauer, & et al, 2007).

Given the statistical evidence that MEDCIN is an inferior product, it is not surprising that at the 2008 Association of the United States Army (AUSA) conference, one presentation alluded that provider dissatisfaction with AHLTA is the third leading reason why providers are leaving the military.

Although not directly related to outpatient coding, one article pertaining to the inpatient arena underscores the fundamental dilemma that occurs when replacement of medical terminology codes occurs on a frequent basis. On August 1, 2007, CMS made a final rule to replace its previous system of 538 Diagnosis Related Groups (DRGs) with 745 new DRGs

known as MS-DRGs that were predicted to increase accuracy for the severity of a patient's condition. This article suggests that hospitals could risk coding incorrectly or even losing revenue if they do not acquire the additional training and resources to implement the federal government's new DRG system (Lubell, 2007). Major coding overhauls like this are costly concerning provider and staff support training time and negatively impact revenue if coding is incorrect.

Reviewing the literature pertaining to coding and losses in hospital revenue provides empirical insight on the minutia yet important details of hospital operations that require linkage to an organization's overall business strategy. In this case, the Army Medical Department's (AMEDD) Balanced Score Card (BSC) becomes a critical document defining strategic objectives and should be the foundation by which all MTF business, plans, and operations link. Subsequently, embarking on this project strives to adhere to two key strategic objectives in the AMEDD and North Atlantic Regional Medical Command (NARMC) BSC and five objectives in the WRAMC BSC. These objectives relate to optimizing resources and promoting a culture of innovation.

The AMEDD and NARMC objectives that serve as the guiding objectives for WRAMC are worded similarly. AMEDD BSC defines its three objectives as Learning and Growth (LG) 19.0 Promote and Foster a Culture of Innovation, LG 20.0 Improve Knowledge Management, and Resource (R) 21.0 Optimize Resources and Value. The same objectives are depicted in NARMC's BSC with LG 15.0 Improve Knowledge Management, LG 16.0 Promote a Culture of Innovation, and R 17.0 Optimize Resources and Value. At the MTF level, WRAMC further specifies its BSC (see Figure 4) into five applicable strategic objectives. The first objective is LG-2 Staff Empowerment and Innovation through Tools and Training and serves as the umbrella objective for the other four. The rest of the objectives follow with L-2 Optimize Resources, L-3

Improve Knowledge Management and Funding (F)-1 Predict and Secure Levels of Funding and F-2 Utilize Resources, Time, Space and Funding Effectively. Subsequently, these objectives provide the strategic focus for this study.

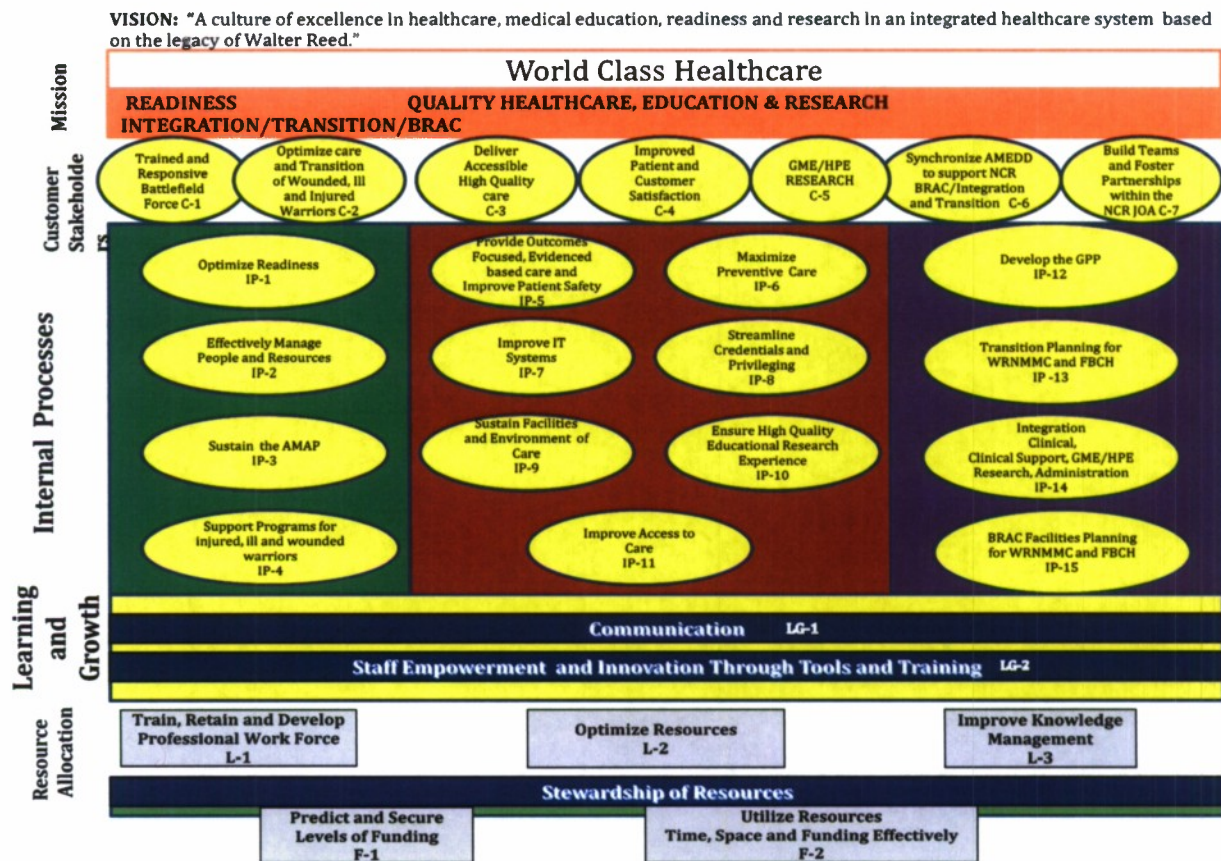


Figure 4. WRAMC Balanced Score Card

Note. From Walter Reed Office of Base Realignment and Closure (BRAC) and Integration.

Methods and Assumptions

Scenario

After conducting this study and analyzing the results, there are three viable scenarios. The first is business as usual. The second is realigning business practices, personnel, and concentrating efforts. The third is hiring additional personnel and/ or a combination of the first or second scenario.

Data

Incomplete outpatient ADM encounters, RVU workload, and PPS earnings for FY 2008 retrieved from M2 will be the primary objects under study. In an effort to provide adequate time to reconcile incomplete outpatient ADM encounters for FY 2008, M2 data was pulled on 21 November 2008. The original data included 1,900 incomplete inpatient encounters and 24,120 incomplete outpatient encounters yielding 26,020 incomplete encounters for FY 2008. For the purposes of this analysis, only the outpatient incomplete encounters (N=24,120) are analyzed.

Determining a statistically powerful sample size that is representative of the population entailed some quantitative analysis. Using the online Raosoft, Inc. sample size calculator to determine a statistically powerful sample size, the following numeric values were inputted. Acceptable margin of error was 5%, needed confidence level was 95%, the population size was 24,120, and the response distribution was 50% to account for the largest sample size. The recommended sample size was 379. This number was rounded to 400 (Raosoft, 2009.)

Prospective Payment System Earnings is the numeric variable used to reflect the change in revenue associated with time intervals such as Fiscal Year Quarters. Therefore, Fiscal Year Quarters stratify the data. Though the average number of incomplete encounters per quarter is 6,030, each Fiscal Year Quarter for 2008 varies in sub-population sizes for incomplete ADM encounters and consists of the following proportion percentages for the total population (see Table 1). Quarter one (OCT-DEC 07) has 5,142 incomplete encounters and accounts for 21.32% of total population. Quarter two (JAN-MAR 08) has 4,286 incomplete encounters and accounts for 17.77% of total population. Quarter three (APR-JUN 08) has 7,784 incomplete encounters and accounts for 32.27% of total population. Lastly, quarter four (JUL-SEP 08) has 6,908 incomplete encounters and accounts for 28.64% of total population. The preceding percentages were rounded to two decimal places. Using the sample size (n=400) calculated from the sample

size calculator, the total sample size was proportionately stratified by quarter into sub-population sample sizes. The sub-population sample sizes were calculated by multiplying the proportion percentages of each quarter by 400, the total sample size. Therefore, the sample sizes for the quarters in chronological order were 85, 71, 129, and 115 to equal 400.

Once determining an appropriate sample size, there were additional data analysis steps taken to ensure randomized, yet calculated sampling within the sub-populations. Using the Data Analysis Sampling Tool Pak function in Microsoft EXCEL, the 10-digit record identification (ID) numbers associated with each encounter was submitted in the Input Range, using a Random sampling method for the requested sample size. The calculated sample size results for each quarter represent an even distribution across the individual clinic identification codes, otherwise known as Medical Expense and Performance Reporting System (MEPRS) Codes.

Table 1
Stratified Sample Sizes for FY Quarters

FY 08 QTRs	QTR/Total Population Size	Population Proportions	Sample Sizes
QTR 1 (Oct-Dec 07)	5,142/ 24,120 =	21.32% * 400 =	85
QTR 2 (Jan-Mar 08)	4,286/ 24,120 =	17.77% * 400 =	71
QTR 3 (Apr-Jun 08)	7,784/ 24,120 =	32.27% * 400 =	129
QTR 4 (Jul-Sep 08)	6,908/ 24,120 =	28.64% * 400 =	115

Note: N=24,120 and n=400 encounters

Scope

AHLTA status analysis. Analyzed data was retrieved from reports produced from M2 and cross-referenced in AHLTA, CHCS, SADR reports, and interface error reports. The sample size is a Fiscal Quarter representation of monthly data from October 2007 through September 2008, which includes the entire fiscal year 2008. Write-back exemption reports are no longer produced;

therefore, it is necessary to manually sample the data to determine the percentage of write-back errors.

Some of the technical diligence needed for critical analysis and to achieve objective findings required several steps to cross-reference and minimize human error. The most important element of the M2 data that assisted with effective identification of an encounter was the record ID number, otherwise known as the Appointment Internal Entry Number (IEN) in AHLTA and CHCS. Other key pieces of information used for verification of specific encounters included the MEPRS code (clinic identification), service date, provider, appointment time, and occasionally patient identification. In an effort to correlate the proper clinic name with the provided MEPRS codes, one needed to enter the MEPRS into the “Create New ADM Encounter Records” section of CHCS to view the named clinics. After acquiring the clinic name, one returned to AHLTA to create a query using the associated clinic names, identified providers, and specific service date to pull the encounter in AHLTA.

The purpose of looking in AHLTA was to evaluate the status of that line-item encounter. Cross-referencing that appointment IEN with that of the identical record ID number provided in M2 verified that the AHLTA encounter matched the incomplete encounter in M2. The most common statuses indicated in AHLTA were “AdminClose, Complete, Updated, or In-Progress”. Some encounters were non-existent in AHLTA. “AdminClose” and “Complete” statuses were the predominant AHLTA status findings. If an encounter displayed “AdminClose”, this was categorized as a human error. “AdminClose” connotes that the provider failed to complete the encounter by never documenting, partially documenting, and for ultimately failing to sign the encounter. AHLTA “AdminClose” statuses fall into three time-related categories in which AHLTA automatically closes the encounter. An encounter that was created in CHCS but was never opened remains available for provider update for up to 30 days. An encounter that was

open and closed but never documented remains open for provider update for up to 90 days. An encounter that was opened, retained documentation, but not signed remains open for up to 120 days. After 120 days, AHLTA electronically closes the encounter. Any revenue associated with the encounter is lost. Therefore, when an encounter displays as “AdminClose” in AHLTA, there is adequate time allotted for a provider to go back and correct an open encounter in order to receive RVU credit.

On the other hand, a signed encounter would make that encounter display “Complete”. A complete encounter has been opened, documented, and signed by the provider. A properly completed encounter should deliver RVU credit to M2. An “Updated” status indicates that the provider or coder went back into that encounter to provide updated information. An “In-Progress” encounter is an open encounter that has not yet been signed or administratively closed.

CHCS and SADR report status analysis. Confirming the status of an encounter in AHLTA is the first major step in the analysis process. The second major step pertains to matching the encounter in AHLTA with the same encounter in CHCS to determine its status in CHCS. CHCS statuses included: “Provider never assigned to a clinic”; “No appointments in the ‘create’ module of CHCS”; “No CPT Codes attached to that encounter in the ‘create’ module of CHCS”; or “Specific number of T-CONs present with no CPT Codes attached”. Encounters were also cross-referenced in the monthly SADR reports to determine their status. Only complete encounters were reported. Identified SADR encounters displayed a warning, an error, or an extensively delayed completion date for an encounter.

As a final method of verification, an ad-hoc query was created through CHCS using the M2 record ID numbers. This report allowed the viewer to see encounters adequately coded with ICD-9 codes, CPT codes, and E&M codes. It also revealed if warnings or errors were associated with that encounter as it was sent through the SADR. Errors prevent SADRs from being sent as

complete, yet warnings do not. Lastly, it verified that the encounter was sent in the SADR; it identified the date the encounter was sent; and it displayed the CHCS or AHLTA source for completion of the encounter.

Findings status. The findings contained some nuances of other suspected errors in conjunction with the five major categories of errors. The simplest findings were write-back errors (WBEs). According to AHLTA, they were reported as complete. In CHCS, they appeared in the Create New ADM Encounter Records Module of CHCS absent of any codes. The second simplest findings to identify were human provider errors. They were indicated as “AdminClose” in AHLTA and were absent of CPT codes in the “Create” module of CHCS. System errors were the third simplest errors to identify. Interestingly, a majority of the system errors reflected “Complete” in AHLTA, but did not have appointments in the “Create” module of CHCS. Rather, a later discovery revealed that these encounters were in fact complete in the “Modify Existing ADM Records” of CHCS with codes attached. The fourth category was created for miscellaneous findings such as training encounters, duplicates, outliers, or SADR warnings or errors. This category represented a relatively insignificant percentage of the population. The last category pertained to encounters difficult to classify. The findings often did not reveal conclusive data, because the encounter did not exist in AHLTA, and there were no appointments in the “Create” module of CHCS indicating an incomplete encounter, or the provider was never assigned to a clinic in CHCS. A majority of these encounters did not have an encounter in AHLTA or CHCS. Therefore, it was difficult to determine if this was attributed to a human, system error, or both. However, the ad-hoc query developed for CHCS clarified the statuses for inconclusive findings.

Analysis

Financial Metrics

Financial metrics were assessed through the totaling of RVU PPS earnings. The difference between the total potential RVU PPS earnings minus actual RVU PPS earnings is the area of focus for this study. In FY 2008, WRAMC earned approximately \$65.83 million in PPS Earnings from 897,374 RVUs. The total realized RVUs do include Ambulatory Procedure Visits and Inpatient Consults, but were not analyzed in the actual study. According to NARMC Resource Management, the average PPS dollar value for a RVU is \$73.00 and based off the mix of different specialties. With non-realized RVUs or inferred SADRs, there is opportunity to optimize resources to recapture lost workload. The outpatient incomplete encounters analyzed in this study created a total loss of nearly \$2.292 million in PPS Earnings. Adjusted PPS earnings with a 34% decrement to account for labor of military personnel decrease the revenue to a total loss of \$1.557 million.

Before one can begin to optimize resources to recapture WRAMC's lost workload for FY 2008, it is necessary to answer the first of three research questions for the purpose of this study. The restated part one question is; what percentage of human and/ or system errors (incomplete note, CHCS system, write-backs) is causing the most problems for lost RVUs? The following information defines the areas of errors and their percentages into three major and two minor categories: Human Error, Write-Back Error, CHCS System Error, Miscellaneous Error, and Inconclusive Data (see Figure 5).

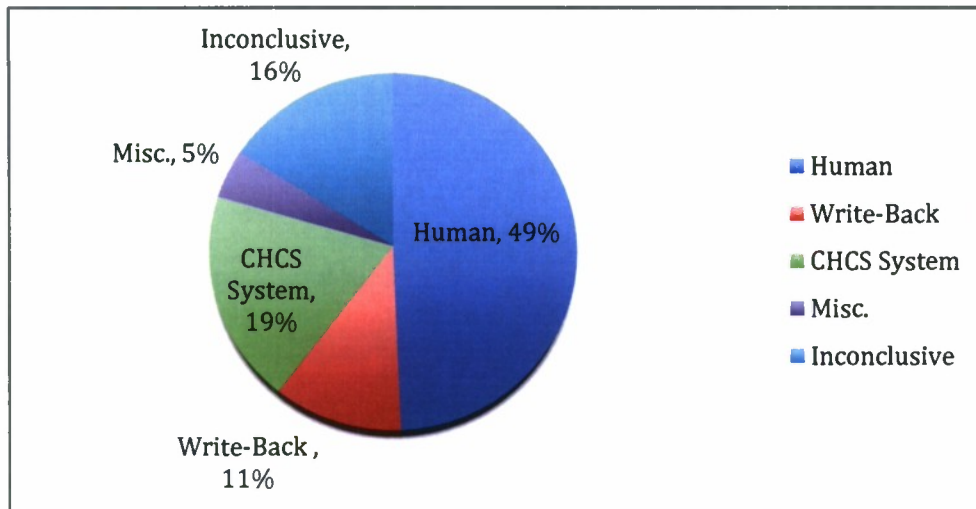


Figure 5. Percentages of Error

Human errors. The area of errors that accounted for the highest percentage of errors was human. For the purposes of this study, human errors are defined by failure of the provider to complete his or her notes in AHLTA. One of the limitations that draws upon a major assumption with categorizing human error is that there is no way to determine if failure and lack of user-friendliness of the system contributed to incomplete encounters identified as “AdminClose” statuses in AHLTA.

Providers continue to be dissatisfied with the utilization of AHLTA. Provider dissatisfaction with AHLTA is the third leading reason for providers to leave military service. The Office of the Surgeon General acknowledges that dissatisfaction is a persistent issue and has developed the MEDCOM AHLTA Provider Satisfaction (MAPS) initiative in an effort to make AHLTA more user-friendly. COL J. Mark Webb recently briefed for the AMEDD Electronic Health Record (EHR) Summit VI on March 11, 2009. His first presentation slide painted a defining picture of overall AHLTA satisfaction on a Likert Scale of 1-5 (see Figure 6) (Webb, 2009).



Figure 6. Overall AHLTA Satisfaction

Note. From "Electronic Health Record Summit VI," by J.M. Webb, 2009, March, *Army Knowledge Online Web site*. Retrieved April 13, 2009, from <https://www.us.army.mil/suite/doc/15447923>.

Given the literature pertaining to MEDCIN's (EMR platform that supports AHLTA) low reference (25%) and interface (7%) terminology sensitivity, it reinforces the inferiority of the product and corroborates users' ill feelings towards it function. This information is important to keep in context when reviewing the percentage of human errors.

Though human error remained high, it did not account for more than 51% of the errors. This study disproved previously untested speculation by senior administrators, data quality experts, and resource management experts that a majority (greater than 50%) of incomplete encounters was due to providers failing to document and signing their encounters in AHLTA.

The average percentage for FY 2008 was 50.05%. The first two quarters were higher with the first quarter representing 58.8%. The second quarter revealed a downward trend with 56.3%. The most dynamic decrease occurred in third quarter with 43.4%. Lastly, fourth quarter showed the smallest percentage for all four quarters representing 41.7% for total incomplete encounters. The downward trend reflects an administrative emphasis to assist and energize providers to close their encounters in AHLTA. This credit is given to LTC Henry Jung, Director, Department of

Medical Administration and Operations, his department administrators, and the data quality team whose attentive efforts illustrate a positive change and optimization of resources to recapture the potential for lost workload. The first Thursday of each month for the weekly DMAO meetings is devoted to reporting ADM compliance for each department and provides a forum by which to exchange knowledge for best practices. Process improvement such as cross-communication amongst data quality and administrators continues to support WRAMC strategic objectives such as improvement of knowledge management and securing funds.

Write-back errors. Write-back errors have been a routine system problem for completing ADM encounters. A write-back error is an encounter that is signed or co-signed by a provider in AHLTA and contains the required ICD-9 diagnosis codes and E&M codes, but does not properly transfer into CHCS ADM allowing for RVU production. There are several reasons why this occurs, but it is related to an error condition in AHLTA or during the update to ADM. The most common error condition is that AHLTA did not complete the encounter update to ADM due to the Clinical Data Repository (CDR) number not being assigned. Other errors include AHLTA Business Rules not consistent with ADM, primarily due to an AHLTA encounter with no CPT codes. Additional errors include AHLTA allowed entry of invalid CPT Code Modifier, obsolete ICD-9, or CPT codes, or an injury date later than the encounter date. Scanned documentation can also cause an AHLTA error along with a visit not found in CHCS to link encounter data. This was particularly evident when the provider was not assigned or inactivated in CHCS (Colon, 2009).

In March 2008, AHLTA stopped producing write-back error reports for MTFs, thereby making it difficult to distinguish write-back related SADR transmission problems. This study confirmed that there continues to be a problem with write-back errors. There has been incongruence in simultaneously synchronizing annual coding updates for both CHCS and

AHLTA. As a result, this incongruence caused systematic problems that increased the number of write-back errors associated with incomplete ADMs. In January 2008, 3M released new CPT codes. AHLTA conducted its initial patch in April 2008; however, there were additional codes that had not yet been fully updated into AHLTA until August 2008. Consequently, CHCS and AHLTA were not communicating with identical codes (Colon, 2009).

The lack of synchronized code updates increased the percentage of write-back errors for that period. In order for ADMs to be properly completed, AHLTA must communicate with the same coding language so that CHCS accepts and ultimately produces a complete RVU. WBEs jumped in the third quarter (April-June) to nearly 20%. In response to evident system faults and the knowledge of increased WBEs, coders were directed to manually correct WBEs in CHCS. As previously stated, the second phase of the AHLTA fix for WBE was finally implemented in August 2008. As a result, the WBE rate decreased to 5% by the fourth quarter. Given the analysis, WBEs accounted for a total fiscal year average of 11.13% of all incomplete encounters. This substantial percentage of system errors negatively affects revenue and completeness of ADMs and corroborates the argument that 10% of inferred SADR should qualify as a financial write-off to TRICARE Management Activity or MEDCOM. The implication and cost of these errors will be further discussed in the cost section.

CHCS system errors. CHCS system errors revealed a unique uniform trend with this category of incomplete encounters. Unlike human or write-back errors, CHCS system errors were defined as incomplete encounters that depicted complete in AHLTA, absent of an open encounter in the “Create” module of CHCS, and appeared complete with attached codes in the “Modify” module of CHCS. By all visible means, the encounter appeared complete in both AHLTA and CHCS systems, but counted against the MTF as inferred SADR in M2. This anomaly initially accounted for roughly 20% of total incomplete encounters, yet a follow-on

sensitivity test drew in nearly half of the encounters initially categorized as inconclusive errors; bringing the total percentage to approximately 29% as CHCS system errors with the sensitivity test. The fact that these account for more than half as many as human errors do qualifies as a significant finding, and a previously unidentified element that is negatively affecting revenue. Running a monthly CHCS ad-hoc test will identify completed encounters that need to be resent.

Miscellaneous errors. Miscellaneous errors were composed of four sub-categories, which individually aggregated to less than 1% of the total, while actual interface errors accounted for 2% of the total population. These errors were defined by duplicate encounters with the same IEN numbers, training encounters for AHLTA and CHCS classes (being counted as inferred SADR), outliers that did not fit into any of the above categories, and interface errors. The average percentage for the miscellaneous category was 4.5%. Similar to human errors, the higher percentages were depicted in the first and second quarters with 4.7% for first quarter and 7% for the second quarter. Miscellaneous errors tapered off to 3.1% and 3.5% in the third and fourth quarters respectively. Given the weight that each sub-category represented, this category has minimal significance.

Inconclusive findings. Certain incomplete encounters remained whose cause could not be identified. These accounted for approximately 16% of the total population of incompletes. Inconclusive findings occurred when the encounter could not be located in AHLTA or CHCS by its IEN, Service Date, Patient Name, or Provider, but were still reported as inferred in M2. Another example would depict a documented encounter in AHLTA but was not present in CHCS because the provider was never assigned to a clinic. However, the parameters of the ad-hoc query used for the sensitivity test helped to identify problems with encounters that were previously categorized as inconclusive, and enabled nearly half of them to be re-categorized as CHCS system errors.

Benefits

The ability to retroactively determine the percentage of lost workload associated with different error types can be applied to future projections and justify the need and best approach to concentrate resources for the most immediate impact. This study has provided a snapshot of problem areas contributing to incomplete encounters. It has raised concerns regarding system errors and diminished the blame on providers failing to complete their encounters.

Costs

Before embarking on the associated costs pertaining to each category of errors and costs pertaining to recommended courses of action, it is necessary to review the fundamental breakdown of total losses in light of M2 and WRAMC/North Atlantic Regional Medical Command's (NARMC) Resource Management calculations. According to M2 data, for FY 08, WRAMC lost approximately \$2.292 million in gross PPS earnings due to incomplete outpatient encounters from the Standard Ambulatory Data Reports (SADR), excluding Ambulatory Procedure Visits (APVs) and inpatient consults. After the total Prospective Payment System (PPS) earnings were discounted 34% to the Adjusted Prospective Payment System (APPS) earnings, the actual loss to WRAMC is \$1.513 million. The discount percent is representative of personnel costs for military providers because military provider wage earnings originate from a separate source of funds. These calculations are gross calculations.

For the purposes of facility and regionally wide calculations, NARMC uses an average PPS dollar value of \$73.00 per simple RVU. WRAMC's incomplete encounters totaled 24,120 equating to a simple RVU loss of 32,317.76 counts. Multiplying \$73.00 by 32,317.76 RVUs yields a PPS loss of \$2.359 million. The Prospective Payment System loss (\$2.359M) decremented by 34% or multiplied by .66 yields a total Adjusted Prospective Payment System (APPS) revenue loss of \$1.557 million. To verify the calculations, dividing the total APPS

revenue loss of \$1.557 million by the APPS value of ($\$73.00 \times .66 = \48.18) \$48.18 per RVU ($\$1.557 \text{ million} / \$48.18 \text{ per RVU} = 32,317.76 \text{ RVUs}$) yields 32,317.16 incomplete simple RVUs for FY 2008. Dividing the APPS value of \$1.557 million by 12 months, negative monthly cash flows pertaining to lost SADR (outpatient) workload is approximately \$129,755.81 per month.

Preventable revenue loss is associated with the diagnosed percentage of errors for the entire fiscal year. The losses are calculated at the Adjusted Prospective Payment System of 34% decrement (see Figure 7). Given that human error accounts for 50.05% of the total loss, the dollar value is \$779,313.37. The write-back errors accounted for 11.13% of the total with a represented loss of \$173,301.86. The CHCS system errors in the original analysis accounted for 19.35%; the dollar value loss for these errors is \$301,292.98. Aggregately, miscellaneous errors are significant as they account for 4.57% of the total population with a dollar loss of \$71,158.08. In the original analysis, the inconclusive data is significant in its findings and could represent appointments that were Administratively Closed, Canceled, Left With Out Being Seen, and No-Showed, but will never produce a credited SADR. This arena accounts for 16.2% of the population and is represented by a loss of \$252,245.29.

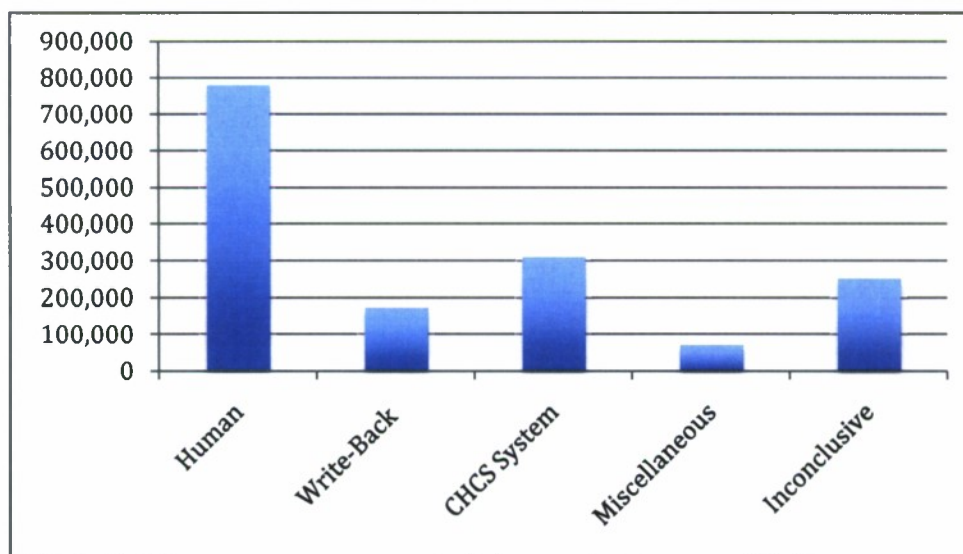


Figure 7. Types of Revenue Loss

Major Assumptions

There are several major assumptions that require detailed investigation in order to determine validity. The first major assumption is that providers are not completing their encounters and that is contributing to a majority of RVU workload loss. The second major assumption is that End of Day reports are not consistently being closed. The third major assumption is that there are business practice inconsistencies that do not lend to enforced completion of encounters. The fourth major assumption is that unsynchronized patches or updates of codes in AHLTA and CHCS are creating write-back errors.

Sensitivities, Risks, and Contingencies

Sensitivities

A key aspect that contributed to the greater fidelity of this study is the powerful ad-hoc query launched in CHCS. Ms. Charlene Colon, Management Analyst, employed by Womack Army Medical Center, developed this query. The query enables several thousand lines of encounters to be pulled and analyzed. Noteworthy information that matriculated from this report were statuses pertaining to presence of ICD-9, CPT, and E&M codes, interface warnings or errors, date of encounter sent in SADR, status of being sent in SADR, source of encounter (AHLTA or CHCS), and billable encounters. In order for a SADR to be successfully sent to M2, it must meet a minimum of two criteria. The SADR must have an ICD-9 code representing a diagnosis and an E&M code representing the provider's level of medical analysis. Some encounters will have CPT Codes when minimal procedures such as labs or x-rays are ordered. However, if an actual error status is attached to an encounter and reported through the interface module, this will prevent any SADR from being successfully sent to M2. Interface errors are manually fixable. Though the system will initially prevent a SADR, an unfixed error status is a

human responsibility to fix. Therefore, an uncorrected error becomes the fault of lack of human oversight. Interface errors accounted for only 2.3% of total incompletes.

The true strength of the CHCS supported ad-hoc report is that it lends answers to analyzed areas that are suspected to fall into the CHCS system errors category. A majority of the discovered system errors analyzed in the sample size were displayed as “Complete” in AHLTA and complete in the “Modify” module of CHCS, but were still being reported in M2 as “inferred” or incomplete SADRs. In essence, they had both ICD-9 and E&M codes present for each encounter. In the original analysis, it was clear that nearly 20% of the total sample size was attributed to system errors showing as both complete in AHLTA and CHCS. The ad-hoc query enabled the ability to run the entire population of 24,120 incomplete encounters and identified all encounters that contained necessary codes, error statuses, and SADR statuses. Nearly 6,976 encounters out of the 24,120 were categorized as system errors. This number in percentage is roughly 29% of the population, which is representative of similar results revealed in the sample size and account for nearly half of the encounters that were previously unclassifiable due to inconclusive findings.

A clear example of this sensitivity is represented in the timing of extracting data from M2. Originally, data was pulled on November 21, 2008. This date was presumed to be late enough that most changes for FY 08 data would be minimal. The same data was pulled again on March 10, 2009. Surprisingly, this data had changed dramatically. Incomplete encounters totaling 24,120 previously had been reduced to approximately 17,144 incomplete encounters. This is a difference of 6,976 encounters. These encounters were also present in the original ad-hoc query for data pertaining to the November 2008 pull.

Analyzing the difference of 6,976 encounters with greater granularity, it was discovered that every encounter that did not have an error status associated with it did have an E&M and

ICD-9 code. Therefore, these encounters were correctly classified as CHCS system errors. They met all the criteria for a complete encounter, yet continued to hang in CHCS without being properly reported as a “Recorded” status in M2. An additional sensitivity test that may need to be conducted is a comparative analysis of the first three months for FY 2009 against the last six months of FY 2008, to see if some of the suspected write-back errors associated with the update implementation have been smoothed or corrected.

Risks

Given the nature of sampling, the error percentages for incomplete encounters each month, there may be some risk associated identifying an exact percentage. Percentages are approximate.

Contingencies

Some contingencies that may need examination are evaluating the communication pathways and business processes that occur from transferring data from the Data Quality Management team to the clinic administrators, to clinic providers, and to coders, or other designated personnel assisting with closing daily encounters.

Recommendations for Multi-Disciplinary Approaches

After conducting this study and analyzing the results, there are three viable scenarios. The first is business as usual. The second is realigning business practices, personnel, and concentrating efforts. The third is hiring additional personnel and/ or a combination of the first and second scenarios.

Business as usual is a highly viable scenario due to the effective business practices that have been implemented. As the human error factor trends downward, it indicates a movement towards performance improvement. Weekly meetings chaired by the Director of Department of Medical Administration and Operations encourage knowledge sharing and task orientation with

department administrators. Existing business practices such as producing daily and weekly ADM compliance reports for department administrators should remain in effect. On the first Thursday of each month, the Data Quality Analysts brief ADM compliance for completeness. Published percentages of compliance encourage professional competition and incentives improved performance. The previously described business practices illustrate that business as usual is needed and inevitable.

The second course of action is to realign business practices and concentrate efforts on opening communication channels between the coders and the providers they support. Recommendations for realigning business practices include DMAO asserting a two-pronged approach of also addressing service and department chiefs concerning ADM compliance and encouraging Data Quality to run ad-hoc reports that identify complete yet unsent SADR's.

According to a study conducted at Moncrief Army Community Hospital, after implementing a system where coders acted as coaches and mentors to providers to encourage accurate coding; coding compliance went from a rate consistently running below 90% in FY 04 to remaining above 90% throughout FY 05. Subsequently, this course of action is a very viable option thereby improving coding accuracy and encounter completion (Hamlin, 2006).

As bi-annual ICD-9 (OCT) and CPT (JAN) updates occur, providers have historically stored commonly used coding terminology in their templates and "Favorites" folder of AHLTA. These codes become obsolete as new updates are implemented. It is therefore important for administrators to encourage provider/coder rapport. Coders should review and verify provider AHLTA "Favorites" and templates with outdated codes. Building confidence in provider support benefits the hospital thereby streamlining efforts to improve patient care and revenue.

The third course of action suggests hiring additional personnel or combining the first and second scenario. Given the emphasis of correct coding impacting revenue, it is reasonable to

deduct that hiring additional coders may have an impact on improving return on investment. In November 2006, the Deputy Commander for Administration approved the hiring of additional coders to augment various clinics with the intent of improving coding accuracy, productivity, and data quality. There are currently 26 coders supporting WRAMC. WRAMC averages 70,000 monthly encounters. Dividing the workload by 26 coders over 20 monthly business days yields a daily coder quota of 134. Even though the monthly average of 2,010 incomplete encounters would justify hiring one additional coder, there is no guarantee that an additional coder would provide the solution for all the proven reasons why an encounter is incomplete. Therefore, the current number of coders supporting WRAMC seems to be adequate for the numeric throughput of completed encounters. In fact, facility space poses such a dilemma for coder workspace that WRAMC PAD proposed a remote coding initiative to free administrative workspace and allow coders to work remotely from home. Unless hired for remote purposes, hiring additional coders would continue to pose a facility space dilemma.

As a result, the most sensible course of action that would save WRAMC resources from additional hiring of labor would be to adopt scenarios one and two, by continuing business as usual, modifying business practices, and placing an emphasis on a Coding Coach Program for providers. Initiatives like these help to streamline business processes, eliminate duplicate efforts, and save time; which ultimately saves the organization money.

Limitations

This study had a few limitations. The first limitation is that the data is subject to change. The reason for this is that any medical staff (coder, provider, data quality, and administrator) that has the ability to affect RVUs or correct ADM encounters can alter the total incomplete SADR. In an effort to capture data that was least likely to change, the M2 data was pulled on 21 November 2008, several months after the close of FY 2008. The second limitation was

exploration of numerous possibilities that contributed to an incomplete encounter, especially those classified as human error. AHLTA downtime, mobile laptops missing update feeds, and computer problems may have contributed towards the human error category. Subsequently, intelligent deductions were made.

Recommendations for Future Research

This study identified four areas within clinical and administrative processes that create avenues for future research. One recommendation would be to evaluate the viability of correcting write-back errors and assessing the labor cost in comparison to the approximate \$170,000.00 its currently costing WRAMC each year. The second recommendation would be to focus on the human error element. Given that AHLTA dissatisfaction is the third leading reason why providers were exiting the military in an Office the Surgeon General (OTSG) study conducted in June of 2008, one could conduct a study on the impact of AHLTA functionality facets on completeness of encounters. Variables should be transformed on a Likert Scale and address facets of ease of navigation, speed, reliability, training, and so forth. Another suggestion would be to conduct a Lean Six Sigma project that evaluates and measures the efficacy of a Coding Coach Program for providers.

Lastly, given the statistically proven inferiority of MEDCIN to SNOMED CT, one should research the viability of replacing MEDCIN with SNOMED CT, or a competitor equivalent. A recommendation would be to compare respective return on investments of each product based on total complete/incomplete encounters and potential change in revenue.

Conclusion

As a department administrator at WRAMC, the three executive skill sets that are the foundation for success are human resources, contracting, and data quality management. Understanding data quality and training on its related health systems provides the tools and

knowledge for analyzing a hospital's productivity, billing, and revenue cycle. By identifying the percentage of errors associated with incomplete encounters, calculating the associated types of revenue loss, and recommending courses of action that would optimize revenue and mission accomplishment; support WRAMC's strategic objectives to empower staff and innovate through tools and training, optimize resources, improve knowledge management, predict and secure levels of funding, and utilize time, space, and resources effectively.

Appendix

Definition of Abbreviations Listed in Figures 2 and 3

ADM	Ambulatory Data Module
AHLTA	Armed Forces Health Longitudinal Technology Application
CCE	Coding Compliance Editor
CHCS	Composite Health Care System
DEERS	Defense Enrollment Eligibility Reporting System
EAS IV	Expense Assignment System IV
MEPRS	Medical Expense and Performance Reporting System
MHS MART (M2)	Military Health System Analysis and Reporting Tool
MDR	Military Health System Data Repository
SADR (CAPER)	Standard Ambulatory Data Record
SIDR	Standard Inpatient Data Record
PDTS	Pharmacy Data Transaction Service
TPOCS	Third Party Outpatient Collection System
WAM	Workload Accounting Menu
WWR	Worldwide Workload Report

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