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The Department of Defense's Composite Health Care System is a state-of-the-art, integrated medical information system that DOD is acquiring at an estimated cost of $1.1 billion for use in its 767 medical treatment facilities. Ireland Army Community Hospital (IACH) is serving as the operational test site for the CHCS. Little guidance was provided IACH as to how to structure and staff its information management division (IMD) to support such large operational, maintenance, and training requirements. This study documents the various tasks which were added to the IMD's responsibilities as a result of the implementation of the CHCS. The analysis reveals that several additional FTEs are required and the hospital's TDA must be adjusted to provide more authorizations to the IMD.

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A STUDY TO DETERMINE THE MOST EFFICIENT ORGANIZATIONAL STAFFING STRUCTURE FOR THE INFORMATION MANAGEMENT DIVISION SUBSEQUENT TO THE IMPLEMENTATION OF THE COMPOSITE HEALTH CARE SYSTEM AT IRELAND ARMY COMMUNITY HOSPITAL, FT. KNOX, KY

A Graduate Management Project

Submitted to the Faculty of

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In Partial Fulfillment of the

Requirements for the Degree

of

Master of Health Administration

by

Captain Scott D. Hendrickson, MSC

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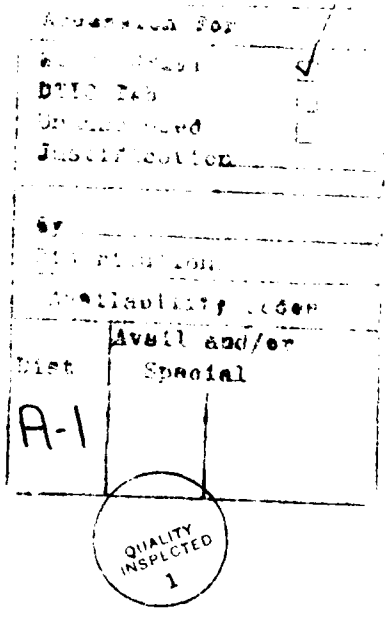

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Finally, I cannot overlook my wife and two daughters who have endured so much while I was obtaining my education. Many times my wife had to play the dual role of father and mother while I was studying or working on various projects. Their unceasing support at home made this project possible.

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Chapter I

INTRODUCTION

Background

The number of computer-based information systems in private and public sector hospitals have grown exponentially during the past twenty years. A new computer products and services industry has developed to supply the tools necessary to build computer-based information systems. A substantial number of individuals who design, build, and operate those systems now classify themselves as computer professionals. In Army hospitals, those types of employees are grouped together in a work center called the Information Management Division (IMD). While there has been a significant increase in the amount of automation and its associated tasks as a result of the implementation of the Composite Health Care System (CHCS) at Ireland Army Community Hospital (IACH), staffing authorizations within the IMD have changed very little.

The CHCS is an integrated hospital information system which may eventually support Department of Defense (DoD) medical treatment facilities around the world. The objectives of the CHCS are to: 1) improve the quality of patient care, 2) increase the efficiency of operations, 3) enhance the accuracy and availability of information, and 4) provide standardized, yet flexible, computer support of essential facility operations. The system will automate

seven major functional areas as follows: 1) Patient Administration, 2) Patient Appointments, 3) Laboratory, 4) Radiology, 5) Pharmacy, 6) Physician/Nursing Order Entry, and 7) Clinical Dietetics.

The system will be installed at IACH in three stages over a three year period. Stage 1 is already providing approximately 45% of the system's total potential functionality. Another 40% will be added by Stage 2 in June 1989 and the remaining 15% will be deployed in Stage 3 in early 1990. The first portion of Stage 1 became operational in the Pharmacy in September 1987. The other six areas became operational to varying degrees between October 1987 and February 1988.

On 28 October 1986 IACH was notified by Headquarters, Health Services Command that the hospital had been selected as a demonstration site to perform an operational test of the CHCS. IACH was built in 1957 as a ten-story structure of 490,000 square feet with a 500 bed capacity. A construction project to upgrade and expand the facility was completed in 1980. In addition to the main hospital structure, five outlying troop medical clinics are operated on Ft. Knox and are included in the operational test of the CHCS.

Conditions Prompting the Study

The Commander and Deputy Commander for Administration recognized the need to assess the number and type of personnel within the IMD to ensure that an adequate number of personnel would be available to operate and maintain the system, as well as to

perform the added training mission. Essentially the entire hospital staff of 1000 military and civilian personnel would need training prior to becoming users of the CHCS. Table 1 summarizes the Table of Distribution and Allowances (TDA) pertaining to the IMD which was in effect at the time IACH was notified it would be an operational test site.

Table 1

TDA in Effect on CHCS Notification Date*

	Required	Authorized
Office of the Chief (Para 770)		
Chief (O4)	1	1
Secretary (GS04)	1	1
Data Processing (Para 770A)		
Sr. Comp. Prog. Anal. (GS11)	1	1
Comp. Prog. Anal. (GS09)	2	2
Operations Branch (Para 770B)		
Comp. Opr. (GS09)	1	0
Comp. Asst. (GS06)	2	0
Systems Branch (Para 770C)		
Comp. Prog. Anal. (GS09)	3	0
Admin. Services (Para 770D)		
Mgt. Asst. (GS06)	1	1
Mgt. Asst. (GS05)	1	0
Clerk Typist (GS03)	1	0
Mail & Dist. (Para 770E)		
Adm. Sp. (E5)	1	1
Mail Clk. (GS04)	1	1
Mail Clk. (GS03)	2	0
Reproduct. Branch (Para 770F)		
Adm. Sp. (E5)	1	1
Total military	3	3
Total GS civilians	16	6
Grand Total	19	9

* See Appendix N for explanation of abbreviations used in TDA.

The Chief, IMD was concerned that the specialty mix of the division's staff was not adequate and began preparing work

estimates and justifications for additional personnel. Requests for additional TDA authorizations and/or overhires were submitted through Health Services Command to the Tri-Service Medical Information Systems (TRIMIS) Program Office. Some of the additional personnel required to begin operations were provided by the civilian contractor.

The civilian contractor selected for the CHCS operational test at IACH was Science Applications International Corporation (SAIC) of La Jolla, California. SAIC has a ten-year history of health services research and specializes in developing automated systems for Department of Defense applications. Initially, SAIC augmented the IMD staff by providing eight personnel.

Workload data was also assessed to determine the initial quantity and logical placement of the new computer devices. Workload programmed for IACH during the initial implementation year (i.e. Fiscal Year 1987) was as follows:

Table 2

Ireland Army Community Hospital Programmed Workload - FY87

Operating Beds	178
Operating Bassinets	17
Total Operating Beds	195
Daily Bed Occupancy	155
Daily Admissions	32.3
Daily Live Birth	3.3
Daily Clinic Visits	1570
Radiology Monthly Procedures (wtd.)	953
Laboratory Monthly Procedures (wtd.)	16095
Pharmacy Monthly Procedures (wtd.)	2975

The staff at IACH anticipates that the CHCS will continue to have a significant impact on both the position descriptions and the number of personnel needed to perform the additional IMD tasks required to support the system. Because of the shortcomings inherent in current staffing procedures and guidance, the IACH Deputy Commander for Administration directed that a study of the IMD staffing structure be performed. When the U.S. Army Health Services Command was contacted to determine what efforts had been previously documented, it was indicated that there were no ongoing staffing studies nor had any studies been performed in the past to substantiate how the IMD should be staffed. Once it became clear there would be no external guidance to assist IACH, it became evident that what was needed would be a standardized method of determining the requirements for technical and administrative support personnel in the IMD based on the amount of work performed. It is to this end that this research effort is directed.

Statement of the Problem

The purpose of this study is to determine the most efficient organizational staffing structure for the Information Management Division subsequent to the implementation of the Composite Health Care System at Ireland Army Community Hospital, Ft. Knox, KY.

Literature Review

Organizational and departmental design is a central problem for managers. What is the 'best' structure for the organization? What are the criteria for selecting the best structure? What signals

indicate that the organization's existing structure may not be appropriate to its tasks and its environment?

Structure is an important tool for managing for several reasons (Leavitt and Brief 1987, 328). First, the manager must contend with the constraints or freedoms of the structure he designs. Second, structure is one of the primary methods the manager can use to change his organization's performance. Third, the structures people work in really do influence the way they behave.

An organization, as defined by Robbins, is 'the planned coordination of the collective activities of two or more people who, functioning on a relatively continuous basis and through division of labor and a hierarchy of authority, seek to achieve a common goal or set of goals' (1983, 5). The word organization connotes something more than just people, positions, and jobs. It suggests an integration of personnel into a smoothly functioning team for the accomplishment of the objectives of the enterprise.

Organizational design is the allocation of resources and people to a specified mission or purpose and the structuring of these resources to achieve the mission. The key characteristic of organizational structure is that 'it links the elements of the organization by providing the channels of communication through which information flows' (Duncan 1984, 60).

In constructing the optimal organizational structure, managers must first determine what types of structure are available. Managers tend to think of organization structure in

terms of two general types, the functional and the decentralized (Duncan 1984, 61). Most organizations today are either functional or decentralized or are some modification or combination of these two general types.

To successfully carry out an information systems program, constant attention must be paid to the best form of internal organization. Systems and programming teams are usually organized along functional lines so that individuals gain expertise in the given functional area. The actual operation of the hardware is normally kept separate from the systems group, and sufficient provision for the administrative function should be made to plan and coordinate the entire information systems function. Data control, a data librarian, physical security, internal control, and backup facilities must be provided.

An efficient organization is said be a productive organization. Productivity, in its simplest form, equals output divided by resource inputs. The two greatest keys to productivity improvement are organization and scheduling (Eastaugh 1985, 61). Much can be achieved by examining what is being done and how the employees are organized to accomplish their assigned tasks.

Organizational moves to improve efficiency may include such steps as consolidation of small elements to achieve some economies of scale, reducing the number of levels in the hierarchy, establishing special positions to facilitate communication and coordination, and the realignment of various elements. A good

organizational structure is not permanent. Forces are constantly at work, both inside and outside the organization, which will require adjustments in the organization if it is to remain effective.

Electronic data processing is an intellectual advance comparable to the use of steam in manufacturing: both were not only major changes in themselves, they set the stage for unforeseeable developments in the future (Griffith 1987, 329). Computer capability has reached the threshold of utility for hospital information services in only thirty-five years. Each new generation of data processing hardware and software has provided 100 or 1000 times the power of its predecessor for the same or, in some cases, less cost.

Historically, data processing departments have merely been appendages to the financial arm of organizations (Schmitz and Drebes 1988, 74). By a wide margin, most computer applications used in hospitals before 1983 involved accounting. For a number of reasons this orientation is gradually changing. Data processing departments are taking on a separate and distinct identity. They are now regarded more and more as organization-wide data gathering facilities. In current organizations, particularly industry, such a department manager often reports directly to the executive vice-president or the president of the organization (The Chief of the IMD at IACH reports directly to the Deputy Commander for Administration [DCA]).

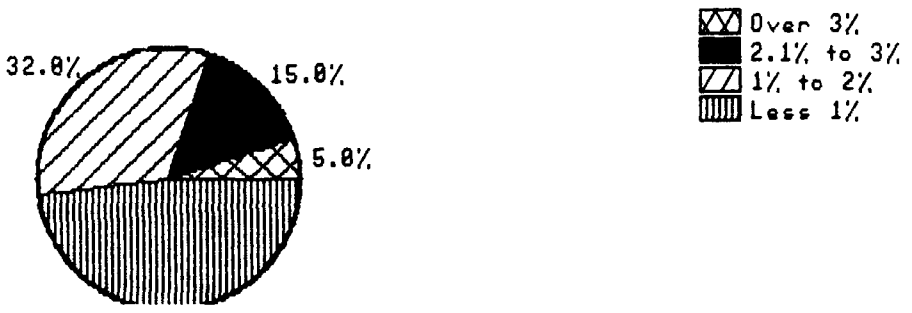
In addition to the manager being selected to head the department, three levels of personnel must be recruited to staff an information systems department; professional, technical, and clerical. Professional staff includes systems analysts and computer programmers. Technical level personnel operate the computer and other data processing equipment. Health services organizations must recruit aggressively to attract qualified systems analysts, programmers, and information systems managers; personnel in great demand by both for-profit and not-for-profit organizations (Austin 1988, 177).

Originally, in many organizations, the information services department had to search for new computer applications. Now, for most mature computer installations, there is more demand for services than there are resources available to satisfy the demand. Current changes in the fiscal and competitive environments are placing new demands on management information systems (MIS), including (Steinwachs 1985, 614): 1) better information on inputs [i.e., costs]; 2) information on characteristics of patients, providers, and the process of care that can explain variations in costs per case; and 3) information on community patterns of use and the portion of the market served by the hospital. A well designed and efficient information management department is crucial if these demands are to be met.

Hospitals invest thousands of hours and billions of dollars each year in computer systems. According to Dorenfest & Associates

survey, the nation's hospitals spent $3.5 billion on information systems products and services in 1988 (Gardner 1989, 34). As illustrated by Figure 1, almost half of all hospitals spend less than one-percent of their operating budgets on information systems, according to the 1988 profile database published by McGraw-Hill.

Figure 1
Percent of Total Hospital Operating
Budget Spent for MIS



Comparatively, the banking industry typically spends 10% or more of operating budgets on information systems. Although industry analysts expect the percentage spent for MIS in the health care industry to increase, patient care will always be a priority for hospitals, and that is where the bulk of the money will go.

The introduction of a computer system represents a significant organizational change. The objective of such a planned change is to keep the organization current and viable. Work groups and their functions will require review and perhaps realignment based on any formal change implemented. When organizations introduce sophisticated information processing, the centralization dimension

of structure is typically altered (Robbins 1983, 270). Improved information processing allows top management to decentralize authority yet maintain control.

Every health care organization will have unique requirements in making a systems transition (Lemon and Meier 1987, 58). Tasks, at all levels, to include managerial duties, will normally be affected when a hospital-wide computer system is installed. Those new tasks and duties may require that different or additional personnel be hired (Worthley 1982, 104).

While personnel costs will continue to consume about 40% (see Table 3) of the average hospital's data processing budget, Zinn Enterprises predicts that there will be a substantial change in the types of employees working with information systems (Gardner 1989, 34). As software becomes more standardized and more easily modified by the user, hospitals will need fewer programmers and more systems analysts and project managers. These are people who may have worked in hospital departments and have practical experience in how those departments operate, but they may not have professional data processing experience.

Table 3
Percent Expenditure of DP Budget

	ALL Hosps.	<200 beds	200-400 beds	>400 beds
Hardware	27%	26%	29%	30%
Software	25%	26%	25%	21%
Personnel	40%	42%	36%	40%
Other	8%	6%	10%	9%

Source: Modern Healthcare Feb. 3, 1989 p. 34

The concept of centralization addresses the locus of decision making authority. If problems flow upward and the senior executives choose the appropriate action, the organization is said to be highly centralized. Conversely, if authority is dispersed downward in the hierarchy, the organization is considered to be decentralized. As Robbins points out, centralization, like complexity and formalization, is not an absolute, but a relative value. Centralization and decentralization are two extremes on a continuum (1983, 7).

Hofman suggests several reasons which favor consolidation of resources while allowing for decentralized decision making (1984, 46): 1) the development of operations procedures for systems will be easier and more consistent; 2) economies of scale are available by consolidating resources such as service agreements, supplies purchases, and full-time equivalents (FTE); 3) established methods for vendor evaluation and selection can be used when working with user departments to select systems; and 4) centralized management will improve the system(s) through the information systems staff's awareness of capabilities of existing systems that can be shared among departments.

There are many reasons, however, why some centralized control is desirable. The development of a corporate data base for support of management decision making is virtually impossible without some central control to develop individual information systems (Austin

1988, 179). A centralized approach can assist the organization in developing a cadre of trained information systems professionals available to work in all the administrative and clinical areas of the organization. Sufficient activities and authority must be aggregated to make the information service effective in the context of the organization's mission. Well-managed hospitals have sought centralization and common direction of input, data processing, and user services to support their steadily increasing use of information (Griffith 1987, 358).

An organizational design decision tree was developed by Duncan to help managers decide whether to structure their organization or department as decentralized, functional, or mixed (1984, 72). The decision tree considers two primary variables: 1) the nature of the organization's goals and environment and, 2) whether or not the tasks to be completed are simple or complex. The decision tree, unfortunately, does not address the specifics as to how a manager should then align his organization once the basic level of centralization has been determined.

Many hospitals do not have or cannot afford the staffing resources required to design, program, and implement a large-scale hospital information system (HIS). The resulting tendency has been to hire consultants to support implementation (Conklin, et. al. 1988, 179). Through consultants, hospitals may obtain the desired system without creating a large data processing department, but the data processing department created may not be very

responsive to user requests for improving existing applications or developing new applications.

As an alternative to hiring consultants, some hospitals are considering decision support systems (DSS) as one way to contain costs while determining staffing needs. Unfortunately most health care related DSSs are primarily designed for use in allocating available nursing personnel and to date have shown not to be practical for designing an information management department (Nutt 1984, 1002).

There tends to be a growing acceptance in management philosophy that each organization is unique and that, therefore, the elements of structure must be carefully selected for each organization. Contingency theories of organization have shown that there is no one best structure (Kazmier 1980, 190). However, organizational theorists have not specified the decision process managers can follow in deciding which structure to implement.

As in the civilian sector, it is not the intent of Headquarters, Department of the Army (HQDA), that organizations be absolutely standardized in size (Army Regulation [AR] 570-4 1987, 8). Staffing levels are determined by workload and other factors such as time-distance, span of control, and contractual support. In some cases, military organizations use a single location standard to determine their staffing requirements. Also known as local appraisal, the single location standard is used when the function under study is peculiar to one location, or the service

provided or mode of operation is very different from that needed at other locations (AR 570-5 1984, 18-1). This often is the case with Army IMDs. The size of the medical treatment facilities supported by the IMDs and the support available from the installation's Directorate of Information Management (DOIM) vary greatly, thus, tending to make Army IMDs unique at different locations.

In summary, the literature reveals neither a universal civilian protocol nor a standard Army staffing 'yardstick' which can be used to determine the staffing for an information management department. The author, therefore, agrees with Cole's proposal to use organizational based appraisal and individual based innovation as a means of tailoring an information management department to best meet the facility's mission requirements based on specific local needs and resource availability (1983, 239).

Objectives

The objectives of this study are to:

1. Review current literature to assess the impacts of automation on various organizational staffing structures (e.g. a centralized IMD versus a decentralized IMD) in health care facilities.

2. Analyze the methods being used to reorganize a MIS department after a significant system addition or expansion.

3. Determine specific branch and individual responsibilities by assessing the current organizational structure and workload of

the IMD and by reviewing a pre-CHCS TDA and available historical workload data.

4. Conduct interviews with the key senior staff and with the supervisors in each branch/section of the IMD to gather opinions and recommendations for improved organization and efficiency.

5. Calculate current manpower requirements using a combination of established methods.

6. Identify the differences between currently recognized (i.e., authorizations) and calculated manpower requirements.

7. Tailor the most efficient staffing structure for the IMD by designing one which will meet the workload and environmental conditions that are specific to IACH.

Criteria

The following criteria are established for this study:

1. A significance level of $\alpha = .05$ will be used for all statistical tests performed during this study.

2. The new organizational structure must be mutually acceptable to management (i.e., Commander, Deputy Commander for Administration, Chief IMD, Branch supervisors) and be in compliance with manpower/force development regulations and local union policies.

Assumptions

The following assumptions were made in order to conduct this study:

1. That the patient workload/beneficiary population at IACH would not change significantly during the data collection period (i.e., as the hospital's workload increases, the need for more IMD support will also increase).

2. That the CHCS would produce additional workload within the IMD, thereby generating increased personnel requirements. This assumption is based on the fact that the CHCS has added significant ongoing training and maintenance requirements. At IACH the 1000 person staff requires training on an on-going basis. IMD personnel also share the responsibility for maintaining approximately 500 CHCS devices.

3. That a manpower staffing standard system (MS-3) equation would not be developed by Health Services Command (HSC) or the Information Services Command prior to the completion of this study. It should also be noted that staffing requirements for IMDs are not described in Department of the Army Pamphlet 570-557 (Staffing Guide for Army Medical Department Activities) and therefore are based entirely on local appraisal.

4. That the workload measured during the two month measurement phase is representative of the rest of the year.

5. That user demand for services other than CHCS support was being met at the time of the study. Although this is a rather bold assumption, the intent of the study is to determine the impact the CHCS has on the IMD staffing requirements. Future users of the study can use established manpower survey techniques or standards

to determine personnel requirements for those administrative functions unique to their respective IMDs but not significantly affected by the CHCS.

6. That representatives of the contractor, Science Applications International Corporation (SAIC), would continue to serve as the on-site CHCS system manager and primary operators.

Limitations

This research was subject to the following limitations:

1. This study was based on the IMD of a 200 bed Army Medical Department Activity (MEDDAC) functioning with a newly installed integrated computer system. Accordingly, the final staffing recommendations may not be applicable to a small 20 bed hospital or to a large 500 bed medical center.

2. Due to time and resource constraints, the data to be used for determining the percentage that each of the major tasks contributes to the total workload will be collected over a relatively short two month period. The total recommended number of FTEs required, however, was based on the actual number of man-hours worked over 12 full months.

3. This study was completed before the CHCS was fully implemented and operational, implying that the IMD staff remains on the low end of the learning curve. When an organization or division makes any significant change - whether that change is restructuring, merging, or downsizing - the immediate result is a drop in productivity. The IMD staff is still in the process of

developing and refining its methods of training CHCS users and operating the CHCS system. No one in the IMD had experience managing such a comprehensive system, a system that affects every department and employee in the hospital. Productivity is likely to increase once the implementation phase is completed and the IMD staff progresses along the learning curve and improves its efficiency of operation.

4. This study examined an IMD that has undergone considerable reorganization over the past four years. The functions of the Adjutant, duplicating section, visual information section, and medical library have been transferred to other divisions in the hospital or to the installation DOIM. Man-hours for those sections' tasks would have to be measured and added to the equation if the methodology of this study were to be used for determining the IMD staff at another facility where those functions are still a part of the IMD.

5. A considerable amount of subjectivity was used to form the resultant staffing structure. This was necessitated by the fact that as a test site, there is no historical data to objectively analyze or use for the purposes of comparison.

6. Due to the fact that very few people have the technical expertise or the functional knowledge to fully understand the support required to operate the CHCS, interviews to solicit staffing recommendations were limited to three individuals.

Definitions

The terms listed below are used throughout the paper and are defined as follows:

a. Accountable time - total man-hours for which the work center supervisor is held accountable for in determining productivity or operational efficiency. It equates to assigned time, plus borrowed time, plus overtime, minus nonavailable time, and minus loaned time.

b. Historical performance - documented past work performance of the work center.

c. Manpower staffing standard - an expression of the quantitative and qualitative manpower requirements for the performance of a given set of functionally homogeneous tasks at varying levels of workload. It is normally stated both as a mathematical equation relating required man-hours to workload factors, and in tabular format showing numbers and skills of people required for a range of incremental workload factor values.

d. Required strength - the minimum number of military and civilian personnel which an Army unit or activity requires to perform its mission effectively.

e. Technical estimate - a determination of the standard hours required for a given task, based upon an estimate made by individuals technically and professionally competent to judge the time required. Generally used when there is insufficient time or expertise available for more precise techniques.

Research Methodology

An extensive literature review was conducted to identify current trends and impacts which automation has had on various organizational staffing structures, especially those in health care facilities. This research was based on the following hypotheses:

H_o = The organizational staffing structure, as specified on the TDA for the IMD prior to the implementation of the CHCS, is sufficient to complete the IMD's entire mission in the most efficient manner.

H_a = The pre-existing staffing structure is not the most efficient and needs modification.

The most efficient organization (MEO) was developed for the IMD using a combination of some of the management study techniques described in AR 5-20 and AR 570-4. The staffing structure was developed through a modified manpower staffing standards study using a phased approach. The phased approach, as prescribed in AR 570-5, consists of three phases; preliminary, measurement, and computation.

I. Preliminary Phase

Planning of the study was done in the preliminary phase. Conducting this phase was critical because the success of the other two phases depended materially on its quality. During the preliminary phase the objectives were to become thoroughly familiar

with the functional area, formulate a study plan, and prepare thoroughly for the measurement phase. Significant steps of this phase were as follows:

1. Identification of work centers and major tasks.
2. Review of work center descriptions.
3. Review of job descriptions.
4. Selection of appropriate work measurement methods.

Major emphasis during the preliminary analysis was given to understanding what functions were to be measured and who performed those functions. The following techniques were used in obtaining information relevant to the conduct of operations within the IMD:

1. Selected reference materials (e.g., AR 25-5, HSC Reg 10-1) were reviewed to acquire a working knowledge of current policies and procedures which govern division operations.

2. Existing studies (e.g., most recent Schedule X) of the IMD were reviewed to gain familiarity with findings and recommendations made in the past.

3. Key personnel, including the IMD chief, data processing chief, and administrative services chief were interviewed to obtain an appreciation of how the division functions.

4. Direct observation was used to gain familiarity with the physical layout and day-to-day operation of the division.

Major functions performed by the IMD at IACH are described in Health Services Command Regulation 10-1 and are broken down into

five major disciplines; 1) Records, 2) Printing, 3) Publications, 4) Automation [maintenance and training], and 5) Telecommunications.

For each category [i.e., work center], the major functions performed on a routine basis were identified by the branch supervisor for analysis purposes. To gain a more detailed illustration of the work being accomplished, those five disciplines were broken down further, resulting in 11 different major tasks. A list and description of the major tasks is provided at Appendix A. To determine the specific type and amount of work (e.g., configuration management vs. training) being performed as a part of the CHCS task, that major task was further broken down into three sub-tasks. A total of 13 (10 major tasks and 3 CHCS specific tasks) tasks were measured and analyzed.

II. Measurement Phase

This phase encompassed the actual collection of data required for developing the most efficient staffing structure. The primary product of this phase was a comprehensive set of standard input data, reflecting pertinent information on inputs and outputs of the defined work centers. Secondarily, but still significant, the results included information on situations not identified in the preliminary phase which signaled necessary changes or exceptions to the work center descriptions to ensure full standards coverage.

Time study, work sampling, and operational audit were considered as options for the primary measurement method. In

accordance with (IAW) AR 570-5, the operational audit was considered the most appropriate work measurement method for this project and was used to collect data throughout the study.

An operational audit incorporates a combination of up to four data collection techniques--good operator, historical performance, technical estimate, and directed requirement--to ensure a systematic method of work measurement. For the purposes of this study, the historical performance and technical estimate techniques were used.

Four sets of data were gathered for comparison and analysis. The first two data sets consist of historical data documenting the number of hours actually worked by the personnel within the IMD. The third data set consists of information gathered during interviews with the primary personnel responsible for overseeing the staffing, installation, and operation of the CHCS. The last data set consists of technical estimates based on backlog appraisals. The four data sets are briefly described as follows:

1. Historical (task specific), 2 Months: Each employee within the IMD was required to record the amount of his/her accountable time spent actually performing each of the 13 tasks on a daily basis for two months. The two month collection period was October and November 1988.

After the major functions being performed in the IMD were established, a standard time collection sheet was developed by the investigator. The time collection sheets were submitted to the IMD

branch supervisors for review and comment. Upon completion of that review, appropriate modifications were made to the time collection sheets and the hospital forms manager assigned a local form number to this document (see Appendix B) .

An explanation of the purpose of the study and the mechanics of completing the collection sheets preceded the collection period. The investigator explained what the employees were being asked to do and emphasized that their cooperation was vital to the success of the project. It was also stressed that no attempt was being made to single out underachievers or overachievers. Workload data was collected from the staff at the end of each week and was incorporated into a spreadsheet for initial analysis (see Appendix C). Weekly totals were then consolidated into a spreadsheet (see Appendix D) to arrive at a monthly total for each of the two months being measured.

2. Historical, 10 months: The total number of man-hours worked for each of the other 10 months (January - September, and December) of 1988 was extracted from the Uniform Chart of Accounts - Personnel Utilization System (UCAPERS) reports. These hours were used as part of the equation (as described below) to calculate the total number of FTEs required in the IMD.

3. Interviews: The 'expert' opinions were solicited from three key IACH senior staff members who work with the IMD staff and the CHCS on a daily basis. These interviews were conducted to gain a subjective assessment of the IMD's present operations that may

have otherwise been overlooked during the objective quantitative analysis.

In addition to a general discussion of the IMD's staffing, each person interviewed was asked to complete a three page survey instrument (see Appendix E) which was developed by the investigator. The first two pages of the survey provided the participant with some historical workload data and asked the respondent to provide written responses to four questions. The third page of the survey requested that the respondent complete a listing as to what he would consider to be the ideal staffing level required to adequately support the CHCS and the entire IMD mission at IACH. Those interviewed and surveyed included: 1) the military CHCS project officer (a lieutenant colonel with extensive personnel and computer applications experience); 2) the civilian contractor's site manager; and, 3) the Chief of the IMD (a military Medical Information Systems Officer [67D] with prior experience at the TRIMIS-Army Program Office).

4. Technical estimate of backlog: The IMD Chief was tasked to prepare a technical estimate of the number of hours that would be required to eliminate what he and his staff had identified as CHCS related backlog and unmet CHCS user demands. The literature suggests that this backlog often goes unmeasured. An accurate and defensible estimate of the man-hours required for the work which is presently going undone was converted to FTEs and added into the final number of FTEs actually required.

Information from the four data sets was analyzed and, as objectively as possible, combined to form the resultant staffing equation.

III. Computation Phase

The culmination of the development process was the computation of the number and specific types of personnel required to staff the IMD using the data and supporting information accumulated from the measurement phase and literature review. This phase included a thorough analysis and validation of the input data. Input data (i.e., man-hours worked) were considered valid and reliable if the number of hours reported on the time collection sheets matched the number of hours that the individuals reported on their respective official time cards. Sampling was performed periodically by the investigator to determine the accuracy of the reported workload data. Based on this sampling, no discrepancies were found, and it was determined that the IMD personnel were, in fact, reporting the data accurately. All of the calculations discussed in the remainder of this section are presented in the quantitative analysis section in Chapter II.

The next step was to determine the number of FTEs that were required to accomplish the IMD mission based on the man-hours performed during 1988. This was accomplished simply by dividing the annual total number of man-hours by 12 and then dividing that quotient by the Army Availability Factor (AAF). The AAF for personnel assigned to fixed medical treatment facilities, as

described in Table 3-1, AR 570-4, has been established as 145 man-hours per month. It is important to keep in mind that the monthly average number of hours is based on last year's performance and all of the work that was not accomplished (i.e, the backlog) still needed to be considered and included in the equation. The number of personnel required by the IMD to complete its historically unfinished mission was determined from the technical estimate prepared by the Chief of the IMD. The technical estimate was reviewed and the approximated number of FTEs needed to eliminate the documented backlog and unmet user needs was added to the number of FTEs computed during the previous step. Thus, the equation used for determining the total number of FTEs was as follows:

(annual man-hours / 12 / AAF) + (# for backlog) = Required man months i.e., FTEs

Although the total number of FTEs was then known, it was at this point that the study broke new ground. As was indicated earlier, there is no Department of the Army "yardstick" available to break down the workload (i.e., man-hours worked in this case) and derive the total number of FTEs. There is also no formula to convert those FTEs into specific job titles and positions.

The next step was to ascertain the percentage of man-hours that each of the major tasks contributed to the total number of

man-hours. The percentage each task contributed was calculated using the average percentage for the two months surveyed. For example:

198 (Oct training hrs) divided by 2713 (total Oct hrs) = .07

319 (Nov training hrs) divided by 2858 (total Nov hrs) = .11

.07 + .11 = .18 .18/2 = .09

Thus, in this example, nine percent of the IMD work could be attributed to training related functions. The annual total number of man-hours was multiplied by the derived fractional values (percentages) for each of the thirteen tasks. This value was calculated to demonstrate the percentage of the total workload that was attributed to each of the thirteen tasks. The percentage of the IMD workload that could be directly attributed to the CHCS was also calculated at this point by summing the percentages for the three CHCS tasks. The sum of the 13 fractional values was one (1.0), indicating that 100% of the workload was accounted for. The final staffing structure for each branch, and the IMD as a whole, was developed based upon the number of man-hours attributed to each of the specific tasks. For example, if 7000 annual man-hours are required for CHCS training time, the computation demonstrates a need for 4 FTEs with trainer skills:

7000 hrs / 12 months / 145 = 4.02 or 4 FTEs

This computation was repeated for each of the major tasks and the resultant number of FTEs were grouped together into branches or

work teams as appropriate. The results for both the percentage and FTE calculations are found in Appendix F.

After all the data was collected and processed, a correlated *t*-test was performed to determine whether there was a statistically significant difference between the number of FTEs determined to be required by the study and the number of FTEs authorized on the TDA (which was in effect at the time the CHCS was initially implemented). A significant difference was demonstrated, indicating the need for additional personnel and thus permitting the rejection of the null hypothesis.

In addition to the inferential data provided by the *t*-test, descriptive statistics (mean, range, etc.) were calculated for each branch and the IMD as a whole. The inferential statistics and the descriptive statistics are illustrated in the quantitative analysis section found in Chapter II.

The last step was to develop an efficient organizational chart. Current concepts and recommendations regarding centralization, decentralization, span of control, division of labor, etc. were reviewed and, if indicated by the literature, minor adjustments were made to fine tune the staffing structure and organizational chart to maximize its efficiency.

Chapter II.

DISCUSSION

General

The determination of how many full time equivalents are required to staff a functional element has always been of concern to managers. In economic terms, it is desirable that the marginal revenue generated by the hiring of an additional person would be greater than the marginal cost of hiring the additional manpower. As an element of expense for a business, it is hoped that the salary paid to any additional person would be offset by either an increase in revenues or a corresponding decrease in costs due to efficiency factors. Although this sounds simple in theory, the practicality of measuring marginal revenues and marginal expenses can be difficult. This becomes extremely difficult (if not impossible) in institutions (e.g., hospitals) where personnel are not directly involved in revenue generation (e.g., MCCUs or DRGs) as is the case with the information management function at IACH.

The Army has had a formal manpower staffing system in effect for some time. Staffing guides are used for approximations of manpower based on selected measurement factors or 'yardsticks' and the volume of work performed. These yardsticks are general in nature and do not necessarily measure all the work a section is required to perform due to local policy variances. The Department of the Army has realized these shortcomings and instituted a Manpower Staffing Standards System as outlined in Army Regulation 570-5.

It should be noted that, while some of the functions (e.g., Mail Room and Distribution Service) of the IMD are broadly covered by existing yardsticks (see Appendix G) in Department of the Army manpower documents, the yardsticks do not account for the entire IMD mission. The only yardstick available for data processing related tasks is for garrison or installation level activities. Work performed in the data processing section of the installation DOIM has too many dissimilarities with those actions performed by the hospital IMD so the DOIM yardstick also cannot be used. This fact is borne out by the fact that previous manpower surveys used local appraisal methods to determine staffing requirements.

According to policies outlined in Army Regulation 570-4, the primary consideration, in the use of manpower and the establishment of positions is, the responsible and successful execution of the assigned military mission. Army manpower utilization policie, pertinent to this study include the following:

a. Supervisory positions should be determined solely on the basis of workloads. Supervisors should have an optimum span of control and there should be an absolute minimum of intermediate supervisory positions.

b. Only the minimum number of positions required to accomplish assigned missions and approved programmed workloads will be provided.

c. Whenever feasible, positions authorized by a TDA should be designated as appropriate for either male of female personnel.

d. Civilian employees are to be used to the maximum extent, except in TDA positions that require military incumbents for reasons of law, security, or specialized military training or knowledge.

e. Recommendations are based on normal workloads using a logical estimate of what the workload will be in the foreseeable future.

The success of any data processing operation is contingent on having qualified personnel. Hiring and retaining individuals with great potential requires a budget that permits paying adequate and competitive wages.

Overview of the IMD

Mission. The mission of the IMD is to provide integrated information management services and support for the hospital and its outlying clinics. Information management services and support encompasses the five disciplines of the Army information mission area: telecommunications, automation, visual information, records management, and publishing and printing.

Organization. The organizational scheme of the IMD at the time of the study is depicted at Appendix H. As was mentioned previously, the IMD falls under the direct supervision of the Deputy Commander for Administration. Lines of authority and responsibility within the respective branches are well defined.

Staffing Authorization. The results of the most recent Manpower Survey Report, commonly known as a 'Schedule X', are found

in Appendix I (DA Form 140-1). The survey, completed by Army Health Services Command in April 1985, recognized a need for 22 personnel. Since that survey was completed, four positions and the respective staff were transferred out of the IMD.

The staffing authorization document in effect at the time of the study was TDA HSW2LAAA, #HS0289. As is indicated by Table 4, the IMD had 18 recognized requirements and authorizations for only 10 personnel. The disparity between the numbers in the required and the authorized columns is significant. At various times since early 1987 the Deputy Commander for Administration recognized the shortfall of authorizations, reassigned 2 military personnel, and approved overhire actions for 6 civilians. One second lieutenant was reassigned from the Clinical Support Division to serve as the automated data systems security officer (ADPSSO). The installation DOIM loaned the IMD one enlisted soldier to serve as the hospital telecommunications coordinator. The civilian overhires included three CHCS trainers, two computer assistants in the Data Processing Center and one Management Assistant in the Administrative Services Branch. During the two month data collection period, a total of seventeen full-time military and civilian personnel were employed within the IMD. The senior military on-site project officer, not found in the IMD TDA, also serves as the Chief, Clinical Support Division and dedicates about one-third of his man-hours to CHCS related tasks.

Table 4

TDA in Effect at Time of Study*

	Required	Authorized
Office of the Chief		
Chief (O4)	1	1
Secretary (GS4)	1	1
Data Processing		
Supv. Comp. Prog. Anal. (GS11)	1	1
Comp. Prog. Anal. (GS09)	2	2
Comp. Opr. (GS09)	1	0
Comp. Asst. (GS06)	2	0
Comp. Prog. Anal. (GS09)	3	0
Admin. Services		
Spt. Svcs. Supv. (GS07)	1	1
Mgt. Asst. (GS04)	1	0
Adm. Sp. (E5)	1	1
Mail Clk. (GS04)	1	1
Mail Clk. (GS03)	2	1
Adm. Sp. (E5)	1	1
Total military	3	3
Total GS civilians	15	7
Grand Total	18	10

* See Appendix N for explanation of abbreviations used in TDA.

It is important to note here that, in addition to the ten personnel authorized on the TDA, the civilian contractor employed nine FTEs at IACH. Table 5 provides a brief description of the SAIC staff. During CY 1988, those SAIC personnel worked 19,425 hours. The SAIC man-hours were totally devoted to CHCS operations and actually equated to 11.16 FTEs.

Facility Analysis. The location and type of office space and work areas allocated to the IMD are adequate and provide the staff with a functional and comfortable work environment. The division

chief, his secretary, and the entire data processing branch are located on the ninth floor of IACH. The training area occupies three rooms and consists of 25 CHCS terminals and 2 overhead projectors. Although the computer room is located in the basement, little time is actually spent there, so operations are not inhibited.

Table 5

SAIC Staff

Position	No.	Responsibilities
Site Manager	1	Supervisor/Senior Analyst
System Support Spec.	1	Software Maintenance/SIR
Hardware Spec.	1	Device Maintenance
Admin. Assistant	1	Computer-room Operations
Computer Operator	5	Secretarial/Administrative
Total	9	

The military and civilian contractor project officers are located in an office on the first floor in the Headquarters wing. The civilian contractor also has office space on the sixth floor for his hardware specialist, software specialist, and operators. Ideally, the personnel occupying the sixth floor office should either be co-located with the project officers or in the basement adjacent to the computer room. However, due to office space constraints this is not the case.

The Administrative Services Branch occupies four rooms (i.e., branch supervisor's office, mailroom, distribution center, and management assistant's office) in the basement and one room (i.e.,

blank forms stockroom) on the ninth floor. With the exception of the blank forms stockroom, the work areas of this section are located adjacent to one another and are conducive to smooth performance.

Operating Procedures. Functions of the IMD are described on Health Services Command Regulation 10-1. The Data Processing Branch coordinates all the data processing, planning, acquisitions, configuration management, training, and disposal of automated systems at the hospital, with essentially no support from the DOIM. Tasks specifically associated with the CHCS include user training, trouble shooting, data base management, hardware and software security, and the preparation of system change requests (SCR).

The contractor-provided staff is a vital asset to IACH. SAIC personnel are on duty 24 hours per day, seven days per week. These SAIC personnel operate and maintain the CHCS and perform software backups each night for changes made to the system each day. A backup of the entire system is performed twice weekly and takes approximately six and one-half hours to complete. Additionally, the SAIC staff submit system incident reports (SIR) and satisfy some local software ad hoc report needs.

Systems such as the Uniform Chart of Accounts (UCA), TRIFOOD, and Central Processing and Distribution (CPD), etc., are locally operated by the division/service in the hospital that uses each of the respective systems. The IMD staff only provides technical expertise and coordinates assistance for these systems.

The Administrative Services Branch is composed of elements concerned with the management of correspondence, forms, directives and publications, micrographics, copiers, mail and distribution, files equipment, and the maintenance and disposition of records. The branch also carries out the responsibilities associated with the Freedom of Information Act and the Privacy Act.

Technology Utilized and Supported. A multitude of labor-saving systems are being used by the IACH staff which require IMD support. Communications are enhanced through the use of the CHCS electronic mailman message system. Appendix J provides a list of the hardware utilized and/or supported by the IMD staff.

Workload Data. Man-hours worked in the IMD during the calendar year (CY) 1988 are broken down by month and by branch in Table 6.

Table 6

Monthly Man-Hours Worked (CY 1988)

	Data Processing	Admin Services	Monthly Total
Jan	1130	943	2073
Feb	1060	916	1976
Mar	1886	1044	2930
Apr	1788	867	2655
May	1411	845	2256
Jun	1528	691	2219
Jul	1722	745	2467
Aug	1875	1096	2971
Sep	1978	685	2663
*Oct	1924	789	2713
*Nov	2062	796	2858
Dec	1444	636	2080
Total	19808	10053	29861

* Data collection month

Survey Findings

All three of the survey instruments were returned to the investigator by the respondents. Listed below is a summary of the responses to each of the four questions. (Note, a copy of the survey with the questions in their entirety is found at Appendix E.)

1. Greatest shortcoming of present staff?

This question resulted in three considerably different responses: a) A lack of experience of both the IMD and SAIC staffs with managing a system of such magnitude; b) The distinct disparity between the number of requirements and the number of authorizations is causing a significant reliance on military and civilian overhires; and, c) A shortage of trained and experienced IMD staff to assist the microcomputer users.

2. User demands being met?

All three respondents felt that the majority of the users' CHCS demands were being met. However, that was being accomplished at the expense of the demands of the personal computer users. As PCs proliferate throughout the hospital, the instruction being provided is minimal and as a result, the microcomputers and the respective software applications are being grossly underutilized.

3. IMD centralized or decentralized?

Each respondent indicated that the IMD should remain a centralized operation.

4. Appropriate number of SAIC staff?

There were only two responses to this question; one respondent indicated that the present number of SAIC personnel is adequate. The other wrote that more SAIC personnel are needed.

The final page of the instrument requested the respondents to provide the number of personnel, by position, which he deemed necessary for the IMD. The SAIC site manager declined to complete this portion of the instrument on the grounds that he was not authorized by SAIC to make such a detailed assessment or recommendation. Both of the other respondents supplied numbers that were significantly higher than the number presently authorized by the TDA.

Quantitative Analysis

The descriptive statistics calculated from the data presented in Table 6 demonstrated that the IMD staff worked an average of 2488.42 hours per month. The mean, range, and standard deviation (std. dev.) for each of the two branches and the IMD as a whole are presented in Table 7.

Table 7

Descriptive Statistics
(Man-hours per month)

	Mean	Range	Std. Dev.
Data Processing	1650.67	1060 - 2062	332.47
Admin. Services	837.76	636 - 1096	143.22
Total Division	2488.42	1976 - 2971	357.03

n = 12
Std. dev. = (n-1)

Table 8

Correlated *t*-test

Pre CHCS	Study
$\bar{X}_1 = 1.67$	$\bar{X}_2 = 4.50$
$\Sigma X_1 = 10$	$\Sigma X_2 = 27$

$t(5) = -4.04$, $p < .05$

Reject H_o

Note: See Appendix K for the complete correlated *t*-test equation and calculation.

The point borne out here is that the TDA needs modification to accurately correlate with the personnel actually required to operate the CHCS and to adequately staff the IMD.

Table 9

FTE Equation

(annual man-hours / 12 / AAF) + (# for backlog) = Required man months i.e., FTEs

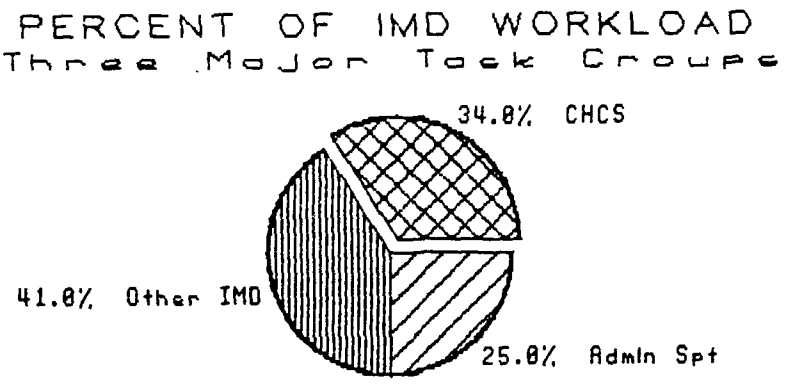
(29861 / 12 / 145) + 1 = 18.16 man-months

= 18 FTEs for the IMD

18 (IMD) + 9 (SAIC) = **27 FTEs**

Workload of the Data Processing Center was divided into two categories for analysis. Those two categories were CHCS related tasks and all of the remaining tasks. Thus, when the administrative support services are included, the IMD essentially has three distinct workload categories. As illustrated by Figure 2, the CHCS accounts for thirty-four percent of the IMD workload.

Figure 2



Chapter III.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

On the basis of the research conducted, the following conclusions were made:

1. There was a significant difference between the number of employees authorized by the TDA (in effect at the time of the initial implementation of the CHCS) and the number of personnel presently employed and required to perform the IMD mission.

2. There is a need for a staff and an area in the hospital dedicated for CHCS training. As more automation moves into a facility, the functional users will become increasingly computer literate. This will generate a new breed of technically knowledgeable users who will not only expect more, but will demand

more from the information systems community. Automated systems are designed to reduce the workload in the functional user's area, but not necessarily in the IMD. Rather, the automated system will increase the amount of work required of the specialists who work in the IMD.

3. The CHCS has not significantly impacted upon the Administrative Services Branch of the IMD. Workload, and therefore manpower requirements, have changed very little since the deployment of the CHCS at IACH.

4. Additional support, especially training, is needed for microcomputer users.

5. Health care information systems and computer technology are not a panacea for problems which require management intervention. The CHCS, like all information systems, must be managed as a tool to assist in the accomplishment of the organizational mission.

Implementing a hospital computer system involves substantial conditions of uncertainty and, therefore, of risk. The scope of this risk includes the economic impact of the system on the organization and the impact of the system on the personnel using and maintaining it. While every organization will approach the transition from old to new systems in different ways, it is believed that strategic planning is a fundamentally important first step in alleviating the problems of uncontrollable cost over-runs, project failure, inappropriate staffing, and chaotic organizational change.

Recommendations

Based on the findings and conclusions of this study, the following ten recommendations are made regarding the IMD staffing:

1. The recommended staffing level is found in Table 10 below.

Table 10
Recommended Staffing Authorizations*

	Recmd.	Current Auth.	+/-
Office of the Chief			
Chief (O4)	1	1	0
Secretary (GS04)	1	1	0
ADPSSO (GS09)	1	0	+1
Data Processing			
Sr. Comp. Prog. Anal. (GS11)	1	1	0
Comp. Prog. Anal. (GS09)	2	2	0
Micro Comp. Asst. (GS06)	2	0	+2
Micro Comp. Trainer (GS09)	1	0	+1
CHCS Trainers (GS09)	3	0	+3
Admin. Services			
Spt. Svcs. Supv. (GS07)	1	1	0
Mgt. Asst. (GS04)	1	0	+1
Adm. Sp. (E5)	1	1	0
Mail Clk. (GS04)	1	1	0
Mail Clk. (GS03)	2	1	+1
Adm. Sp. (E5)	0	1	-1
SAIC Contractor Staff			
Site Manager	1	1	0
System Support Spec.	1	1	0
Hardware Spec.	1	1	0
Admin. Assistant	1	1	0
Computer Operator	5	5	0
Total military	2	3	-1
Total GS civilians	16	7	+9
Total SAIC civilians	9	9	0
Grand Total	27	19	+8

* See Appendix N for explanation of abbreviations used in TDA.

The first thing needing clarification is that this study is not recommending that eight additional personnel be hired but rather,

that eight more personnel be recognized as requirements and added to the TDA. The reader is reminded that, at the time of the study, twenty-six personnel were performing IMD and CHCS related functions. Although the current TDA only authorizes a total of ten personnel for the IMD, seventeen government personnel (including seven overhires) and nine SAIC were gainfully employed and their resulting man-hours were analyzed.

The rationale for recommending 27 personnel (of which 9 are SAIC staff) was based a combination of the information revealed after the analysis of the four data sets (described in the research methodology section of Chapter 1). The types of personnel were decided on based primarily on the calculations and percentages provided by the first data set (2 month collection period). Although the second data set equated to approximately 28 personnel (17 TDA staff and 11 SAIC staff), interviews with the SAIC site manager indicated that the man-hours for the SAIC staff were inflated due to a significant number of overtime hours experienced in 1988. In his opinion, the huge number of overtime hours was a one-time occurrence and will not be repeated.

Data set three (interviews/survey) and data set four (technical estimate of backlog/unmet user needs) both indicated a need for additional microcomputer support, primarily in the form of training. Therefore, it is recommended that a position for a trainer be established.

The technical estimate of the Administrative Services Branch demonstrated that a considerable number of significant tasks are presently being performed by the management assistant in one of the overhire positions. Delaying or not performing those tasks would potentially create a significant backlog, therefore, supporting the recommendation for recognizing one additional FTE authorization there.

2. The organizational chart proposed for the most efficient IMD at IACH is found at Appendix L. As illustrated on the organizational chart, it is recommended that the IMD be under the centralized control of the Information Management Officer. Both the literature and the survey results of this study support this recommendation.

3. As early as possible, determine the number of personnel to be provided by the contractor. Alert the supporting Civilian Personnel Office to your projected civil servant needs, e.g., additional computer operators, trainers, etc..

4. It is recommended that the establishment of a competent CHCS training team be given the utmost priority at the military medical treatment facilities about to install the CHCS. A time-line prepared by the TRIMIS-Army office suggests that a training coordinator be appointed 15 months before the CHCS is deployed in the facility. The data collected by this study indicate that a minimum of three trainers per 1000 hospital employees should hired. Recruiting for competent personnel to serve

as trainers may be difficult, depending upon the computer literacy of the population from which the supporting personnel office has to draw.

The introduction of an integrated computer system represents significant organizational change, the impact of which can be minimized by a well designed training effort. To manage the change humanely and effectively, the hospital should develop an information management plan (IMP) covering several years of new implementations or upgrades. The IMP should be integrated with the hospital's and the DoD's long range MIS and financial plans. The CHCS training team should understand the organizational objectives for installing the system and assist in their achievement. The team needs to be supported by the command group and be prepared for staff concerns and possible resistance.

The hospital staff will accept the new computer system much quicker if it is proficient and comfortable using the system. Effective and meaningful training is mandatory if the staff is to accept and fully utilize the functionalities available in the CHCS. A copy of the monthly training schedule used at IACH is found at Appendix M. Computer training is often very resource intensive. For example, when a new physician arrives at a facility he/she will need between ten and twelve hours (based on present-day functionalities) of instruction before he/she can effectively begin seeing patients and efficiently use the CHCS. In most cases new arrivals cannot be pooled and trained as a group. The point here

is that a trainer is required to give the necessary classes whether there is one person or 20 persons needing training. Whatever the training area ends up being referred to as (e.g., a computer lab, a training room, or an information center), an area should be dedicated for ongoing CHCS training. The need for constant training at all levels in the fast changing environment of information systems must be recognized and accommodated.

5. The manning saved in the functional users' area(s) can justifiably be diverted into the IMD. For example, if the CHCS streamlines the operation of the pharmacy staff to the point where one less pharmacy specialist is needed, the authorization for that specialist could be converted to an IMD related job specialty and transferred to the IMD. An important point to keep in mind here is not to "punish" a section by automatically pulling an authorization from the section that improves its efficiency and productivity; doing so will only stifle attempts by other section chiefs to improve their productivity. It is very possible that the section chief can use the person, whose job has essentially been eliminated by the computer, to perform other tasks in the section that were previously not being accomplished.

6. Increased emphasis should be given at the MACOM level (HSC and/or ISC) to establish a MS-3 equation that could at least serve as a starting point for determining the proper IMD staff at those medical treatment facilities about to install the CHCS.

7. It should not be forgotten that the most important element in any automation project is the human element; the staff. Employees should be involved in identifying changes both prior to and during the implementation process. If turmoil, anxiety, and unrealistic expectations surrounding the project are not proactively managed, the success of the project will be at risk. It is incumbent upon health care administrators to ensure that available personnel are utilized to the best advantage. The impact that a computer system will have on a given department or an entire organization is often neither fully appreciated nor understood. Undue hardship on the staff can be minimized by gaining an understanding of the potential impact that the new system will have on the design and future operation of the IMD.

8. A sound monitoring program should be developed for identifying and evaluating the effects and results of changes made to improve productivity. Mechanisms should be included for identifying and addressing potential employee reactions to these changes, such as increased numbers of grievances and other forms of resistance.

9. It is important to consider a variety of staffing structures when designing or reorganizing a department rather than seeking some rigidly optimal solution that is presently working at another facility whose mission may be entirely different than every other facility. When designing any system or organization it is important to keep in mind the concept of equifinality, which

argues that 'there are a number of ways to skin a cat.' More exactly, it states that a system can reach the same final state from differing initial conditions and by a variety of paths.

10. Another key recommendation for the Commander who is about to receive a CHCS, is to establish a CHCS project team. The IMD staff has neither the manpower nor the expertise at the functional user level to carry out the myriad of tasks associated with such a large undertaking. The team should be under the direction of a senior staff officer. In most cases, the Information Management Officer will be too junior in rank to efficiently affect the necessary changes or to dictate new policy and procedural changes to the entire hospital staff. The team at IACH was headed by the Chief of the Clinical Support Division (a Lieutenant Colonel) and had 12 members. Membership should include personnel from each of the administrative divisions in the hospital (e.g. PAD, lab, dietetics, pharmacy, and radiology), as well a knowledgeable representative from the physician, nursing, and IMD staffs. Obviously, a contractor's representative will be a key member of the team and, among other things, will play an integral part in fine-tuning the system. Also, a benefits realization coordinator should be appointed to serve on the team. It is not necessary for the position to be filled by someone from the IMD (e. g., at IACH the Nurse Methods Analyst performs this duty).

The CHCS project team should be afforded with an environment that nurtures creativity, experimentation, and excitement about the

future. If properly utilized, the team can play a vital role in overcoming the staff's natural resistance to change. The team should ensure that the lessons learned, the solutions generated, and the benefits realized as a result of the team's efforts are quickly documented and distributed to other affected users.

In closing, it is understood that neither information technology nor the Composite Health Care System will solve all the problems administrators and clinicians face while managing the complex operation of a hospital. Information and analysis cannot replace the judgment and intuition of experienced managers. To be effective, managers will have to know how to best use their human resources in conjunction with computer systems. The first step in making a new computer system work is to have users that are well trained. Having an adequately staffed and efficiently organized information management division is essential if the full benefits of the Composite Health Care System are to be realized.

Appendix A

List of Tasks Measured

List and Definition of Tasks

1. CHCS: Includes configuration mgt., training, operations, hardware and software troubleshooting, ECPs, SIRs, Database mgt., tours.

2. Microcomputers: Includes installation/testing, software development. troubleshooting, and user tng.

3. AQCESS: Includes user training, troubleshooting, backups, and database mgt.

4. Security: Includes all ADPSSO related tasks, issuance of passwords, physical security, and security SOP compliance

5. Telecommunications: Includes telephone operations, facsimile and modem related tasks.

6. Printing and Duplication: Includes forms, publications, copy machine management

7. Records Management: Includes all tasks associated with the creation, maintenance, use, and disposition of records/files.

8. Mail and Distribution: Includes pickup and sorting of distribution and mail, suspense log activities, patient locator tasks, official mail management and postal duties.

9. Plans and Operations: Includes other ADP and secretarial duties, development of IMP, ISP, SOPs, other AR 25-1 tasks, HSC/DA/DOD actions or suspenses, misc. meetings, and proponent duties.

10. Professional Development: Includes One-day training, SQT, OJT, correspondence or college course work done on duty, and Physical Training.

11. Office Housekeeping: Includes nonmission functions involved in managing the internal affairs of your office, personnel, and equipment.

Appendix B

Time Collection Sheet

IMD WEEKLY SUMMARY OF INDIVIDUAL WORKLOAD

NAME _____

MAJOR TASK	MON	TUE	WED	THU	FRI	SAT	SUN	TOTAL
1. CHCS								
a. Configuration mgt								
b. Training								
c. Operations								
2. Microcomputers								
3. AQCESS								
4. Security								
5. Telecommunications								
6. Printing and Duplication								
7. Records Management								
8. Mail and Distribution								
9. Plans and Operations								
10. Professional Development								
11. Office Housekeeping								
Total*								
COMMENT								

*Explain if less than 8

Appendix C

Weekly Data Spreadsheet

By Employee/By Task

Week #1 - October 1989

By Employee/By Task
(Hours)

Task	Emp 1	Emp 2	Emp 3	Emp 4	Emp 5	Emp 6	Emp 7	Emp 8	Emp 9	Emp 10	Emp 11	Emp 12	Emp 13	Emp 14	Emp 15	Emp 16	Emp 17	Task Total
CONFIG	3.50	8.00	33.00	0.00	0.00	6.00	31.00	12.00	0.00	0.00	0.00	0.00	0.00	24.00	0.00	40.50	0.00	158.00
TNG	36.25	0.00	7.00	0.00	0.00	0.00	7.50	12.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	65.75
OPNS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.00	2.00	6.00	0.00	0.00	17.00
MICRO	1.25	23.00	0.00	27.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00	54.25
AQCESS	0.00	1.00	0.00	9.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.00
SECRTY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TELECOMM	0.00	0.00	0.00	0.00	0.00	12.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00	16.00
PRT/DUP	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	18.00	0.00	0.00	24.25	0.00	0.00	0.00	0.00	0.00	43.25
RECMGT	0.00	0.00	0.00	0.00	0.00	1.50	0.00	0.00	5.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	7.50
MAIL/DIST	0.00	0.00	0.00	0.00	0.00	1.50	0.00	0.00	6.00	32.00	34.00	8.50	0.00	0.00	2.50	0.00	31.00	115.50
PLN/OPN	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.50	0.00	0.00	5.50	15.00	10.50	28.50	3.00	2.00	75.50
PROFDEV	0.00	12.50	0.00	21.50	0.00	12.00	0.00	0.00	0.50	0.00	0.00	2.25	5.00	3.00	0.00	2.00	0.00	58.75
OFFICE	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	6.00	0.00	0.00	1.00	7.00	0.00	3.00	12.00	7.00	42.00
Emp Total	41.50	44.50	40.00	57.50	0.00	40.00	42.50	24.00	46.00	32.00	34.00	41.50	44.00	42.50	40.00	57.50	40.00	667.50

Appendix D

Monthly Recapitulation Spreadsheet

By Week/By Task

November 1988

(hours)

		WK1	WK2	WK3	WK4	WK5	TASK TOTAL
	CONFIG	122.00	97.00	85.00	103.25	69.50	476.75
	TNG	97.00	82.00	71.00	24.00	45.00	319.00
	OPNS	48.25	21.00	53.50	30.00	36.50	189.25
T	MICRO	89.50	67.00	76.00	43.00	33.00	308.50
	AQCESS	7.00	5.00	4.00	4.00	8.00	28.00
A	SECRTY	9.00	14.00	11.00	5.25	0.00	39.25
	TELECOMM	6.00	28.00	12.00	1.00	15.00	62.00
S	PRT/DUP	49.75	28.00	30.75	19.75	31.75	160.00
	RECMGT	3.00	0.25	0.25	1.50	5.50	10.50
K	MAIL/DIST	73.25	109.25	82.50	99.00	77.50	441.50
	PLN/OPN	74.50	75.00	82.50	53.75	40.75	326.50
	PROFDEV	111.25	54.75	89.50	49.50	39.00	344.00
	OFFICE	76.75	23.00	17.50	15.00	21.00	153.25
	WKLY TOT.	767.25	604.25	615.50	449.00	422.50	2858.50

Appendix E

Survey Instrument

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IMD Staffing Survey

Please take a few moments to answer the questions below and fill in the far right-hand column (i.e., the "Recmd" column) of the attached staff listing. Use your expertise and experience to designate the appropriate number of staff, types of personnel, and the best mix of employees (e.g., military vs. DA civilian vs. contractor). Feel free to add or delete personnel as you deem appropriate. Based on CY 88 historical man-hour data, the IMD completed the work of slightly more than 17 FTEs and the SAIC personnel worked the equivalent of just over 11 FTEs. Therefore, your estimate could justifiably total at least 28 FTEs.

1. What do you perceive to be the greatest shortcoming of the present staffing of the IMD?

2. Do you believe user needs/demands are being satisfied? Why or why not?

3. Do you think the IMD should be centralized (as it is now) or decentralized? Why?

4. Do you think the contractor (SAIC) should provide more personnel or less personnel? If more, what type(s) of personnel? If less, who would perform the tasks presently being performed by those SAIC personnel?

Comments/Recommendations:

I. TDA Staff

	Req.	Auth.	Assgn.	Recmd.
Office of the Chief (04)				
Chief (04)	1	1	1	--
Secretary (GS04)	1	1	1	--
ADPSSO	0	0	1	--
Telecomm. Coord.	0	0	1	--
Data Processing				
Sr. Comp. Prog. Anal. (GS11)	1	1	1	--
Comp. Prog. Anal. (GS09)	2	2	2	--
Comp. Opr. (GS09)	1	0	0	--
Comp. Asst. (GS06)	2	0	2	--
Comp. Prog. Anal/Trainers (GS09)	3	0	3	--
Admin. Services				
Spt. Svcs. Supv. (GS07)	1	1	1	--
Mgt. Asst. (GS04)	1	0	1	--
Adm. Sp. (E5)	1	1	1	--
Mail Clk. (GS04)	1	1	1	--
Mail Clk. (GS03)	2	1	1	--
Adm. Sp. (E5)	1	1	0	--
TDA Total	18	10	17	--

II. SAIC Staff

Site Manager	1	1	1	--
System Support Spec.	1	1	1	--
Hardware Spec.	1	1	1	--
Admin. Assistant	1	1	1	--
Computer Operator	5	5	5	--
Total SAIC	9	9	9	--
GRAND TOTAL	27	19	26	--

Thank you for your participation. Please return your completed survey to CPT Scott Hendrickson, Administrative Resident.

Appendix F

Workload Percentage and Equivalent Number of FTEs

TASK	Percent of WORKLOAD	Equiv. # FTEs	Recmd # FTEs	POSITION/COMMENT
CHCS Configuration	13	2.23	2	Prog. Analysts
CHCS Training	14	2.40	3	CHCS Trainers
CHCS Operations	7	1.20	1	Serves as Chief, Data Processing
Microcomputers	11	1.89	3	2 Comp. Assists. and 1 Trainer
AQCESS	1	.18	0	To be phased out
Security	2	.34	1	ADPSSO
Telecommunications	2	.34	0	To be performed by the ADPSSO
Print/Dupl.	6	1.03	2	1 Mgt. Assist. and 1 Admin Spec.
Records Mgt.	1	.18	1	C, Admin. Svcs.
Mail/Dist.	15	2.57	3	2 in Mailroom and 1 in Dist. Center
Plans/Opns	13	2.23	2	C, IMD and Secty.
Professional Dev.	9	1.54	0	Spread among all
Office Hskpg.	6	1.03	0	Spread among all
Total	100%	17.16	18	

Appendix G

Sample 'Yardstick'

Table 557-13.1: Mail Room and Directory Service

Work Performed. Receives and distributes incoming correspondence and dispatches outgoing correspondence. Maintains suspense file on appropriate correspondence. Provides messenger service for hospital elements. Insures through liaison with the installation postal officer that adequate postal services are provided to patients and duty personnel. Maintains locator files and performs directory service.

Yardstick	Population supported *	100	400	750	1,200	1,700	2,200
	Manpower requirement	1	2	3	4	5	6
	Interval rate	.0033	.0029	.0022	.002	.002	

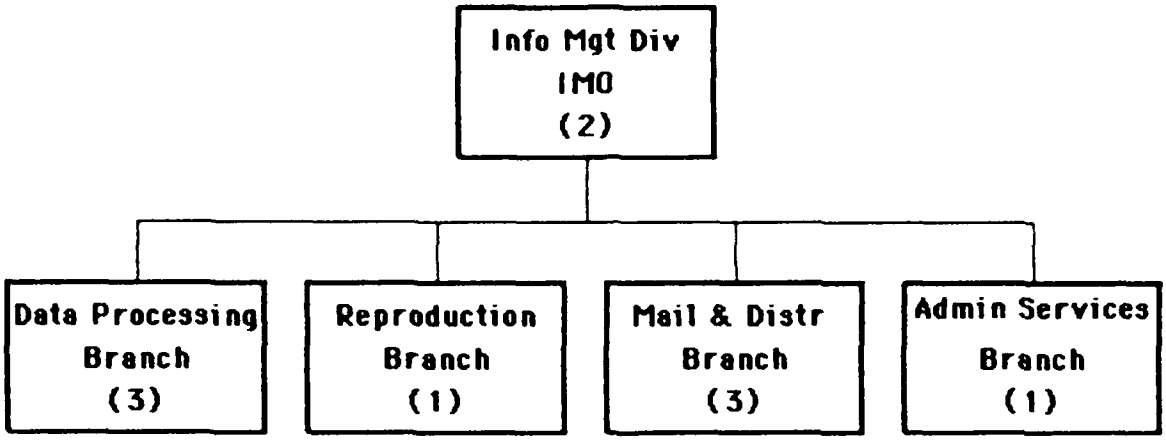
	Military positions				Position delineation	Number of positions						*Civilian positions*	
Line	Duty position title	BR	MOS code	Grade								Job title	Code
1	MAIN DISTRIBUTION SP.	..	71L20	E-5	C	..	1	1	1	1	1	MAIL SUPERVISOR.	GS-305
2	SENIOR CLERK	..	71B20	E-4	C	..	..	..	..	..	1	CLERK (TYPING). CLERK	GS-301
3	CLERK	..	71B10	E-3	C	..	..	1	1	2	2	CLERK	GS-301
4	MAIL DELIVERY CLERK.	..	71B10	E-3	C	1	1	1	1	1	1	MAIL CLERK	GS-305
5	MESSENGER	..	71B10	E-3	C	..	..	..	1	1	1	MESSENGER	GS-302

*Total assigned and attached strength of the installation Medical Department Activities, including patients assigned and / or attached to the Medical Holding Company (Detachment).

Appendix H

IMD's Present Organizational Chart

Present Organizational Chart



Number in parenthesis = number of personnel

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Appendix I

Most Recent Manpower Survey Report

'Schedule X'

MANPOWER SURVEY REPORT -SCHEDULE X - MANPOWER AND WORKLOAD DATA

For use of this form, see AR 570-4; the proponent agency is DCSPER.

REPORTS CONTROL SYMBOL CSFOR-76

MAJOR STAFF ELEMENT	DIVISION	BRANCH	SECTION OR UNIT	SHEET NO.	LINE NO.
USA MEDDAC FORT KNOX	DATA PROCESSING DIVISION	OFFICE OF THE CHIEF		13	8

DESCRIPTION OF WORK PERFORMED

Provides overall management for all ADP resources for the MEDDAC. Implements policies and plans in support of DA and HSC objectives/regulations. Provide total hardware and software support for all MEDDAC ADP users.

YARDSTICK CODE: Local Appraisal and TB 18-21

WORK UNIT: N/A

SECTION A - SUMMARY OF MANPOWER

CURRENT REQUIREMENTS	OFF 1 a	WO b	ENL c	US CIV 1 d	NON-US CIV e	TOTAL MANPOWER SUBJ TO ALLOC 2 f	OTHER MANPOWER US g	OTHER MANPOWER NON-US h	TOTALS 2 i
1. ALLOCATION	1			1		2			2
2. ACTUAL STRENGTH	1			1		2			2
3. RECM BY CO	1			1		2			2
4. RECM BY SURVEY TEAM	1			3		4			4

YARDSTICK ALLOWANCE COMPUTATION

SEE SURVEY TEAM SPECIFIC REMARKS

SECTION B - PERFORMANCE DATA

YEAR AND MONTH 1984 a	MANPOWER AVG STR b	MANPOWER TOTAL MAN-HOURS WORKED c	MANPOWER HRS OP IN MO. d	MANPOWER EQUIV MAN-MONTHS (c ÷ d) e	WORKLOAD NO. OF WORK UNITS f	WORKLOAD W/L PER PERSON (f ÷ e) g
Jan	2	340	168	2.0		
Feb	2	278	160	1.7		
Mar	2	344	176	1.9		
Apr	2	325	168	1.9		
May	2	284	176	1.6		
Jun	2	426	168	2.5		
Jul	2	390	168	2.3		
Aug	2	377	184	2.1		
Sep	2	301	152	2.0		
Oct	2	296	176	1.7		
Nov	2	295	160	1.8		
Dec	2	247	160	1.5		

1. WORKLOAD USED AS BASIS OF APPRAISAL

2. AVERAGE PRODUCTIVITY

3. MANPOWER ALLOWANCE

SURVEY WORKLOAD (1) ( ) / AVG PRODUCTIVITY (2) ( ) = ____ × 1.11 = ____

SECTION C - MANPOWER

ALLOC STR a	RANK OR GRADE b	ACTUAL STR c	RANK OR GRADE d	JOB TITLE e
1	03	1	03	C, DPD/AMO
1	GS-04	1	GS-04	Secretary

AMS CODE: 84779241000

TDA PARA: 028

DA FORM 1 NOV 73 140-4

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

MANPOWER SURVEY REPORT -SCHEDULE X - MANPOWER AND WORKLOAD DATA

For use of this form, see AR 570-4; the proponent agency is DCSPER.

REPORTS CONTROL SYMBOL CSFOR-76

MAJOR STAFF ELEMENT	DIVISION	BRANCH	SECTION OR UNIT	SHEET NO.	LINE NO.
MEDDAC FORT KNOX	DATA PROCESSING DIVISION	SYSTEM & PROGRAMMING		13	9

DESCRIPTION OF WORK PERFORMED

Provides systems analysis, design and programming services to all MEDDAC activities. Tests, enhances, documents, implements and maintains HSC, TRIMIS, and local unique ADP systems, office automation, and data base administration.

YARDSTICK CODE: Local Appraisal and TB 18-21

WORK UNIT: N/A

SECTION A - SUMMARY OF MANPOWER

CURRENT REQUIREMENTS	OFF a	WO b	ENL 1 c	US CIV 2 d	NON-US CIV e	TOTAL MANPOWER SUBJ TO 3 ALLOC f	OTHER MANPOWER US g	OTHER MANPOWER NON-US h	TOTALS 3 i
1. ALLOCATION				1		1			1
2. ACTUAL STRENGTH				2		2			2
3. RECM BY CO			2	3		5			5
4. RECM BY SURVEY TEAM				4		4			4

YARDSTICK ALLOWANCE COMPUTATION

SEE SURVEY TEAM SPECIFIC REMARKS

SECTION B - PERFORMANCE DATA

YEAR AND MONTH 19 84 a	MANPOWER: AVG STR b	TOTAL MAN-HOURS WORKED c	HRS OF IN MO d	EQUIV MAN-MONTHS (c ÷ d) e	WORKLOAD: NO. OF WORK UNITS f	W/L PER PERSON (f ÷ e) g
Jan	1	155	166	.92		
Feb	1	160	160	1.		
Mar	1	158	176	.90		
Apr	1	163	168	.97		
May	1	167	176	.95		
Jun	1	168	168	1.		
Jul	1	156	168	.93		
Aug	1	158	184	.86		
Sep	2	224	152	1.5		
Oct	3	425	176	2.4		
Nov	2	295	160	1.8		
Dec	2	335	160	2.1		

1. WORKLOAD USED AS BASIS OF APPRAISAL

2. AVERAGE PRODUCTIVITY

3. MANPOWER ALLOWANCE

SURVEY WORKLOAD (1) ( ) / AVG PRODUCTIVITY (2) ( ) = ____ × 1.11 = ____

SECTION C - MANPOWER

ALLOC STR a	RANK OR GRADE b	ACTUAL STR c	RANK OR GRADE d	JOB TITLE e
1	GS-11	1	GS-09	C, Sys & Prog Br
		1	GS-07	Computer/System Analyst

AMS CODE: 84779241000

TDA PARA: 028A

DA FORM 1 NOV 73

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

MANPOWER SURVEY REPORT - SCHEDULE X - MANPOWER AND WORKLOAD DATA

For use of this form, see AR 570-4; the proponent agency is DCSPER.

REPORTS CONTROL SYMBOL CSFOR-76

MAJOR STAFF ELEMENT	DIVISION	BRANCH	SECTION OR UNIT	SHEET NO.	LINE NO.
MEDDAC FORT KNOX	DATA PROCESSING DIVISION	OPERATIONS BRANCH		13	10

DESCRIPTION OF WORK PERFORMED

Functions of the Operations Branch are shown in paragraphs 2-10 through 2-15 of TB 18-21. These functions include, but are not limited to, receipts and processing of input from users, reductions of data to machine readable form, scheduling and operation of the computer system as well as ancillary equipment and maintenance of the machine readable media library.

YARDSTICK CODE: Local Appraisal and TB 18-21

WORK UNIT: N/A

SECTION A - SUMMARY OF MANPOWER

CURRENT REQUIREMENTS	OFF a	WO b	ENL c	US CIV 4 d	NON-US CIV e	TOTAL MANPOWER SUBJ TO 4 ALLOC f	OTHER MANPOWER US g	OTHER MANPOWER NON-US h	TOTALS 4 i
1. ALLOCATION				0		0			0
2. ACTUAL STRENGTH				1		1			1
3. RECM BY CO				5		5			5
4. RECM BY SURVEY TEAM				4		4			4

YARDSTICK ALLOWANCE COMPUTATION

SEE SURVEY TEAM SPECIFIC REMARKS

SECTION B - PERFORMANCE DATA

YEAR AND MONTH 19 84 a	MANPOWER AVG STR b	MANPOWER TOTAL MAN-HOURS WORKED c	MANPOWER HRS OP IN MO d	MANPOWER EQUIV MAN-MONTHS (c ÷ d) e	WORKLOAD NO. OF WORK UNITS f	WORKLOAD W/L PER PERSON (f ÷ e) g
Dec	1	67	160	.42		
Jan	1	176	176	1.0		
Feb	1	119	119	.76		
				.73		

1. WORKLOAD USED AS BASIS OF APPRAISAL

2. AVERAGE PRODUCTIVITY

3. MANPOWER ALLOWANCE

SURVEY WORKLOAD (1) ( ) = ____ × 1.11 = ____

AVG PRODUCTIVITY (2) ( )

SECTION C - MANPOWER

ALLOC STR a	RANK OR GRADE b	ACTUAL STR c	RANK OR GRADE d	JOB TITLE e
		1	GS-06	Computer Assistant

AMS CODE: 84779241000

TDA PARA: 028B

DA FORM 1 NOV 73 140-4

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

MANPOWER SURVEY REPORT -SCHEDULE X - MANPOWER AND WORKLOAD DATA

For use of this form, see AR 570-4; the proponent agency is DCSPER.

REPORTS CONTROL SYMBOL CSFOR-76

MAJOR STAFF ELEMENT	DIVISION	BRANCH	SECTION OR UNIT	SHEET NO.	LINE NO.
MEDDAC Ft Knox		Adjutant	Reproduction	1	13

DESCRIPTION OF WORK PERFORMED

As indicated in YS Code 557-13.2.

YARDSTICK CODE: 557-13.2

WORK UNIT: Impressions (Thousands)

SECTION A - SUMMARY OF MANPOWER

Current Requirements	OFF a	WO b	ENL 1 c	US CIV 1 d	NON-US CIV e	TOTAL MANPOWER SUBJ TO ALLOC 2 f	OTHER MANPOWER US g	OTHER MANPOWER NON-US h	TOTALS 2 i
1. ALLOCATION			1	1		2			2
2. ACTUAL STRENGTH			1	1		2			2
3. RECM BY CO			1	1		2			2
4. RECM BY SURVEY TEAM			1	1		2			2

YARDSTICK ALLOWANCE COMPUTATION

SEE SURVEY TEAM SPECIFIC REMARKS

SECTION B - PERFORMANCE DATA

YEAR AND MONTH 19 84 a	MANPOWER AVG STR b	MANPOWER TOTAL MAN-HOURS WORKED c	MANPOWER HRS OP IN MO d	MANPOWER EQUIV MAN-MONTHS (c ÷ d) e	WORKLOAD NO. OF WORK UNITS f	WORKLOAD W/L PER PERSON (f ÷ e) g
Jan	2	336	168	2.0	164	82
Feb	3	472	160	3.0	229	76
Mar	3	472	176	2.7	185	69
Apr	3	501	168	3.0	212	71
May	2	356	176	1.5	201	134
Jun	1	168	168	1.0	158	158
Jul	1	168	168	1.0	232	232
Aug	2	338	184	1.8	179	99
Sep	3	400	152	2.6	162	62
Oct	2	264	176	1.5	192	128
Nov	3	428	160	2.7	173	64
Dec	3	322	160	2.0	154	77
1. WORKLOAD USED AS BASIS OF APPRAISAL					187	
2. AVERAGE PRODUCTIVITY						139

3. MANPOWER ALLOWANCE

SURVEY WORKLOAD (1) (187) / AVG PRODUCTIVITY (2) (139) = 1.35 × 1.11 = 1.5 or 2

SECTION C - MANPOWER

ALLOC STR a	RANK OR GRADE b	ACTUAL STR c	RANK OR GRADE d	JOB TITLE e
1	E5	1	E4	Admin Sp
1	GS04	1	1	Dupl Equip Oper

AMS CODE: 84779241000

TDA PARA: 002D

DA FORM 1110 4

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

REPRODUCED AT GOVERNMENT EXPENSE

MANPOWER SURVEY REPORT -SCHEDULE X - MANPOWER AND WORKLOAD DATA

For use of this form, see AR 570-4; the proponent agency is DCSPER.

REPORTS CONTROL SYMBOL CSFOR-76

MAJOR STAFF ELEMENT	DIVISION	BRANCH	SECTION OR UNIT	SHEET NO.	LINE NO.
MEDDAC Ft Knox		Adjutant	Mail & Dist Sec	1	12

DESCRIPTION OF WORK PERFORMED

As indicated in YS Code 557-13.1

YARDSTICK CODE: 557-13.1

WORK UNIT: Population Supported

SECTION A - SUMMARY OF MANPOWER

Current Requirements	OFF a	WO b	ENL c	US CIV d	NON-US CIV e	TOTAL MANPOWER SUBJ TO ALLOC f	OTHER MANPOWER US g	OTHER MANPOWER NON-US h	TOTALS i
1. ALLOCATION			1	3		4			4
2. ACTUAL STRENGTH			2	4		6			6
3. RECM BY CO			1	4		5			5
4. RECM BY SURVEY TEAM			1	3		4			4

YARDSTICK ALLOWANCE COMPUTATION

SEE SURVEY TEAM SPECIFIC REMARKS

SECTION B - PERFORMANCE DATA

YEAR AND MONTH 1984 a	MANPOWER AVG STR b	MANPOWER TOTAL MAN-HOURS WORKED c	MANPOWER HRS OP IN MO d	MANPOWER EQUIV MAN-MONTHS (c ÷ d) e	WORKLOAD NO. OF WORK UNITS f	WORKLOAD W/L PER PERSON (f ÷ e) g
Jan	6	976	168	5.8	1167	201
Feb	5	682	160	4.3	1128	262
Mar	5	766	176	4.4	1123	255
Apr	4	636	168	3.8	1023	269
May	5	862	176	4.8	981	204
Jun	5	670	168	4.0	1152	288
Jul	4	648	168	3.9	1191	305
Aug	6	930	184	5.1	1194	234
Sep	6	752	152	5.0	1230	246
Oct	6	1063	176	6.0	1308	218
Nov	6	879	160	5.5	1270	231
Dec	6	869	160	5.4	1200	222
1. WORKLOAD USED AS BASIS OF APPRAISAL					1164	
2. AVERAGE PRODUCTIVITY						271

3. MANPOWER ALLOWANCE

SURVEY WORKLOAD (1) (1164) = 4.3 × 1.11 = 4.8 or 5
AVG PRODUCTIVITY (2) (271)

SECTION C - MANPOWER

ALLOC STR a	RANK OR GRADE b	ACTUAL STR c	RANK OR GRADE d	JOB TITLE e
1	GS04	1	GS04	Mail Clerk
1	E5	1	PFC	Admin Spec
2	GS03	2	GS03	Mail Clerks
		1	GS03	Clerk Typist
		1	E4	Cdr Driver (detailed from Vet Actv)

AMS CODE: 84779241000

TDA PARA: 002C

DA FORM 180 A

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

MANPOWER SURVEY REPORT -SCHEDULE X - MANPOWER AND WORKLOAD DATA

For use of this form, see AR 570-4; the proponent agency is DCSPER.

REPORTS CONTROL SYMBOL CSFOR-7L

MAJOR STAFF ELEMENT	DIVISION	BRANCH	SECTION OR UNIT	SHEET NO.	LINE NO
MEDDAC Ft Knox		Off of the Adjutant		1	11

DESCRIPTION OF WORK PERFORMED

As indicated in YS Code 557-13.

YARDSTICK CODE: 557-13

WORK UNIT: Strength of Section

SECTION A - SUMMARY OF MANPOWER

CURRENT REQUIREMENT	OFF 1 a	WO b	ENL 1 c	US CIV 2 d	NON-US CIV e	TOTAL MAN-POWER SUBJ TO ALLOC 4 f	OTHER MANPOWER US g	OTHER MANPOWER NON-US h	TOTALS 4 i
1. ALLOCATION	1		1	2		4			4
2. ACTUAL STRENGTH	1		1	2		4			4
3. RECM BY CO	1		1	2		4			4
4. RECM BY SURVEY TEAM	~~1~~ 0			~~1~~ 3 2		~~5~~ 3 2			~~5~~ 3 2

YARDSTICK ALLOWANCE COMPUTATION

SEE SURVEY TEAM SPECIFIC REMARKS

SECTION B - PERFORMANCE DATA

YEAR AND MONTH 19 84 a	MANPOWER AVG STR b	MANPOWER TOTAL MAN-HOURS WORKED c	MANPOWER HRS OP IN MO d	MANPOWER EQUIV MAN-MONTHS (c ÷ d) e	WORKLOAD NO. OF WORK UNITS f	W/L PER PERSON (f ÷ e) g
Jan	5	869	168	5.2	6	1
Feb	4	693	160	4.3	6	1
Mar	4	732	176	4.2	6	1
Apr	4	684	168	4.1	6	1
May	4	687	176	3.9	6	2
Jun	4	739	168	4.4	6	1
Jul	4	714	168	4.3	6	1
Aug	4	648	184	3.5	6	2
Sep	4	496	152	3.3	6	2
Oct	4	754	176	4.3	6	1
Nov	4	472	160	3.0	6	2
Dec	4	671	160	4.2	6	1
1. WORKLOAD USED AS BASIS OF APPRAISAL					6	
2. AVERAGE PRODUCTIVITY						2

3. MANPOWER ALLOWANCE

SURVEY WORKLOAD (1) (6) / AVG PRODUCTIVITY (2) (2) = 3 × 1.11 = 3.3 or 3

SECTION C - MANPOWER

ALLOC STR a	RANK OR GRADE b	ACTUAL STR c	RANK OR GRADE d	JOB TITLE e
1	04	1	03	Adjutant
1	E6	1	E6	Admin Supervisor
1	GS06	1	GS06	Mgmt Asst
1	GS04	1	GS04	Secy (Typing)

AMS CODE: 84779241000

TDA PARA: 002B

DA FORM 1 NOV 71 1401-4

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

Appendix J

Computer Hardware Utilized/Supported by IMD at IACH

CHCS Hardware (Manufactured by Digital unless otherwise noted)

4 Vax, Model 8550 (32 mega-bytes each)
10 Memory Disks,. Model RA482
8 Memory Disks, Model RA81
2 Tape Drives, Model TA81
4 Vax Consoles
2 Controllers, Model HSC50
2 Printers, Model LG01
1 Star Coupler
5 Statistical Multiplexers (for outlying buildings)
352 CHCS terminals/monitors (AMPEX)
114 Printers
2 Card Embossers

Other Automation Systems Supported

Automated Quality of Care Evaluation Support System (AQCESS)
Uniform Chart of Accounts (UCA)
Patient Monitoring System
Computer Assisted Practice of Cardiology (CAPOC)
Automated Central Tumor Registry (ACTUR)
Health Risk Appraisal System (HRA)
Central Processing and Distribution System (CPD)
Medical Expense and Reporting System (MEPRS)
Tri-Service Food Service System (TRIFOOD)
Stand-alone Microcomputers (includes Zenith, IBM, Wang, etc.)

Appendix K

Correlated *t*-test

Equation and Calculations

	X_1	X_2	$X_2 - X_1$
	2	3	1
	3	5	2
	0	4	4
	5	6	1
	0	4	4
	0	5	5
ΣX	10	27	17
$\bar{X}$	1.67	4.50	2.83
std. dev.	2.07	1.05	1.72

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\delta / \sqrt{n}}$$

$$t = \frac{1.67 - 4.50}{1.72 / \sqrt{6}}$$

$$t = -4.04$$

Critical Value = +/- 2.57*

$t(5) = -4.04, p < .05$

Reject H_o

* Source: Daniel, Wayne W. Biostatistics: A Foundation for Analysis in the Health Sciences 3rd ed. Wiley & Sons, New York: 1983, page 494.

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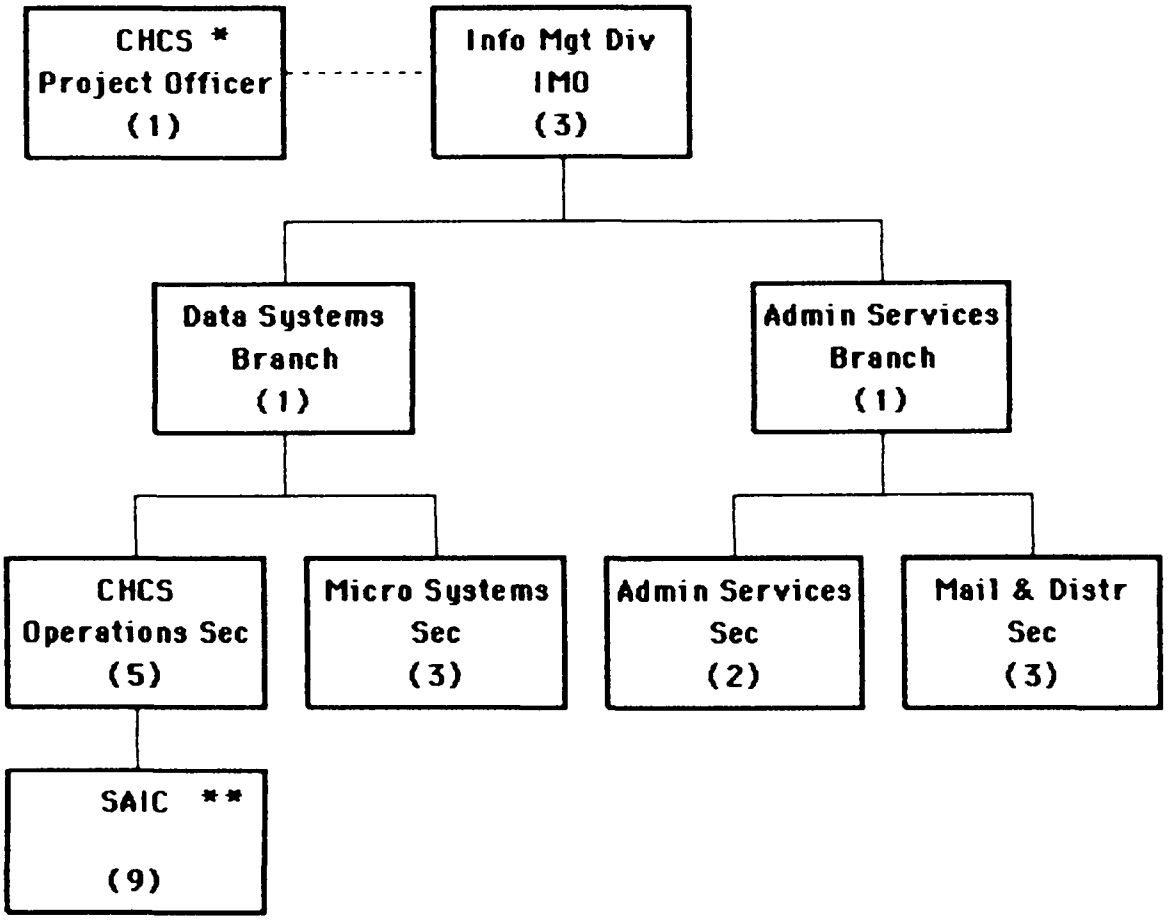
Appendix L

Proposed Organizational Chart

Proposed Organizational Chart



* Temporary position, not on TDA

** Contractor personnel, not on TDA

Number in parenthesis = number of personnel

Appendix M

Sample CHCS Monthly Training Schedule

S	M	T	W	T	F	S
2	3 ORIENTATION 0830 - 1200 BASIC FUNCTIONS- PHYS. 1300 - 1600 BASIC FUNCTIONS- NURSES 1300-1600	4 **ORIENTATION 0830 - 1200 ADV. FUNCTIONS- PHYS. 0730 - 1200 ADV. FUNCTIONS- NURSES 0730 - 1200	5 FRONT DESK 0830 - 1130 BOOKING APPTS. 1300 - 1600	6 BASIC ALLIED HEALTH 0800 - 0930 ADV. ALLIED HEALTH 1000 - 1130	7 RAD, LAB, PAD PHARMACY - AS NEEDED	8
9	10 ORIENTATION 0830 - 1200 BASIC FUNCTIONS- PHYS. 1300 - 1600 BASIC FUNCTIONS- NURSES 1300-1600	11 **ORIENTATION 0830 - 1200 ADV. FUNCTIONS- PHYS. 0730 - 1200 ADV. FUNCTIONS- NURSES 0730 - 1200	12 FRONT DESK 0830 - 1130 BOOKING APPTS. 1300 - 1600	13 BASIC ALLIED HEALTH 0800 - 0930 ADV. ALLIED HEALTH 1000 - 1130	14 RAD, LAB, PAD PHARMACY - AS NEEDED	15
16	17 ORIENTATION 0830 - 1200 BASIC FUNCTIONS- PHYS. 1300 - 1600 BASIC FUNCTIONS- NURSES 1300-1600	18 **ORIENTATION 0830 - 1200 ADV. FUNCTIONS- PHYS. 0730 - 1200 ADV. FUNCTIONS- NURSES 0730 - 1200	19 FRONT DESK 0830 - 1130 BOOKING APPTS. 1300 - 1600	20 BASIC ALLIED HEALTH 0800 - 0930 ADV. ALLIED HEALTH 1000 - 1130	21 RAD, LAB, PAD PHARMACY - AS NEEDED	22
23	24 ORIENTATION 0830 - 1200 BASIC FUNCTIONS- PHYS. 1300 - 1600 BASIC FUNCTIONS- NURSES 1300-1600	25 **ORIENTATION 0830 - 1200 ADV. FUNCTIONS- PHYS. 0730 - 1200 ADV. FUNCTIONS- NURSES 0730 - 1200	26 FRONT DESK 0830 - 1130 BOOKING APPTS. 1300 - 1600	27 BASIC ALLIED HEALTH 0800 - 0930 ADV. ALLIED HEALTH 1000 - 1130	28 RAD, LAB, PAD PHARMACY - AS NEEDED	29
30						
	**ONLY AVAILABLE IF MONDAY ORIENTATION IS FULL.					

Appendix N

Explanation of TDA Abbreviations

Abbreviation	Term
Para.	Paragraph
GS.	General Service
Sr.	Senior
Comp.	Computer
Prog.	Programmer
Anal.	Analyst
Opr.	Operator
Asst.	Assistant
Mgt.	Management
Dist.	Distribution
Adm.	Administrative
Sp.	Specialist
Clk.	Clerk
Reproduct.	Reproduction

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