Data Quality Improvement Activities
In The
Military Health Services System
And The U.S. Army Medical Department

By:
Lieutenant Colonel David J. Corey, U.S. Army, MHA, CHE
Chief, Statistical Quality Control Branch
Customer Service Division
Corporate Executive Information System
Fort Sam Houston, Texas 78234-6025
E:mail: LTC_David_Corey@medcom1.smtplink.amedd.army.mil

Abstract

This paper describes data quality improvement activities in the Military Health Services System (MHSS) and Army Medical Department for 1997. The MHSS is a worldwide managed care enterprise with a $15.1 billion annual budget, 150,000 employees, 107 hospitals and 480 clinics. The author states there are various data quality issues in this system to include those dealing with organizational culture, processes and personnel. Initiatives that are being taken to improve data quality are presented, such as the formation of the Statistical Quality Control Branch and the implementation of data quality plans and the use of data quality metrics. There are detailed discussions on the use and the positive impacts of these metrics. The paper concludes that well designed data quality metrics can level the entire corporate playing field, taking the dynamics of personality out of the decision making process.

Acknowledgment

1.0 Introduction

In 1997, the U.S. Department of Defense's (DoDs) medical system is still in the throws of the largest business process re-engineering effort in its history. It continues to move from a resourcing methodology that is workload based to one that is capitated, based on enrolled lives. It is reinventing its culture, its business rules and the way it measures its performance.

In order to survive as an entity, the DoD's Military Health Services System (MHSS) finds that it must embrace the principles of managed care. It must do so in order to continue to provide medical services to its beneficiaries. Its ability to create efficiencies and eliminate duplication, while still providing accessible, high quality care in a cost effective manner is of great interest to Congress and the American taxpayer. If the MHSS fails to achieve these results, much of what it does could be privatized, leaving only care for active duty soldiers, sailors, airmen, and marines under military control.

Realizing these consequences, the leadership of the MHSS understands that improvements in the areas of information management, information quality, and information technology is vital to its overall success. MHSS leadership, to include the Assistant Secretary of Defense (Health Affairs) (ASD(HA)) and the Surgeons Generals (SGs) of the Army, Navy, and Air Force Medical Departments are beginning to understand that decision makers at all levels must have accurate, complete and timely information to nimbly react to an ever changing environment and plan a course for military medicine into the next century. They are also understanding that the courses that are plotted must be measured to ensure that all levels of the MHSS are aligned to these proper bearings.

This paper provides an update from the Statistical Quality Control Branch (SQCB), Customer Services Division (CSD), of the Corporate Executive Information System (CEIS) in its efforts to support the MHSS' goals to improve information quality, measure performance and provide feedback. It is a natural follow-on to the paper that the SQCB presented at the 1996 Conference on Information Quality (Corey et al. 1996).

Chapter 2 describes the current environment of the MHSS. Chapter 3 highlights the common data quality issues inherent in the MHSS and chapters 4 and 5 provide a review of systematic initiatives that are being taken and specific success stories about individual metrics that have been implemented. Conclusions are made in chapter 6.

The author knows that what is offered in this paper may not be totally relevant to other organizations. All organizations have distinct evolutionary paths with differing core technologies, leaderships, and information systems. It is hoped, however, that through the sharing of the experiences gained in operationalizing data quality improvement programs in an organization as large and complex as the MHSS, may help other data quality pracitioners towards that end.

2.0 Current Environment

It is important to understand the organizational environment in which data quality improvement programs and initiatives are taking place in the MHSS. This understanding must also extend to the current and projected environment surrounding MHSS information management and information technology.

2.1 Organizational Environment

The Office of the Assistant Secretary of Defense Health Affairs (OASD(HA)) is the entity that oversees the provision of health care services for all DoD beneficiaries worldwide. It is responsible for the promulgation of health policy, oversight of the annual $15.1 billion Defense Health Program (DHP), and MHSS strategic planning. The OASD(HA) receives the DHP from the Comptroller General of the DoD and allocates portions of it to the Army, Navy, and Air Force Medical Departments. The Services medical departments are headed up by three-star flag officers who are called Surgeons General (SGs). They receive policy and budget guidance from OASD(HA) along with guidance from their own Service military department Secretaries and Chiefs of Staff. Even though the ASD(HA) has no line authority over the Services' SGs, it has much power, as it controls the vast majority of each Services' operational medical budgets. With increasing regularity, this MHSS leadership is banning together to agree on common goals.

Each SG controls a medical department with differing intermediate commands that serve a regional area or functional mission. Each of the individual Services' hospitals and clinics have differing organizational designs with dissimilar internal/external line and staff relationships. These facilities are commanded by a military physician, nurse, or other medical professional. An organizational diagram of the DoD and the MHSS is depicted in Figure 1.

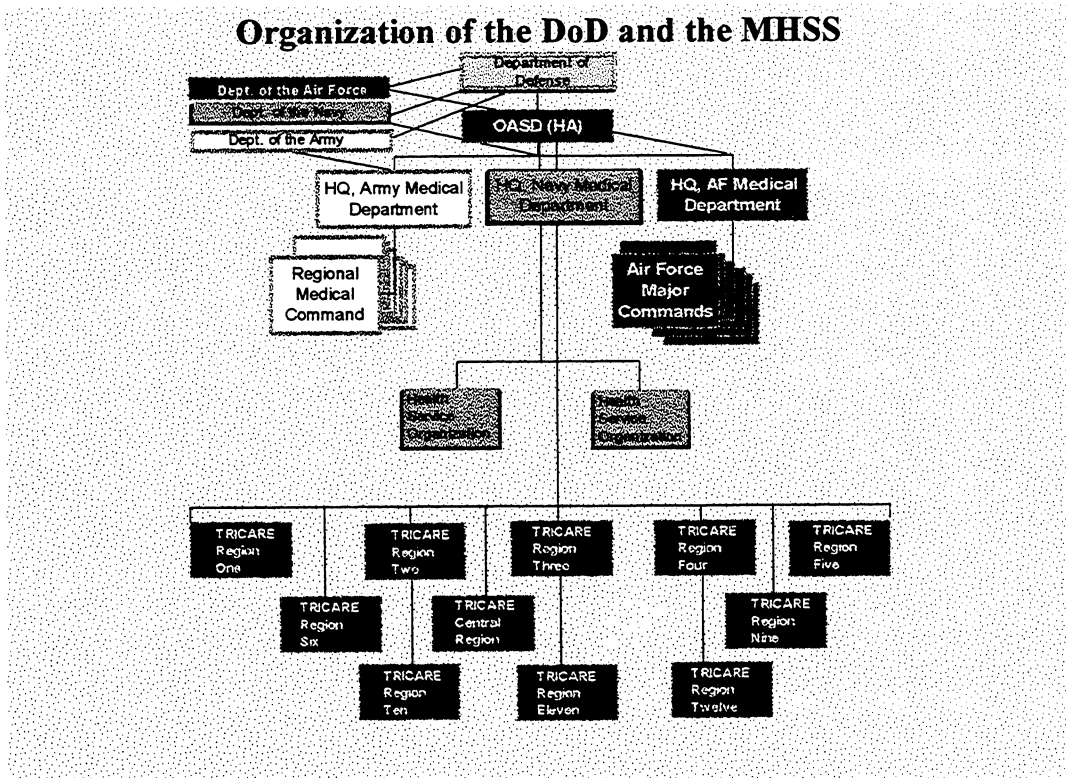**Figure 1: Organization of the DoD and the MHSS**

Presently, the MHSS inventory of health care facilities consists of 107 bedded hospitals and 480 clinics located throughout the world. The MHSS employs 150,000 personnel. This staffing includes a mixture of uniformed active duty officers and enlisted, and DoD civilian government employees. The mixture of staffing differs from Service to Service. It must be

remembered that military treatment facilities' primary missions are to provide day to day service to DoD beneficiaries while at the same time acting as training and sustaining bases to prepare military medical personnel for wartime and readiness missions.

DoD beneficiaries receive their care either inside MTFs or from local civilian providers. Care provided inside MTFs is under the direct control of local facility commanders. Commanders are also responsible for the internal management of all policies, processes, personnel, and budgets of their hospitals or clinics. Their guidance for policy and budget execution internal to their MTFs is received from their own respective Medical Department Surgeon General.

By the end of 1997, most care provided by civilian providers that surround military hospitals and clinics will be overseen by one of eleven TRICARE regional Lead Agent (LA) offices. Each TRICARE LA office is staffed by Tri-Service personnel whose mission is to manage all facets of health care provided to DoD beneficiaries in the civilian sector. Each TRICARE Lead Agent office employs a single civilian contractor to assist in creating efficiencies in each local region and to develop and maintain a civilian managed care network of providers and hospitals spanning the entire continuum of care, consistent with OASD(HA) policy. The Lead Agent office monitors the contractor's performance and the expenditure of funds used for civilian care.

When the TRICARE Program is fully implemented, all DoD beneficiaries will be offered a choice of three health care plans to include a Health Maintenance Organization (HMO) option , a Preferred Provider Organization (PPO) option, or an indemnity insurance plan. Beneficiaries are being strongly encouraged to enroll in the HMO option, which is referred to as TRICARE Prime. The enticement to enroll in TRICARE Prime is that it offers less out-of-pocket costs with increased benefits such as regular physical exams and guaranteed access to care. Active Duty uniformed military personnel have no choice and are automatically enrolled in TRICARE Prime. The other options, though offering greater freedom of choice of providers, have higher co-pays and deductibles.

MHSS leadership wants to increase TRICARE Prime enrollment to create efficiencies inside MTFs and thus maximize their capacity. In order to maximize enrollment in TRICARE Prime, by October 1997 the OASD(HA) will embark on a budget allocation methodology called enrollment based capitation or EBC. This methodology will have two main funding components. The first will allocate a predetermined amount of funds to each facility per year per TRICARE Prime beneficiary who is enrolled to a Primary Care Manager (PCM) inside the MTF.

The second component is that of transfer payments. This will allow MTFs that provide care for beneficiaries that do not live in their own catchment areas the opportunity to bill other MTFs or Service Medical Departments for the care they provide. This component of the funding methodology is to provide a funding stream for referral centers and facilities that were not capitated for providing care for out-of-area beneficiaries.

With the advent of programs and business practices such as TRICARE and EBC, the management focus of MHSS medicine has changed from that of being centrally planned and managed, to one that is more focused on local execution. For these programs to be successful, the responsibility clearly falls to local commanders and staffs. They will require

information that is accessible, complete, accurate, and timely. Commanders will need this type of information in order to create efficiencies inside their own facilities and to collaborate with other military and civilian providers in their local areas and regions. To provide additional assistance, the MHSS information management (IM) community is also instituting many changes and improvements in the areas of information management and information technology.

2.2 Information Systems and Technology Environment

The MHSS IM community is making great strides to improve its information management systems and technology. Of particular importance to the Statistical Quality Control Branch is its focus in four main areas. Those main areas are the realization of the Emerald City vision, the deployment of CEIS, the implementation of performance metrics and the deployment of the Ambulatory Data System. The goal of all of these projects is to reduce redundancies and give the local commander the information and technological edge that is needed to be successful.

The first main focus area is the development of the Emerald City vision. Over the past three years, the MHSS leadership has recognized that information technology was, in fact, impeding its ability to meet key elements of its health care and readiness mission. A thorough analysis revealed that it had over 100 different systems in use. These systems were generally "stove-pipe" systems, custom-built to meet very focused functional needs. It was not uncommon to find three to four terminals on a hospital staff member's desk, each devoted to a separate functional area of the care they were providing. Technical enhancements were implemented on a non-standard, piecemeal basis, thereby limiting their benefits. Generally, the information processed by these systems was locked within them, partly because of the lack of common standards. The difficulty in exchanging information between systems led to some costly duplication.

To address these issues, OASD(HA) in collaboration with the Services' Chief Information Officers (CIOs) have developed and are implementing an Information Management/Information Technology (IM/IT) Strategic Plan which provides a vision for the MHSS information requirements of the future. That vision has become known as Emerald City, and it reflects the MHSS goal for being a world-class, integrated health care organization.

As an integrated information enterprise, the MHSS has six functional business areas. They include the Clinical, Logistics, Resources, Executive Information/Decision Support, Theater and Infrastructure.

Within each of these areas, the MHSS IM community is examining the information required and generated for the services provided, and the business processes that support those services. The objective is to provide an integrated, Tri-Service approach to the information necessary for health care delivery. In addition, technical enhancements are standards-based to ensure interoperability among the six functional areas.

As like the rest of the MHSS, this review of technology has resulted in the start of a major re-engineering of the information technology infrastructure of the MHSS. Functioning offices for all of the business areas have been established. These offices are in the process of integrating all MHSS information systems. Their goal is that all of the

existing legacy systems will be retired. Other "migration" systems are being modified to enable a greater degree of information interchange. They are employing new "Commercial-off-the-Shelf" (COTS) products to provide additional capabilities that have increased functionality with less development time and costs. A diagram of this structure is in Figure 2.
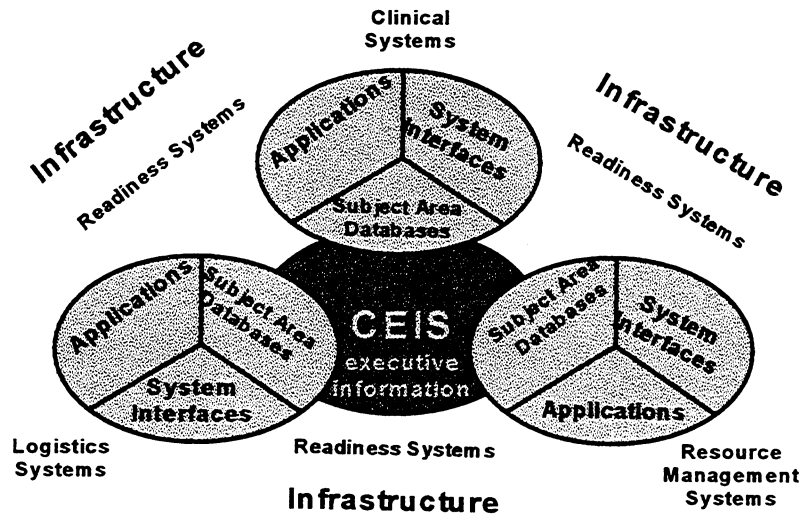
MHSS IM/IT Organizational Structure

Figure 2: MHSS IM/IT Organizational Structure

The vision is that organizational and technical impediments to information exchange will be reduced as the MHSS works toward the eventual elimination of the paper-based patient record. Access to medical knowledge about patients and their conditions will be more readily available to treating physicians internally and throughout the health care service network. Advances in information technology will afford commanders the ability to monitor the health status of their troops and build efficiencies into their health care delivery systems. Health care costs that can be reimbursed, as is planned for in the institution of EBC, and will be invoiced directly to payors. All of these information technology improvements are leading the MHSS to the its vision of the future.

The second area of major focus is the implementation of Corporate Executive Information System (CEIS). Following this vision, the ASD (HA), established the concept of a Corporate Executive Information System that would "drill down," combine, and provide information from separate local MTF source data collection systems. It would also assume the mission of being the decision support and executive information support system for all decision makers at the facility, Lead Agent, and corporate levels of the MHSS.

CEIS was designated as a migration system to eliminate duplicate functions found in various MHSS legacy systems. The plan is to place integrated data bases (IDBs) at each Lead Agent office that will allow for rapid feeds from local MTF source data collection systems. The COTS software packages of CEIS will allow an expanded set of Personal Computer (PC) users increased access to timely information. This information will be in the form of "canned" or ad hoc reports. The reality of this system's architecture puts the

responsibility of data quality squarely on backs of the local MTF staffs. The overall life-cycle budget for the CEIS program exceeds $600 million.

To oversee the development, implementation, and maintenance of CEIS, OASD(HA) designated the Army as the executive agent for all three Services. The Army Medical Department established the CEIS Program Office in February 1995.

As an integral part of the Army concept for CEIS, the Statistical Quality Control Branch, Customer Service Division (CSD) was established in October 1995. Its mission is to provide assistance and education in the area of data quality improvement to CEIS users and to be responsible for developing and implementing data quality improvement plans and projects associated with the system.

The third major focus is the development of metrics. Simultaneously, as the MHSS enterprise works towards the realization of its Emerald City vision, its corporate leadership is involved in monitoring the performance of the all facets of the organization. Until CEIS is fully deployed in all TRICARE regions, the MHSS corporate level leadership, must use information contained in legacy systems and other central data bases to monitor various performance factors such as care utilization rates, cost expenditures, enrollment rates and population fluctuations. It has developed several performance measures to gauge how MTFs and the Services are performing in these areas. These metrics are using the information contained in central data warehouses, that consists of data originating at the local MTF level. All in the chain are starting to realize that the information transmitted may not always be of the highest quality.

The forth major IM/IT project as referenced above, is the deployment of the Ambulatory Data System (ADS). It is being deployed to every clinic in every hospital throughout the MHSS. ADS allows decision makers and providers the ability to capture the intensity of outpatient care provided to beneficiaries. It will become one of the main source data collection systems of CEIS. Previously, all that was captured for this type of encounter was a clinic workload visit that could not differentiate between a simple tonsil check and high intensity outpatient surgery. The old system, called the Worldwide Workload Report (WWR), counted each of these events as one visit. MHSS leadership wanted more granularity of information.

Through a network of mark-sense forms or "bubble sheets" and clinic scanners, this system feeds rich ambulatory data to a central data warehouse. Providers have been mandated to annotate corresponding Current Procedural Terminology 4th edition (CPT 4) and International Classification of Diseases 9th Revision, Clinical Modification (ICD9 CM) codes for the outpatient care they render. The deployment of ADS has been met with less than favorable enthusiasm with those providers and support staff using the system. However, corporate leadership finds that the need for more accurate information about outpatient care far outweighs the costs of its collection.

With the three Services, OASD(HA) has initiated an aggressive drive towards realizing the Emerald City vision before the end of the millennium. By then, the MHSS will have developed a distributed, open systems architecture that is consistent with both DoD and industry standards. However, to achieve all of these visionary goals, in the near term,

MHSS has to overcome many challenges, issues and problems in the area of information quality.

3.0 Data Quality Issues

Data quality is influenced in the MHSS on several levels. On the macro level, three distinct military medical departments is led by a Surgeon General. They lead organizations with wide variances in traditions, language, information systems and war fighting support doctrines. Even though they try to collaborate on common goals and objectives they also have to satisfy the operational needs of the war fighters of their military departments.

On a micro level, each of these medical departments are made up of scores of military hospitals and clinics. Each is commanded by an individual military medical professional. This commander may be a physician, a nurse, a dentist, an administrator or an allied health professional. Each individual commander brings a different set of values, experiences and professional attitudes. Each tries to execute the day-to-day mission of providing healthcare as best as they possibly can.

Even though each level may have tremendous personality variances and deals with a completely different set of stake holders, influences, and scopes of responsibility, each requires information that is accessible, accurate, complete and timely. And in spite of this great diversity, each levels' data quality is impacted by three common factors. Analysis during the past year by the Statistical Quality Control Branch shows that data quality is influenced by three common factors to include organizational culture, the organization processes that generate data and the people who are involved in data generation.

3.1 Cultural Factors

Local, intermediate, and corporate leadership in MHSS have the largest impact on influencing the culture to improve data quality. If they do not use data, if they are not influenced by data driven decisions from headquarters or are not provided timely feedback, data quality suffers. This reality emanates throughout the entire organization whereby processes will not be designed and people will not be motivated to generate high quality data. In other words, "If it is not important to the boss it is not important to me."

For many years in the MHSS, this was the cultural reality. However, slowly this reality is changing at the corporate levels of the MHSS. This year OASD(HA) and the Army Surgeon General (TSG) are instituting performance metrics. The information used in these metrics comes from central data bases that were initially generated at the MTF level. This practice is sensitizing lower level leadership that powerful decisions are being made with data generated under their control. MTF commanders are realizing that they own their data and are responsible for its quality. The ultimate solution is to put in place systematic plans that improve data quality at all levels of the MHSS.

3.2 Process Factors

The second major factor that influences data quality is the business processes of an organization. Organizational design, systems design and established business policies, all have great impacts on data quality. There are design flaws in many MHSS organizations. Very few have establish data quality improvement goals and objectives in their strategic plans. It is still the rule that MTF divisions and departments do not share information or

review data gathered in source data collection systems for which they are responsible. It is still reality that what is input in one system affects the output in another. Without a team approach, some data quality issues may never be discovered.

System design issues are still prevalent. Until the Emerald City vision and full CEIS deployment is realized, employees still face entry of the same data in multiple stand alone systems. Many of these systems are operating on multiple software versions. Many of the systems have adequate functionality to maintain data quality but systems training for personnel is lacking or non-existent.

Business policies also impact greatly on data quality. Policies that are not coordinated with other functional areas can have drastic effects. An example of a bad policy is the in- and out-processing of medical providers. Many areas of an MTF should be involved in this process. Departments such as personnel, the credentials office, medical records, resource management, pharmacy, lab, and x-ray are all parts of this process. If all parts of this process are not coordinated, it will not identify the results of tests and medications ordered by a specific provider and can misallocate costs in hospital financial systems due to inaccurate information contained in the provider tables of an MTF's clinical information system. To illustrate this, one MTF has over 19,000 active providers in its system. Obviously there was a breakdown in this MTF's system to out-process its providers. One has to wonder about its provider step-down costs to various areas throughout the MTF. With a multidisciplinary team approach and coordinated policies, facilities can generate high quality data.

3.3 Personnel Factors

The third major factor that impacts on data quality are the facility personnel that generate its data. It is a fact that the MHSS is filled with highly motivated professionals that truly care about their patients. However, if they do not realize the importance of accurate, complete and timely data, information quality can suffer. A majority of the data in the MHSS is generated by the lowest ranks of the MTF. Personnel such as clerks, receptionists, transcribers, coders, and corpsman play a huge role. These personnel must understand their actions can influence far reaching decisions made by MHSS corporate leadership. Personnel at all levels must be provided feedback and the understanding as to why their jobs are important in relation to high quality data generation. With proper training on systems operations, and a culture that fosters data quality improvement, these personnel factors can be leveraged to act to a facility's advantage.

4.0 Initiatives To Improve Data Quality

Now that the reader has a firm understanding of the MHSS environment and of the data quality issues inherent in the system, this chapter will present some far reaching initiatives that are being implemented by the CEIS Program Office and the Statistical Quality Control Branch. Some are success stories. These initiatives show a commitment by OASD(HA) and the Army, Navy, and Air Force Medical Departments to improve data quality.

4.1 CEIS Capabilities And Deployment

Due to the deployment of CEIS to 25 facilities in three TRICARE regions, the system's capabilities has sensitized users as to the importance of data quality. This sensitization is happening because CEIS' decision support and executive information functionality allows for the integration of data from MTF source data collection systems and from other business area systems. It is allowing a wider set of users to have immediate feedback on their daily performance and many are not liking the results. Because CEIS data is stored at the regional integrated data bases (IDBs), MTF decision makers have ready access to more timely information. These initial reactions are making CEIS users realize that they have ownership of their data. The output of CEIS is showcasing to all involved the data quality battle cry of "Garbage In, Garbage Out!" CEIS use and its immediate feedback is making facilities take action to improve their data quality. These initial results have also justified the CEIS Program Management Plan (U.S. Army 1995) that established an organization with dedicated assets to assist customers with data quality problems, namely the Statistical Quality Control Branch.

4.2 Statistical Quality Control Branch (SQCB)

The SQCB has provided oversight for all CEIS data quality improvement activities since October, 1995. In fiscal year (FY) 1997, its budget was $1.3 million. This operations budget constitutes .001 percent of the $408 million (Kaminsky 1997) IM/IT budget for the MHSS. A small price to pay for data quality. It is staffed with a group of talented biostatisticians, health systems specialists, computer programmers, contractors, and support staff. SQCB staff, on a day-to-day to basis, researches and analyzes data quality issues and provides consultation and education to various customers. During this past year, the branch has been involved in the formulation and operationalizing of its program philosophy, the CEIS Data Quality Plan (U.S. Army 1997a), the CEIS Data Quality Management Guide (U.S. Army 1997b), and the CEIS Inpatient Data Record (IDR) Edit Plan (U.S. Army 1997c).

4.3 Program Philosophy

The program philosophy of the SQCB espouses that data quality is everyone's responsibility. It believes that data quality is affected by three main factors to include the organization's culture, its business processes, and the people that gather its data. Its philosophy also fosters collaborative research with academic and other civilian institutions.

The SQCB educates the generators of data that it is their role to ensure that their data must reflect reality and that it arrives in central data bases in the same condition. These tenants are taught because leadership at all levels are using their data that is contained in these central data bases. Leadership uses it to measure performance, make decisions and take actions that may have lasting and sometimes drastic consequences. These actions may include a memo from a flag officer directing improvement actions be taken, the cutting of a MTF's budget because its enrollment is down, or the closing of a facility because it is too costly to operate. All of these actions may be justified, however, if they are taken based on inaccurate data, they could wrongfully cost careers, patient services, and jobs.

The program philosophy also adheres to the guidance as stated in the Defense Information Systems Agency's DoD Data Quality Management Guidelines (DISA 1996a),

which speaks of the principles of Total Data Quality Management (TDQM) principles and the Data Quality Engineering (DQE) methodology. All of these philosophical components act as the foundation that all other SQCB initiatives and projects are built upon.

4.4 CEIS Data Quality Plan

Last year's paper (Corey, et al. 1996) fully described the CEIS Data Quality Plan (DQP). At that time it was still under development. However, as of this writing, the plan has been drafted and briefed to the Chief Information Officers of the three Services. They met it with tremendous approval. Presently it is being staffed for comment with the Services.

The plan uses as its back bone, the DoD TDQM principles and DQE methodology. It provides guidance and makes recommendations on how to operationalize data quality improvement throughout the MHSS. Much of its guidance and recommendations have been implemented. Included as an appendix to the plan is the CEIS Data Quality Management Guide, formally known as the Commander's Data Quality Assessment Guide (U.S. Army 1996). The CEIS DQP provides guidance in seven main areas. Those areas include education, training, the resourcing of key functions, marketing, communications, feedback, and a plan for implementation.

The SQCB has taken many actions to implement the plan's guidance. In the areas of education and training, it has hosted three data quality conferences. These conferences have been used to educate prospective CEIS users about the system, to spread the gospel of TDQM, and to familiarize them with the self assessment process contained in the CEIS Data Quality Management Guide. The first conference was held in San Antonio in August, 1996. It was attended by 225 executive and functional staff members from the facilities in TRICARE Region VI. The second conference was even larger. It was held in Washington DC. It boasted an attendance of 325 people from 56 facilities and 5 Lead Agent offices. SQCB research has shown that this may have been the largest data quality improvement conference in history. The third conference was held in San Diego, CA, for TRICARE Region 9, where 100 personnel attended.

During the Washington, DC conference, SQCB collaborated with Dr. Richard Wang, Co-chairman of the Total Data Quality Management Program, Sloan School of Management, Massachusetts Institute of Technology (MIT), and Dr. Diane Strong of Worcester Polytechnic Institute in primary research where 175 attitudinal surveys were completed by attendees. This conference's key note speaker was Mr. James Reardon, CIO for OASD(HA) and the chief architect of the Emerald City vision for the MHSS.

The SQCB has used other venues for education and training. It has made assistance visits to 12 facilities in three other TRICARE regions. In all, 825 MTF staff members from 86 of the 107 facilities in the MHSS have received training. Education and assistance are also supported through a 1-800 help line service whereby users can call if they have questions.

In the area of resourcing key functions, further actions have been taken. In the 86 facilities that were trained, all appointed data quality managers to oversee the completion of base line surveys and the self assessment metrics contained in the CEIS Data Quality Management Guide. Additionally, some facilities have formed data quality committees or

councils to manage permanent data quality improvement programs. Each Service also has appointed a data quality manager.

To ensure that Tri-Service input is received and consensus is gained for all MHSS data quality improvement initiatives, the CEIS Data Quality Plan has recommended the establishment of the CEIS Data Quality Integrated Product Team. Its membership includes representatives from each Service and Emerald City business area. The plan also recommends an elaborate process for establishing corporate level data quality metrics. The flow chart in Figure 3 shows that decisions concerning implementation of data quality metrics will be reviewed by the TRICARE Executive Committee (TEC) which consists of the three Surgeons Generals and the ASD(HA).

Progress has also been made in the areas of marketing, communications and feedback. Since March of this year, SQCB has an operational data quality list server. Approximately 200 members have registered. Most are data quality managers and facility functional staff members. The list server is functioning as an information exchange between members that have issues and those who have the answers. All personnel that have attended SQCB conferences and site visits are encouraged to register.

Process for Establishing Corporate Data Quality Metrics

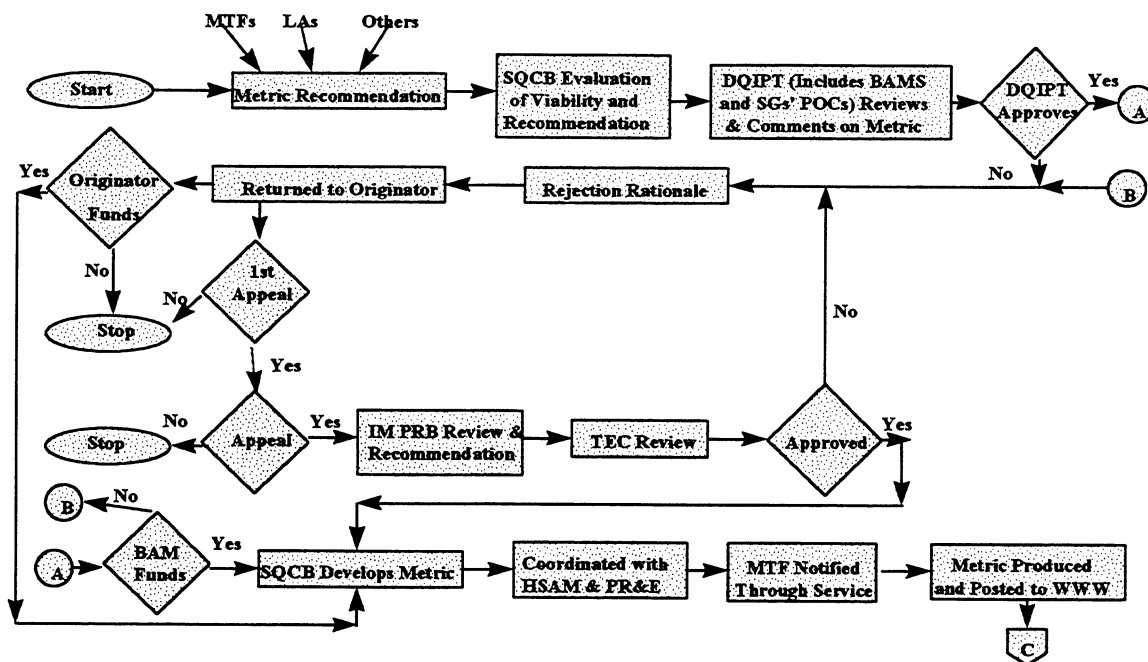**Figure 3: Process for Establishing MHSS Corporate Level Metrics**

Another way SQCB is improving communications and feedback to customers is that is spending $50,000 to re-engineer its data quality web site. In two months it will emulate some of the best web sites in cyberspace. It will be filled with the latest guidance and metrics' results. The goal is to maximize use of the list server and the web site in order to

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lessen the number of telephone assistance calls, thus allowing SQCB staff more time to work on projects.

4.4.1 CEIS Data Quality Management Guide

The center piece of the SQCB's data quality improvement efforts has been the metrics and the processes contained in the CEIS Data Quality Management Guide (DQMG). It has been the main focus of the conferences and site visits conducted by the SQCB. Essentially, it is a management tool for assessing the quality of data residing in the source data collection systems (SDCSs) of MTFs. The goal of the entire process is to improve the quality of data feeding CEIS prior to its deployment by providing the methods and procedures for multidisciplinary teams of MTF staff members to assess and improve data at the local facility level

The CEIS DQMG specifies a step-wise process to establish an operational infrastructure for managing data quality. The key to the process is the requirement that each facility appoint a data quality manager to oversee this self assessment process. The process employed is essentially the Plan-Do-Check-Act (PDCA) method of continuous quality improvement. Once the infrastructure has been established, the guide instructs MTF personnel, with the oversight of the facility data quality manager, in conducting assessments of critical data elements that populate SDCSs by conducting a series of 11 metrics.

The staff then computes the 11 metrics and an objective baseline measure for each metric is established. These baseline measures are annotated on a scorecard. If pre-established metric standards are not met, the staff analyzes the issues, identifies the solutions and performs the metric again. Subsequent scores are again annotated on the scorecard. During this entire process, the staff of the SQCB are available by phone via the 1-800 helpline for consultation.

Once standards are achieved or problems are understood, the MTF commander is briefed as to the facility's data quality status. The commander then signs a data quality evaluation form and it and the scorecard are forwarded back to the SQCB. All individual facility scores are kept confidential. This practice was implemented to have all facilities conduct an honest assessment. The commander's signature completes the self assessment and indicates that he or she is aware of any problems prior to the deployment of CEIS. This entire process is to take no more than sixty calendar days.

The CEIS Program Office (PO) has no line authority to direct that MTF commanders to complete the process. Some facilities that received training in 1996 did not complete the assessment process. However, starting in April 1997, names of those facilities not completing the assessment are being furnished to the Service CIOs, who can forward these results to officers who are in the non-compliant commander's chain of command.

To measure the effectiveness of the guide and to ascertain the level of effort required by MTF staffs to compute baseline measurements for the 11 metrics, SQCB developed a baseline survey. All facilities that were trained in the process in 1996 have been surveyed. Total survey results found that it took a combination of 3.3 personnel 36 hours to compute baseline scores for all 11 metrics. These same results showed that 78 percent of the staff found that the metrics improved data quality, however, only 59 percent said the instructions

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were clearly understandable. Those metrics that received lower scores on usefulness and clarity were modified and improved.

The updated version of the CEIS DQMG and the baseline survey were provided to the 56 facilities that attended SQCB's Washington, DC conference. It showed that it takes a combination of 2.1 personnel 53.7 hours to complete and that 74.2 percent of the users said that the instructions were understandable. This shows that the input from users can make a difference.

Due to the voluntary nature of the self assessment process conducted in 1996, only 48 percent of the facilities totally completed the process. Now with service CIO involvement and with an increased awareness of the importance of data quality, 53 or 95 percent of the 56 facilities that were recently trained completed the process.

4.4.2 Corporate Level Metrics

The original version of the CEIS DQMG was entitled the CEIS Data Quality Assessment Guide. But with the addition of corporate level metrics, the name was changed to reflect that the guide now includes new corporate or management level metrics that contain information and tools useful to MHSS leadership in assessing the quality of data throughout the system. The goal of the corporate level metrics is to provide another means of feedback to MTF commanders. Clearly corporate level leadership wants these metrics in order to monitor performance, standardize reporting, and to modify behavior throughout the system. The CEIS DQMG recommends that corporate level data quality status reports/dash board indicators be developed to monitor MTF performance. An example is in Figure 4.

Example

CORPORATE DATA QUALITY STATUS REPORT

| | | | METRIC SCORES | | | | |
	ENROLL	DISP	MEPRS COST	MEPRS VISIT	IDR ERROR	IDR FORCED ERROR	IDR FORCED
REGION							
Baseline	85	65	89	90	70	89	69
Iteration 1	90	70	90	98	70	90	70
Iteration 2	95	95	95	98	98	95	95
Iteration 3	98	98	98	98	90	98	98
Trend	0.09	0.40	0.09	0.00	0.29	0.09	0.40

Figure 4: Corporate Level Data Quality Status Report

Additionally, the CEIS Data Quality Plan recommends a schedule for reporting these metrics. This process of reporting is illustrated in Figure 5. Both of the processes are under review by the Services. The initial set of corporate level metrics recommended in the CEIS DQP measures various completeness, accuracy, and timeliness dimensions of data transmitted by MTFs to the CEIS IDB and to central data bases. The data elements measured are important generators of information associated with utilization management, Enrollment Based Capitation, and the formation of TRICARE contracts.

Process for Reporting
Corporate Data Quality Metrics
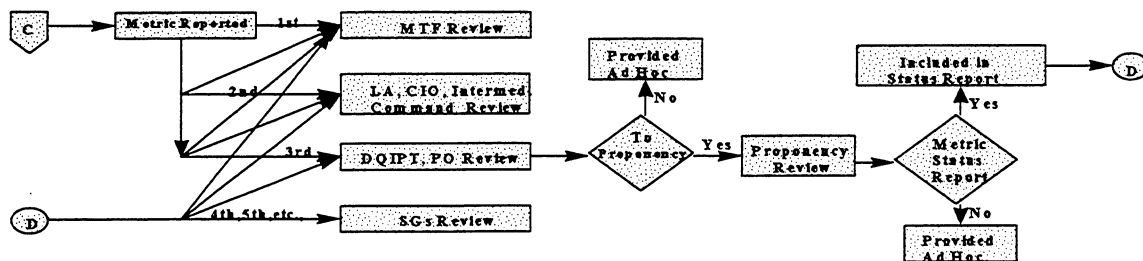
Figure 5: Process for Reporting Corporate Data Quality Metrics

There has been increasing acceptance to this form of measure because of the successes encountered by the implementation of various corporate level metrics by OASD(HA) and the Army Medical Department. Chapter 5 will speak of some of their successes.

4.5 The Inpatient Data Record Edit Plan

Another important program that the SQCB has developed is the Inpatient Data Record (IDR) Edit Plan. The plan provides the three Services and the corporate levels of the MHSS functional oversight for the data quality of the 1491 byte Inpatient Data Records (IDRs) processed at the CEIS Regional Integrated Data Bases (IDB). During processing, the IDB applies 495 edits which check for consistency and validity among various data elements to the IDRs. An example of an error would be a record coding the patient as male and the procedure performed as C-section. The IDB stores error IDRs until a corrected version processes. It is planned that the SQCB will review all error reports and assesses whether global edit failures occurred. In the absence of edit failures, the SQCB forwards error reports to the medical treatment facilities (MTFs) and the Services. The MTF must correct the error IDR and resubmit it to the IDB.

Additionally, the plan provides for MTFs recommending IDRs for forcing past the IDB Edit Checker. "Forced records" are due to medically or administratively unique reasons. Once the Service concurs, the record is "forced" by the SQCB. Finally, the plan provides for urgent and routine edit change processing. The SQCB manages the process through a

Tri-Service functional committee and the resulting Edit Change Proposals to the Integrated Contractor Team and CEIS Program Office. Presently this plan has been approved by the Services. Experience is showing that quality can be improved, but only with aggressive oversight and validation of the edits through the implementation of metrics.

<u>IDR ERROR METRIC</u>

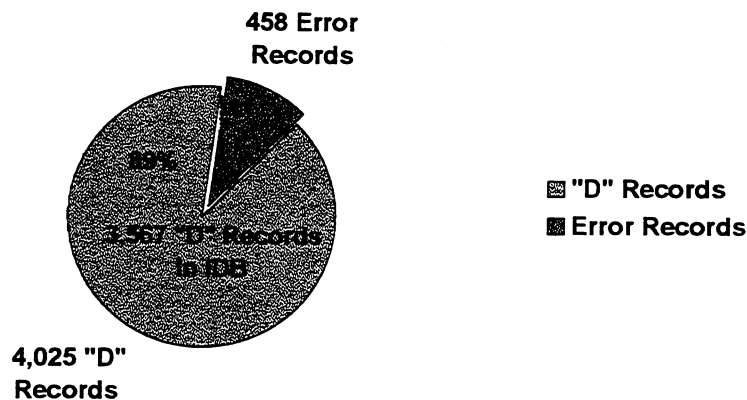$$\frac{\text{\# OF ERROR RECORDS PER TRANSMITTAL}}{\text{TOTAL "D" RECORDS PER TRANSMITTAL}} \quad \text{X 100\%}$$

458 Error Records

■ "D" Records
■ Error Records

4,025 "D" Records

Figure 6: Inpatient Data Record Error Metric.

Three metrics that measure IDR quality have been recommended as part of the initial set of corporate level metrics listed in the CEIS DQMG. The first is entitled the Inpatient Record Error Metric. Its purpose is to serve as a benchmark for completeness and accuracy at the time of electronic batch transmittals of completed inpatient records or "D" records on dispositioned patients by the MTF. Its benefit provides the MTF and corporate leadership with a means of validating the number of inpatient dispositions or "D" records that reside in the CEIS Integrated Data Base and which are presented in the various instances/reports in CEIS. Figure 6 provides an example.

The second metric in Figure 7 is recommended to measure data quality is the IDR Forced Record Metric. The purpose of this metric can be used as a benchmark for the frequency that the MTF determined the need to override the Diagnostic Related Groups (DRG) Encoder Grouper edits at the local level that resulted in an error. It provides an indication of problems with the records processing "system" and associated business practices. Its proposed benefit provides MTF and Corporate leadership with a means of validating the appropriateness of the DRG Encoder/Grouper edits and procedures being used to override the Encoder/Grouper.

IDR FORCED RECORD METRIC
(FORCED ERROR RECORD METRIC)

OF FORCED ERROR RECORDS PER TRANSMITTAL
————————————————————————————————— X 100%
TOTAL ERROR RECORDS PER TRANSMITTAL

Total Error
Records = 808
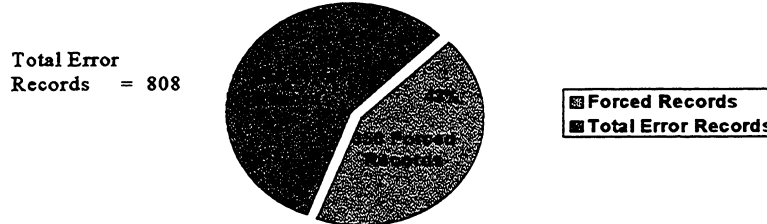

| ▦ Forced Records |
| ▦ Total Error Records |

Figure 7: Example of Inpatient Data Record Forced Record Metric

The third metric in Figure 8 measures IDR data quality is the IDR Errors Per Forced Record Metric. Its purpose is to provide an indicator of the causes of systematic problems with business practices and information for training facility personnel. The metric will be used as a baseline to determine the process requirement if forced records should be returned to the MTF for review. It also provides information for trending improvements in business practices. Its benefits gives leadership at all levels a means of validating the quality of the forced records when the MTF staff overrides the Encoder/Grouper edits. It provides management information for business process improvement and training for facility personnel.

IDR ERRORS PER FORCED RECORD METRIC
(FORCED RECORD ERRORS)

OF ERRORS IN FORCED ERROR
RECORDS PER TRANSMITTAL   =   AVERAGE NUMBER
TOTAL FORCED RECORDS   OF ERRORS PER
PER TRANSMITTAL   FORCED RECORD

830 Errors in Forced Records
—————————————————————————   =   2.4 Errors Per
350 Forced Records This Transmittal   Forced Record

Figure 8: Inpatient Data Record Errors Per Forced Record Metric

Experience with these metrics are showing the SQCB that edit validation is not a static event, but is a dynamic, ongoing process. DoD, for the first time is attempting to apply a set of edits and transmission processes across all three Services in a fully automated way. The benefits will standardize the processing of this data. For this program to work among the three Services consensus will be important.

5.0 Metrics And Success Stories

This chapter is devoted to describing individual corporate level metrics. The majority have been operationalized and are showing success. They are claiming successful, because they are eliciting the desired behavior in the monitored organizations as intended. In the following four sections, each metric's background, description, results, and lessons learned are explained. All monitor performance of various processes in Army Medical Department (AMEDD) facilities.

5.1 Enrollment Metric

With the OASD (HA) preparing to adopt Enrollment Based Capitation (EBC), AMEDD leadership has seen a need to monitor its MTFs' ability to enroll TRICARE Prime enrollees into the Defense Eligibility Report System (DEERS) data base. It wants to do so to maximize its revenue stream. This ability will be important as OASD(HA), in its implementation of EBC, will only provide a predetermined capitated amount of funds to the MTF for each TRICARE Prime enrollee that it has reflected in the DEERS data base. The only information source for enrollee population funding will come from DEERS. Under the rules of the TRICARE Program and EBC funding methodology, all active should be enrolled in TRICARE Prime and entered into the DEERS data base.
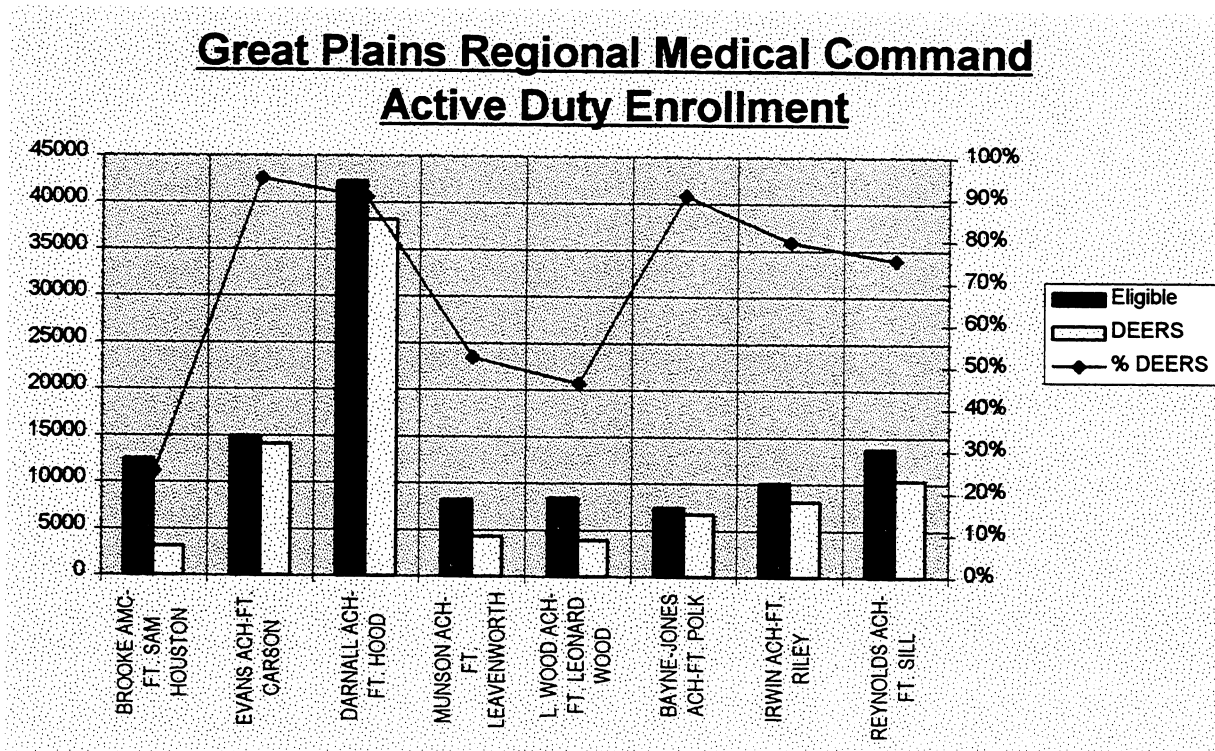

Figure 9: AMEDD Enrollment Metric

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Preliminary research of the DEERS data base by SQCB showed that all active duty military have not been enrolled in DEERS. When comparing present catchment area active duty population figures in the Defense Medical Information System-System Support (DMIS-SS) (another MHSS corporate data set) to DEERS figures, it shows that most AMEDD facilities had far fewer active duty enrollees reported in DEERS than the actual population figures reflected in DMIS-SS. This alerted AMEDD leadership that it could lose $100s of millions when EBC is implemented. So, SQCB is in the process of developing an enrollment metric that will track AMEDD MTF progress in ensuring that its enrollment of active duty personnel is complete and accurately reflected in DEERS. To do so, the metric will compare the potential population figures in DMIS-SS to the actual funded figures in DEERS. Above in Figure 9 is what this potential metric will look like. It is hoped that through the use of this data quality metric, the AMEDD will receive all of the reimbursements it deserves.

5.2 A Tale of Two Metrics

Starting in FY 96 OASD(HA) developed a set of utilization management (UM) metrics to compare inpatient care utilization rates between the Army, Navy, and Air Force Medical Departments. Comparison showed that the Army was the least efficient and OASD (HA) instituted a penalty whereby the AMEDD was withheld $68 million of its FY 97 budget. The Air Force, which was second least efficient, was withheld $34 million and the Navy had $17 million withheld. To improve AMEDD utilization practices, stop future budget withholds, or at least to improve the AMEDDs place in the standings, the Army Surgeon General (TSG) implemented his "Top Twenty" metrics program.

Two of these top twenty metrics measures bed days and disposition rates per 1,000. These two metrics were implemented to emulate the OASD(HA) UM metrics used to apply the budgetary withholds. These monthly metrics extract individual MTF population figures from RAPS and bed days and disposition information from a central data base called the Relative Case Mix Analysis System (RCMAS). The RCMAS information is derived from the transmission of an Inpatient Data Record (IDR). The IDR is an electronic record that accounts for a patient's hospitalization. The IDR contains 213 data elements, including bed days spent in the facility and date of disposition. The Army Surgeon General uses this information in the two metrics he established to track inpatient utilization rates of Army MTFs.

To ensure that the Army Surgeon General is receiving accurate and timely data for these two metrics, the SQCB has developed a third metric. This metric compares like events in two separate data bases. It compares disposition counts by MTF in the Medical Expenses Performance Reporting System (MEPRS) central data base to the disposition counts in the RCMAS central data base. Both sets of data account for the same event but are used for different purposes. They are generated, transmitted and processed in a dissimilar manner. However, both should be equal. So, the SQCB has developed this screening metric to see if dispositions in MEPRS Central for a given month matches those reflected in RCMAS Central. Below in Figure 10 is an example of the metric.

MEPRS - IDR - RCMAS Metric

Comparison of RCMAS and MEPRS Central Dispositions by Month
FY: 1997
As of: 11 Apr 97

		Oct	Nov	Dec	Jan
Region XX					
FACILITY 1	MEPRS	940	910	885	933
	RCMAS	955	922	872	920
(RCMAS/MEPRS)*100		101.60	101.32	98.53	98.61
FACILITY 2	MEPRS	714	767	ERR	ERR
	RCMAS	675	740	429	703
(RCMAS/MEPRS)*100		94.54	96.48	ERR	ERR
FACILITY 3	MEPRS	1313	1064	1007	1037
	RCMAS	1300	1048	988	934
(RCMAS/MEPRS)*100		99.01	98.50	98.11	90.07
FACILITY 4	MEPRS	36	22	32	23
	RCMAS	36	22	33	14
(RCMAS/MEPRS)*100		100.00	100.00	103.13	60.87

Figure 10: MEPRS-IDR-RCMAS Metric

For disposition information to be considered accurate, a MTF's number of disposition totals for a given month reflected in MEPRS and RCMAS must be within plus or minus 5 percent. If an MTF fails to meet this standard, its information is not used for the TSG's disposition and bed days per 1000 metrics. The disposition data used for the screening metric and the TSG's disposition and bed day per 1000 metrics are four months old, i.e., the August 1997 UM metrics presented to TSG, used disposition data that was generated in the month of March 1997. The four month lag in reporting allows time for coding, transmitting, editing, and processing of this information. This practice is speeding up the entire chain's processing time, as the previous standard was to use data that was six months old.

Each facility commander, whose data is not considered accurate or timely enough to be used for the TSG's UM metrics, receives a memo from the Assistant SG reminding them to improve their performance in this area. This metric is creating many new cooperative data quality improvement ventures between the MTF financial and medical records areas, since they are the generators of the MEPRS and RCMAS disposition data.

5.3 Operation Medical Records Management

Operation Desert Storm (ODS) provided many lessons learned on the management of medical records in the operational setting. One of SQCB's missions is to receive and process all Inpatient Data Records (IDR) for the AMEDD, to include those generated during combat operations and deployments. Policy dictates that all deployed units must mail a set of paper forms accounting for each battle field admission back to the SQCB. SQCB personnel then code and process the substantial data contained on these forms into the IDR central data base or ISAM files.

BOSNIA
Case Completeness Metric

UNIT	DISPs IN PARRTS	DISPs in ISAM*	RECORDS DUE	% COMPLETED
212TH MASH	1443	945	498	65%
212TH MASH FST	128	0	128	0%
67TH CSH TOE	836	640	196	77%
67TH CSH FST	59	0	59	0%
21ST CSH	134	0	134	0%
405TH CSH	129	0	129	0%
324TH CSH	52	0	52	0%
GRAND TOTALS	2781	1585	1196	

* = Records either in ISAM files or records that have been received by SQCB

Figure 11: Bosnia Case Completeness Metric

In a recent analysis, based on a population of 350,000 Army personnel that were deployed to ODS and with a disease non-battle injury rate of 1.57 used for that conflict, the SQCB should have received 54,950 records for the operation. However, it only received 20,030. Medical record information from past deployments is vital to national security, soldier welfare, and of great interest to Congress. One only has to read the newspaper about the ongoing issues concerning alleged Persian Gulf War Syndrome. With the Army's current involvement in Bosnia, the SQCB saw an opportunity to improve the completeness rates of the IDR records it is receiving from that operation.

Since ODS, the Customer Service Division (the parent organization of the SQCB) has developed the Patient Accounting Reporting Real-time Tracking System (PARRTS). This system provides a means of tracking admitted patients throughout their continuum of care. PARRTS' function is to provide a small set of electronically transmitted admissions' data back from the deployed units to the SQCB. By transmitting this admission data while the unit is still deployed, PARRTS provides a data quality tool for rapidly validating the number of expected medical records from those deployed units.

By comparing the number of PARRTS admissions transmitted by units in Bosnia to the number of paper forms received or that are being entered in the IDR central data base, the SQCB can project the number of records that are due from each unit. The metric with actual data is above in Figure 11.

To improve timeliness of the paper record transmissions, the SQCB has implemented the following process. On a monthly basis, the SQCB E-mails the above metric, with a patient level report of soldier's social security numbers that identifies records that have not been received to the units on the ground in Bosnia. To date SQCB has a 100 percent completion rate of records from the units that have returned from Bosnia and is receiving regular batch mailings from units still deployed. This is the first time in the history of the SQCB that it has received records from units still deployed.

5.4 ADS Compliance Metric

In mid 1996, OASD(HA) established a revised financing methodology for establishing its TRICARE contracts in health service regions 1, 2, and 5. This methodology mandated that complete ADS information be captured during these contracts' data collection periods. This would mean that the ADS system would have to be operational in every clinic in every

ADS Compliance Metric

ADS Compliance Report for 30 May:

RMC	DMIS	Name	Wkld	SADR	Compliance
North Atlantic	0037	Walter Reed AMC	57249	42747	74.7%
	0255	McNair AHC	369	0	0.0%
	0256	Pentagon AHC	6293	1982	31.5%
Total			63911	44729	70.0%

Figure 12: Ambulatory Data System Compliance Metric

hospital. It would also mean total utilization of the Ambulatory Data System by every provider of care in order to capture every outpatient encounter that occurred in these regions. The ADS data was required by prospective contractors so that they could be more accurate in their bidding process. It was at this time that OASD(HA) began to track ADS rates of usage to try to improve utilization of the system. Another reason that OASD (HA) needed to improve ADS usage was that it would face the potential negative impacts of a $32 million per month in contractual penalties in TRICARE Regions 1, 2, and 5 for not furnishing complete ADS data to these prospective contractors.

Realizing that it may have to ante up its portion of the contractual penalty, AMEDD leadership requested SQCB to develop and implement an ADS compliance metric to track

system usage in Army facilities. Compliance of usage of the ADS is computed by comparing complete Standard Ambulatory Data Records (SADR) (product of the ADS mark sense forms) encounters to workload (visits) counts in a module of the Composite Health Care System (CHCS) called the Worldwide Workload Report (WWR). The metric formula is:

$$\frac{\text{\# SADR Encounters}}{\text{\# WWR visits}} \times 100$$

SADR encounter counts excluded Appointment Status Types of No-Show, Cancellation, Disposition type of Left Without Being Seen, and other encounters not equating to a WWR visit. The standard should be 100 percent, which represents full implementation of the ADS system in each facility. Presently the metric is provided monthly to AMEDD leadership. An actual report is illustrated above in figure 12.

The success of this metric has been tremendous. Since May 1996, the AMEDD wide compliance has risen from 8.7 percent to 62.5 percent in July 1997. Compliance in the AMEDD facilities throughout TRICARE Regions 1, 2, and 5, which was the focal point of the potential contractual penalties, has increased from 23.2 percent in November 1996 to 83.8 percent in July 1997. Compliance at the largest AMEDD facility in the world, Walter Reed Army Medical Center, rose from .3 percent in October 1996 to an astounding 77.6 percent in July 1997.

It can be plainly seen that this corporate level data quality metric greatly influences the day-to-day business processes at AMEDD MTFs. Each facility monitored knows it cannot game the system because all data required to compute the metric is accessed from central data bases. It must be said that without AMEDD corporate leadership support, these results would not have been achieved. Due to the rapid increase in system usage, the AMEDD avoided the $32 million per region contractual penalty. With the improvements made in collecting a more complete set of rich ADS data, AMEDD leadership feels that it may be able turn off the processes required to capture WWR data and is exploring the possibilities of eliminating 40 related personnel positions command wide. The potential savings could be $1 million.

6.0 CONCLUSIONS

During this past year, efforts by the Statistical Quality Control Branch to implement a systematic plan to improve data quality throughout the MHSS is slowly encountering more acceptance, especially by corporate level leadership. This paper has shown that leadership is the key to data quality improvement program and project success. The implementation of data quality metrics, though difficult and time consuming, can make positive impacts on bringing about desirable organizational cultural changes and thus improving the corporate bottom line. Specifically, data quality metrics can assist in moving the MHSS from a workload based bureaucracy to a world class managed care organization.

A well-structured data quality improvement program, with well-conceived metrics allows senior management oversight without disrupting the means of production. Using metrics that are associated with corporation business rules increases decision maker's

confidence in the information they own thus improving the control of their resources of production. Information is a vital resource.

The impact of data quality metrics implemented in the AMEDD has taken the dynamics of personality out of a system that is filled with charismatic leaders. They have allowed for unbiased evaluation based on sound information. They have leveled the corporate playing field, letting the boring personalities play. Finally, this research has shown that timely and useful feedback is key to success. When all levels of the organization know how their performance is going to be measured, know the required achievement standards, and are cognizant of the outcomes of their actions, achievable, rapid and positive results can be obtained.

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List Of Acronyms And Abbreviations

ADS	Ambulatory Data System
AMEDD	Army Medical Department
ASD(HA)	Assistant Secretary of Defense (Health Affairs)
CEIS	Corporate Executive Information System
CHCS	Composite Health Care System
CIO	Chief Information Officer
CPT 4	Current Procedural Terminology 4th edition
CSD	Customer Service Division
DEERS	Defense Eligibility Enrollment Reporting Systems
DMIS-SS	Defense Medical Information System-System Support
DoD	Department of Defense
DRG	Diagnostic Related Group
DQIPT	Data Quality Integrated Product Team (DQIPT)
DQMG	Data Quality Metrics Guide
HMO	Health Maintenance Organization
ICD9 CM	International Classification of Diseases 9th Revision, Clinical Modification
IDB	Integrated Data Base
IDR	Inpatient Data Record
IM/IT	Information Management / Information Technology
IMPRB	Information Management Program Review Board
LA	Lead Agent
MEPRS	Medical Expense and Performance Reporting System
OASD(HA)	Office of the Assistant Secretary of Defense (Health Affairs)
PCM	Primary Care Manager
PDCA	Plan-Do-Check-Act
PO	Program Office
PPO	Preferred Provider Organization
QI	Quality Improvement
SADR	Standard Ambulatory Data Record
SDCS	Source Data Collection System
SG	Surgeon General
SIDR	Standard Inpatient Data Record
SQCB	Statistical Quality Control Branch
TRICARE	Tri-Service Care
TEC	TRICARE Executive Council
TSG	The Surgeon General of the Army Medical Department
WWR	World-Wide Workload Report