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A PROBLEM SOLVING PROJECT TO DETERMINE
IF THE CENTRAL APPOINTMENT SYSTEM ADEQUATELY
SUPPORTS THE OUTPATIENT WORKLOAD REPORTING
REQUIREMENTS AT TRIPLER ARMY MEDICAL CENTER

by

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This paper analyzed an automated central appointment system and its ability to support outpatient workload reporting requirements at an Army teaching hospital. The author studied various alternatives and presented disadvantages and advantages to all of the alternatives.

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I. INTRODUCTION

Development of the Problem

One of the earliest rotations of this residency was
through the Patient Administration Division (PAD). The
rotation was thorough and detailed and appeared to be un-
remarkable until the Medical Statistics Section was visited.
It was expected that this important but routinely small
functional area would consist of one full time employee
generating the few monthly reports required by current regula-
tions. The best known of the reports is generally the Medical
Summary Report (MED 302) and is a recapitulation of the work
done during the preceding month within the clinics and treat-
ment areas of the professional departments. This information
is provided to the Medical Statistics Section (Med Stats)
either by the departments directly or by the Management Infor-
mation Systems Office (MISO) in the case, such as the present
facility, where computer support is available.

Very suprisingly the Med Stats Section consisted of
three full time employees that collected a significant amount
of data and generated what appeared to be more reports than

was actually required. The employees worked at a feverish
pace and even though the supervisor was patient and thorough
in explaining the functions of the section, the explanation
was confusing; so much so that the section was visited twice
again in an attempt to determine exactly what was being
accomplished. In interviewing supervisory personnel and other
organization elements which either utilized or contributed
to the data, it was determined that not much was known by
anyone concerning the functions of the Med Stat Section. It
was not determined where the numbers came from or in many
cases why they were collected or what was their eventual use.
The idea of using this particular area as a problem solving
project began to formulate in that it was felt that the
computer was "driving" the Med Stats Section to the extent
that this section was collecting and summarizing data primarily
because it was available. Generally the data remained data
and was not changed into useful information as should have
been the case. In several instances it appeared that the
Med Stats personnel were correcting manually or serving in
a cybernetic capacity when the computer should have done this
for them. If this were true, then the procedures in this
section could have been streamlined, automated or eliminated

as appropriate and the section reduced by one or more
personnel. The PAD at present does not have a critically
needed CHAMPUS advisor and the position generated by
realigning the Med Stat Section cou' be made available for
that purpose.

However in subsequent interviews with personnel from
MISO it was learned that one computerized system served to
make the lists of appointments for the various clinics on
the Central Appointment Section (CAS) system, generate work-
load reporting cards for the clinics to utilize, and have
these cards used by both the Med Stats Section and Comptroller
Division to formulate their various workload reports. There
are apparently organization structure problems as many of
the clinics manually maintain their own log books as a backup
system as it is apparently felt that the computer system does
not accurately reflect the correct workload. Additionally,
the CAS, PAD and clinics all have different inputs and primary
interests to this system. The CAS is interested primarily
in providing accurate information to the Central Outpatient
Records Section and the appropriate clinics so that the
correct records and patients will arrive at the proper clinic.
PAD is interested primarily in data collection for the Med 302

report and the clinics are interested in primarily reporting
the workload. The present system accepts errors on the
patient reporting cards so if the card can be read by the
computer, it will be accepted regardless of the accuracy or
completeness. The clinics have learned there is no control
on the system or reward for doing 100% accurate work so the
error list is growing rather than decreasing according to
the MISO chief.

Because of these errors, the monthly workload figures
do not accurately reflect a true picture of the hospital.
When it is not possible to determine which clinic the patient
cards came from, they are applied against clinics whose work-
load appears to be less than normal. Compounding this in-
accuracy, the cards are not always submitted in a timely
manner so workload may then be credited against the following
month. While the total TAMC workload is probably accurate,
the distribution is not.

These problems are accentuated by the fact that only
recently has the Clinical Support Division been properly
staffed so there has not been an element given the authority
and charged with the overall responsibility for this system.

In May 1980, Tripler Army Medical Center (TAMC) will
receive a new Burroughs Model 1800 computer to replace the

present second generation hardware. The new system will utilize initially the same language and software presently used. If the problems in the system are not addressed and corrected, the new equipment will not have the full desired impact on the organization. Because of the new equipment coming on line, the changes allowed to the present software will be minimal.

With this information it quickly became obvious that the PSP could not be confined to the Med Stats Section but would include a significant portion of the entire TAMC organization.

Problem Statement

The problem is to determine if the present computerized central appointment system adequately supports the outpatient workload reporting requirements of Tripler Army Medical Center (TAMC); to discuss viable alternatives to the present system and to evaluate the advantages and disadvantages of these alternatives.

Limitations to Problem-Solving Options

In general, the limitations presently found throughout the federal government are the identical problems that limit

the realistically available options to this PSP. Foremost
are the austere funding limitations and the critical shortage
of personnel that is exacerbated by the two for one hiring
policy. In other words, two employees must leave before
one may be hired. With these restrictions, health care
institutions such as TAMC provide few resources to adminis-
trative functions, prefering to concentrate instead upon
maintaining present direct health care capabilities. This
same philosophy is even more prevalent when considering 'new'
administrative functions for the organization. To support
the investment of resources in a new, non-direct patient
care area would require a significant organizational change
and overall staff support. This implies an educational
process to sell the need for such a program and allow adjust-
ment to the change. Briefly stated, the staff at TAMC is
not information systems oriented and consequently does not
see the potential that such a system offers to health care.
This lack of interest will severely limit a major policy
change from the status quo.

A limiting factor that should be considered is the
socio-economic profile of the workforce. Many of these
employees have been working at TAMC since its opening in

in 1948 and provide a very valuable institutional memory.
This group has been a remarkably loyal and productive group
and have become a very knowledgeable, reliable and resilient
workforce. Considerable pride is taken in possessing detailed
knowledge of their area of responsibility. They have estab-
lished norms and standards as would be expected of a mature,
fourth-level group and have the background to know what to
expect in the way of resources in the yearly budget process
and the less frequent manpower surveys. New employees are
assimilated into these groups slowly and taught the standards
and norms in the time honored methods of informal groups.
Many of the wage grade and lower General Scale workers are
having their positions examined for possible contracting-out
under the CETA program. Any intrusion into their work area
is viewed with suspicion.

Literature Review

A brief review of current literature in the field of
information systems, management information systems (MIS)
and hospital information systems (HIS) will quickly impress
even the casual reader with the esoteric language and bewildering
variety of topics that address this subject. The articles
range from excellent informative general teaching vehicles

that present the topic in laymans language while employing

a systems approach to more narrow scoped articles concerning

single episodic ventures into the data processing field.

Examining recent articles, John Cochrane of the California

Hospital Association reported that the quality of information

was more important than was the quantity.[1] There were

numerous articles available which gave practicle advice on

how to computerize an organization,[2] ways to avoid over-

computerization,[3] operation research techniques available to

help design systems[4] and then establish controls over these

same systems.[5] An example of how a Minnesota hospital system

successfully installed *an information system* to the benefit

of all of its consumers of health care was presented[6] in

a very positive manner while a very logical and urgent need

for such a system on a national basis was described by the

Canadian Hospital Association.[7]

The greatest input however was from articles of the

former category. Nolan in his article on the survival of

hospital management,[8] very appropriately pointed out that

computers of today are as superior to the computers of the

mid-1960's (characterized by the IBM 1440) as the computers

of that era were to the Number Mill invented by Charles

Baggage in 1837. In spite of the unparalleled pressures

upon the nation's health care delivery system to provide

high quality medical care to all strata of society at

reasonable costs, beleaguered hospital management has

generally failed to effectively utilize the most significant

managerial development of this century-the computer! Hospitals

have fallen behind other industries in their use of the

computer.[9] This stagnation was apparently initiated by the

federal government's 1971 economic stabilization program but

reasons for its continuation are less clear. Certainly factors

such as lack of pressure from non-financial administrators,

the historically small data processing staffs employed by

hospitals and the numerous examples of early, expensive

failures and disappointments in attempting to computerize

the hospital must be considered as contributors to this

stagnation.[10]

Most hospitals that installed computers during the 1960's

and early 1970's did so as a response to internal pressure

from the fiscal officer; consequently, the data processing

function was typically found, organizationally ,under the

Finance department and functioned primarily as an adjunct to

accounting.[11] Scant attention was given to other administra-

tive areas, much less the clinical departments and perhaps

with good reason. The computers and information systems
of that period were grossly inadequate, very expensive,
rigid and unreliable. Compounding the inadequacies of the
hardware, the staffing requirements for data processing
personnel to manage, define, communicate and implement a
hospital system were routinely underestimated. The complexity
of the patient encounter was severely underestimated during
this era. Data base systems had not appeared and there
were seldom any attempts to integrate the accounting computer
with any other free-standing departmental computers which,
by this time, were occasionally being seen.

While the hardware of the second and third generation
were primarily large general purpose computers which attempted
to satisfy clinical, communication and financial systems,
the hardware of the forth and later generations has moved
toward the mini and micro computers. Additionally, the
vendors and shared computer service companies had developed
field personnel who understood and supported health care
needs.[12]

The critical appraisal of the stagnation of computers
in hospitals may ultimately prove to be a blessing in disguise,
for during this stagnation technology has matured appreciable.

Not only is the hardware more consistent, flexible and
capable, it is much less expensive. The software has likewise
developed to the point where it is now profitable for hospitals
to move into HIS development. Hospital administrators have
two basic strategies to choose from, batch or on-line
processing.[13] Early applications were restricted to batch
processing; in this type, groups or batches of information
were submitted to the computer to be returned later. It is
ideally suited to tasks that can be performed at intervals
such as most of the accounting functions to include accounts
receivables, payroll, payables and inventory. On-line pro-
cessing users enter data at remote site terminals and receive
results on video screens almost instantaneously. While on-
line processing is more expensive to install, hospitals
now have the option of developing applications such as
effective patient care systems, that were impossible with
only batch processing. Additionally, the on-line systems
generally enhance the applications that are possible with
batch processing. Thus in most cases, to accept batch
processing is to opt for a more restrictive, limited set
of capabilities.[14]

While the need of an on-line system is generally recognized, the need for data-base technology is less appreciated. Data base tecnnology supports the idea that data is a resource and should be available to the entire organization. An expensive lesson learned by private industry has been that the key to managing data processing is managing data and not the computer.[15] This concept has given rise to the organization position of Data Base Administrator replacing the MIS officers.[16] Ignorance of this concept has led to many of the non-standard, incompatible applications and data redundancy found in industry today. Data base technology, which is simply an internal system for organizing, structuring, locating and accessing data, has evolved to the point where it should be incorporated into the hospital data processing strategy.[17] This will allow the organization to share a common data base rather than application bound files, centralize and control the data and provide ad hoc reports almost upon demand. By using on-line data-base technology, a hospital is able to move into applications such as medical records, medical record chart control, pharmacy, order communication, laboratory, radiology, admission and disposition and nurse scheduling. Once patient demographic data

is captured, it can be shared throughout the organization
reducing labor costs and increasing accuracy. In his survey
of ten hospitals, Nolan states that while it will cost a
typical 450 bed hospital $1,100,000 to install on-line pro-
cessing, the quantifiable return on this investment will
average $800,000 above costs.[18] This same survey revealed
that unquantifiable results included a patient identification
system that reduced fragmented records from 15% to 1%, a
pharmacy system that dropped the medication error rate from
15% to .1% and a 19 hour reduction in laboratory test results
turn around time. It is significant to note that none of
these applications could have been addressed through a batch
processing system.

While Bowen reports that there is considerable variation
in the amount hospitals spend on data processing, hospitals
in general spend adequately on equipment and personnel, but
when compared to industry, far too little is spent on programs
which would allow the development of productive data base
systems. In the typical hospital, an increase of 5-10% of
the data processing budget entirely devoted to new systems,
would enable that department to increase their program
development by 100-200%.[19] Whitted confirmed these figures
by stating that the largest hospitals are not the most expensive

spenders on data processing as the mean cost per patient
day decreases with the larger hospitals.[20] It was
surmised by the Whitted study that there was a return to scale
for hospital data processing in the large institutions.

Although the technology is available today most
hospital administrators are unaware of it as witnessed when
several administrators were asked "What would you like to
have the computer do for you that it is not now doing?".[21]
The replies were (1) Have computers readily communicate
with each other (2) Have the computer used in the information
gathering process and (3) Have the computer store patient
information, patient origin and patient mix. It is a sad
commentary indeed when one realizes that these requests were
made by respected leaders, published in a widely read journal
on hospital administration as an article describing current
needs of management when the solutions to these requests
were readily available through on-line, data-base systems!

Research Design

The first step in this research project was to determine
which clinics were submitting outpatient workload data and
the methods by which the data was being submitted. This was

accomplished by interviews with personnel from individual
clinics, the Clinical Support Division, the Central Appoint-
ment Section (CAS), MISO, Patient Administration Division
(PAD) and the Comptroller Division. TAMC guidelines on this
topic were studied as were previous management surveys and
routine summary documents such as the Medical Summary Report.
Clinics that provided outpatient workload data even sporadi-
cally, surfaced in one or more of these areas.

Since the paramount concern to this project was the
relationship between the Central Appointment System and the
workload gathering methods, the steps involved in reporting
on outpatient clinic visit were documented and modelled. This
model captured the steps from the time the clinic schedules
were submitted to CAS to the final summation of all workload
data for a certain period of time by MISO. The system work-
sheet preparation was necessary to develop an understanding
of what this system consisted of an to obtain an overall,
indepth picture of the process. The flowsheets are found
at Appendix A.

At the completion of the modelling procedure, interviews
were conducted in thirty clinics within the hospital to
obtain a feeling and understanding of how the clinical personnel

viewed MISO and the importance they attached to these administrative requirements. A sample list of questions asked during each interview is enclosed at Appendix B.

Following the interviews a statistical analysis was made of the gross outpatient workload figures for the period November 1979 through March 1980. This was accomplished to obtain data on how most of the clinics submitted their workload figures. The workload figures for the CAS clinics were then compared to the non-CAS clinics. To determine which types of clinics were most efficient as measured by accuracy of workload submitted, the error listings for November 1979 through March 1980 were examined, the clinics divided into either CAS or non-CAS clinics and the percentage of errors for each group were compared.

Alternative Solutions

It was decided that there were two realistic alternatives in this PSP: (1) To continue with the present arranagement using a combination of manual and mechanized means of making appointments and submitting workload data by any of the several methods presently in use or (2) to automate all or part of the system by use of remote, interactive computer

terminals in the clinic areas which would facilitate a standardization of the submission of outpatient workload data.

The primary advantage of the first alternative was that it is the easier of the two to accommodate. The personnel and idiosyncracies are known and there would be no staff education requirements or organization trauma that normally accompanies any major change. The disadvantage would be that nothing would change; the same inefficiencies and dis- jointed, uncoordinated reporting cacophonies would continue to exist. The potential gains for both health care and education would not be realized.

The advantages of the second alternative, to automate part or all of the system, is that the system would become less labor intensive with the elimination of most data redundancy in the outpatient clinics, the accuracy should be very close to 100% and the reporting mechanisms would be uniform for all clinics. The disadvantages to this alterna- tive would be the education and training requirements for the staff to enable them to appreciate and fully comprehend the need for and capabilities of this system. This alternative would require structure and organization change and as with

any change a certain amount of organization disfunction would occur during the **initial operational** phases.

Evaluation of Alternatives

After the data has been collected, analyzed, evaluated, and the alternatives discussed, the alternatives will be evaluated, using cost and work capacity as the criteria, through the application of a linear programming technique. This technique was selected to facilitate making the best possible decision concerning valuable and scarce resources in an uncertain environment. The object will be to maximize composite health service benefits given the present limited available resources.

II. DISCUSSION

Present System

There are several methods which TAMC outpatient clinics use to report their workload. The oldest, easiest and least informative method is by simply making a mark for each patient treated and summarizing the marks at the end of the day, week and month. This method is commonly referred to the "Tally Sheet" method; at TAMC it is accomplished by using TAMC Form 381, Clinic Visits Tally Sheet. Major clinics using this method include all of the orthopedic clinics, the ENT clinics, physical therapy clinic and most of the clinics located at Schofield Barracks (SB). The only information extracted from these tally sheets are the clinics, patient category and patient age groups as this breakdown is required for the Medical Summary report. Summary cards are prepared from the Tally Sheets and integrated into the Medical Summary report at the end of the reporting period. These visits do not appear on any of the error listings provided by MISO.

Perhaps the best known method of making an appointment is through the Central Appointment Section. This method has been found within the Army since the early 1970's and the

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beginning of the Ambulatory Care Program (APC). At TAMC the CAS function is performed by a total of ten personnel consisting of one civilian supervisor, eight civilian appointment clerks and one military messenger. The information required to make an appointment through CAS is extensive and time consuming but necessary to insure that the patient, the provider and the medical record arrive at proper clinic at the correct time. Close coordination is necessary among the patient, the clinic and the provider and it is the coordination function that the CAS is called upon to fulfill. One of the advantages to the CAS is that a large volume of useful information is collected and summarized in a standard format.

The workflow sheets for the CAS procedure are available at Appendix 1, but stated as briefly as possible, the steps are as follows:

1. The clinics provide their schedule (TAMC Form 305) to CAS, 90 days in advance.

2. CAS reviews the schedules for accuracy and sends them to MISO.

3. MISO punches appointment cards with the clinic and doctor codes, the date and the time of the appointment.

4. The cards are returned to CAS where they are filed by the doctor and clinic.

5. Patients call CAS for appointments and the appointment cards are initiated with the demographic data of the patient.

6. The completed cards are returned to MISO, where the cards are edited and an error listing for CAS is prepared.

7. CAS corrects the error list and returns it to MISO.

8. MISO keypunches the appointment cards and returns them to CAS where they are held until two days prior to the appointment.

9. CAS then returns the cards to MISO where rosters are prepared for each clinic and physician. Rosters are also prepared for Radiology and Outpatient Medical Records Section, requesting records as appropriate.

10. The roster and the appointment cards are returned to the clinics the day before the appointment by CAS.

11. The patient has the appointment and the clinic adds the diagnosis code and procedure code(s), if appropriate, to the appointment cards.

12. The cards are categorized by the clinics, picked up and returned to MISO by the CAS messenger on a daily basis.

13. MISO prepares an error listing and returns the

error listings to Med Stats and Clinical Support

Division who sends them to the clinics for correction.

14. The error listings are returned to MISO where

summary cards are prepared.

15. At the end of the month, the summary cards from

all clinics are totaled and the Medical Summary report

is prepared.

16. For "Walk-In" (unappointed) patients that appear

at any outpatient clinic, TAMC Form 287-3, Walk-In Visit

Worksheet is prepared and sent to the MISO where an

appointment card is punched and the information follows

the same sequence as outlined for an appointed patient.

The forms used in the CAS system and a list of the CAS

clinics are found at Appendix C.

In an effort to standardize the clinic appointment system

and meet the requirements of the Ambulatory Patient Care

Program, thirty-one clinics that make their own outpatient

appointments now collect the same information from patients

as the CAS appointment clerks. The patient data is recorded

on TAMC Form 287, Clinic Appointment Worksheet - Mornings

and TAMC Form 287-1, Clinic Appointment Worksheet - Afternoons.

These forms are sent to MISO two days prior to the appointment,

MISO keypunches cards and provides an appointment list that

is returned to the clinic the day prior to the appointment
and the data is handled in the exact manner as the CAS
clinic data. In fact the only real difference between these
two mechanisms is the manner in which the appointments are
made. Copies of the non-CAS clinic forms and a list of
non-CAS clinics may be found at Appendix D. It is interesting
to note that the Family Practice Clinic is a non-CAS clinic
but uses a TAMC Form 287-2 as the vehicle for recording
appointments. The only difference between this form and
the earlier mentioned forms is some redundant information
such as the clinic code for Family Practice, is pre-printed
onto the Form 287-2.

It should be mentioned that some clinics which submit
workload data do not make any appointments; the major clinics
in this category are the Emergency Room, Acute Minor Illness
Clinic and the Troop Medical Clinics at Schofield Barracks.
These clinics are strictly on a walk-in basis and utilize
only the Tally Sheets to record their workload.

The above discussed mechanisms are the primary methods
by which workload data is recorded, summarized and reported.

Problems With The Present System

A very interesting portion of this project dealt
with the interviews that were conducted between October
1979 and April 1980. A variety of personnel were inter-
viewed to include the Chief of MISO, several of the MISO
staff, three major clinical department chiefs, several
clinical service chiefs, NCOIC's and clerical personnel
for thirty clinics, as well as several staff physicians.
In addition to this group, personnel in Patient Administra-
tion Division, Comptroller Division, Clinical Support Division
and Force Development Division were also interviewed. While
a separate questionnaire was not kept on each interview, the
questions found on the sample questionnaire at Appendix B
were asked to each interviewee. Some general impressions
that resulted from this survey were obtained and reinforced
several teaching points made during the didactic phase of
this program.

(1) Communications is very difficult to accomplish in
an organization such as TAMC. Many personnel were concerned
only with their own areas of responsibility and did not view
it as a part of an overall system. This was particularly
true among the more junior personnel.

(2) Many personnel were unaware of the importance
of workload reporting, reviewing it as another administrative
procedure to be endured and consequently assigned this task
a low priority.

(3) The computer is a large impersonal and remote
entity that is easy to find fault with regardless of the
origin of the problem. Several personnel were not aware
that TAMC even had a computer and very few of them even
knew where it was located or what it did.

Concerning the first question "Do you trust the computer?,"
the overall response was a begrudgingly yes. Those clinics
supported by CAS were much more trusting than any other
category of clinic. The least trustful group were the
clinics that submitted data by Tally Sheet. The more knowl-
edgeable of the system the personnel were, the more trustful
they were.

The second question "Have you met any of the MISO
personnel?" was answered yes by at least one person in each
clinic. The NCOIC, secretary or clerk were the personnel
most likely to have met the "computer people." This question
supported the first question in that the more personal
contact the clinics had with MISO, the more trusting they

were of each other. In a few cases, personnel from other
departments such as CAS, Force Development, PAD and Comptroller
were thought to be from MISO. In three different clinics,
changes prompted by the Uniform Chart of Accounts were
attributed to MISO. In two separate clinics, personnel were
very supportive of MISO and expressed empathy through comments
such as "Their (MISO) job is thankless" or I wouldn't
have their job for anything." The department chiefs and
senior service chiefs routinely knew the Chief, MISO but
physicians below this group were uninformed as to who the
MISO personnel were and to a large extent, what they did.

The third question, asking if the clinic workload
figures normally agreed with the computer's workload
figures, provided the biggest surprise. From the negative
reputation of the MISO that is normally found in the pro-
fessional areas, it was expected that most replies to this
question would indicate wide discrepancies but this was not
the case. In the thirty clinics, twenty-five responded with
a strong yes with five providing equally strong no replies.
None of the twenty-five clinics that responded yes kept any
sort of duplicate records of their workload figure. Several
of the clinics that responded yes, stated that a year ago

there were frequent disagreements but these problems had
been totally eliminated. Three of the clinics responding
with a no kept log books but when the clinic figures were
compared to the MISO figures, the two sets of numbers were
almost identical after several months indicating that the
real problem was the delinquent submission of cards or the
delinquent correction of error cards. There was not a dis-
crepancy greater than 2% found in any of the clinics. The
three clinics that kept separate workload figures were all
small, low volume clinics. In one of these three clinics,
the secretary stated that the numbers had no meaning anyway
since regardless of the volume, the clinic was always staffed
by two physicians and the secretary. That's the way it
had always been and she was positive it would always continue
to be. Under more detailed questioning, the other two "no"
clinics admitted they really just had a gut feeling that
the numbers were different and could not substantiate their
feelings.

An unusual occurrence took place in one of the twenty-
five clinics responding yes; the numbers were different
but the MISO figures were always equal to or greater than
the clinic figures. This was not pursued in any depth

except to determine that patient visits were recorded in
three different locations and the MISO had input from all
three while this secretary usually had only two locations
recorded. It was also noted that during her leave period,
the clinic figures agreed with the MISO figures.

The last question, asking for system improvements,
received the plea,to lessen the amount of paperwork required,
during virtually every interview. Most personnel agreed that
workload figures were important, that CAS reduced clinic
congestion and saved manpower and that MISO attempted to
do a good job but all were adamant in their desires to reduce
the amount of paperwork involved in this process.

At the conclusion of the survey, it was felt that the
reputation of MISO was much worse that it deserved to be
and that much of the criticism is directed at MISO from habit.

Much of the organization assumed that anything that had
to do with the computer meant more work for them and that
the computer would probably not treat them fairly. As the
interviews progressed, it became clear that the feelings
of clinical personnel could not be substantiated by figures
and facts. It was also apparent that most personnel did
not understand what the computer did or how they fit into

the picture. On the other hand, MISO generally felt that the clinics were irresponsible and possibly a little lazy for not filling in the cards accurately and timely. Due to poor communications and a lack of understanding from both parties, a 'we-they' situation was developing between these two groups. An education of workers is needed at all levels to develop an appreciation of the diversity and enormity of tasks facing both of these groups; these differences subsequently lead to different priorities and values. An overview of the entire system--a system approach-- would benefit all aspects of this particular function and would hopefully help both groups to understand the pressures and demands placed on the other group.

Examination of Workload

The gross workload figures for the period November 1979 through March 1980 were collected and examined and several comparisons were made. The total number of appointments for TAMC was the base against which most figures were compared. Several facts need to be reinforced: (1) Schofield Barracks, located approximately 18 miles from TAMC, is the home of the 25th Infantry Division and during this project

performed 30.6% of the outpatient workload recorded for TAMC. None of Schofield Barracks (SB) clinics or Troop Medical Clinics are on the CAS but a limited number do appoint patients using the TAMC Form 287 and 287-1, which result in cards being prepared by MISO and the subsequent generation of error lists. (2) The only appointments appearing on the error lists are those appointments for which appointment cards have been prepared. These are referred to as "carded" appointments. (3) The Tally Sheet clinics do not appear on any lists until the end of the month summaries are made.

The total figures for the project period are as follows:

	TAMC Outpatient Visits	SB Outpatient Visits	Monthly TOTALS
Nov 79	41,289	19,958	61,247
Dec 79	33,986	17,894	51,880
Jan 80	52,247	19,965	72,212
Feb 80	48,635	20,968	69,603
Mar 80	48,637	20,338	68,975
TOTAL VISITS	224,794	99,123	323,917

In order to obtain an understanding of the workload performed by CAS clinics verses the workload performed by the non-CAS clinics, the workload during the sampling period was collected by clinic and placed into whichever category the clinic belonged. The two categories for this display were CAS appointments or carded appointments, meaning those clinics making their own appointments but using the TAMC Form 287 or 287-1.

	CAS Appointments	Total Carded Appointments	Total Outpatient Visits
Nov 79	14,351	27,570	61,247
Dec 79	12,876	28,226	51,880
Jan 80	16,144	29,935	72,212
Feb 80	15,773	33,574	69,603
Mar 80	15,603	30,361	68,975
TOTALS	74,747	149,666	323,917

Dividing the total CAS appointments by the total number of outpatient visits, it is learned that the CAS appoints 23.1% of all outpatient visits to TAMC. During this period 46.2% of all outpatient visits recorded for Tripler had appointment cards prepared for them. It is also interesting to observe that 74,747 of the 149,666 carded appointments were appointed by CAS; stated differently, CAS obtained the

the data for 49.94% of all the appointments for which cards were prepared. In summary then, there were 323,917 total appointments of which 149,666 (46.2%) had appointment cards prepared; CAS appointed 49.94% of the patients for which cards were prepared.

Error Rates

Twice each week, MISO collects all of the completed appointment cards, those cards for patients that have completed their particular outpatient visits, for both the CAS and non-CAS clinics and prepares a list of all errors found on those cards by clinic. The error listings are distributed to each clinic, Clinical Support Division and the Medical Statistics Section for correction. Ideally, the corrections are made, the lists returned to MISO and the correct information is entered into the computer.

The error listings for the sampling period were examined and the numbers of errors for all CAS clinics and all non-CAS clinics were obtained.

	CAS CLINICS		NON-CAS CLINICS	
	ERROR CARDS	TOTAL CARDS	ERROR CARDS	TOTAL CARDS
Nov 79	1,478	20,845	535	10,716
Dec 79	970	18,664	712	9,589
Jan 80	1,115	19,507	617	6,987
Feb 80	906	17,200	472	8,992
Mar 80	956	20,388	315	8,702
TOTALS	5,425	96,604	2,651	44,977

Dividing the total number of error cards from CAS
clinics by the total number of cards from the CAS clinics,
an error rate of 5.62% for the test period is obtained.
With the non-CAS clinics, an error rate of 5.89% is obtained
using the same methods. At some point in the past, the
TAMC commander made the decision that all error cards would
be counted in the workload totals rather than loose this
documented effort because of a clerical error. The only
errors that could not be accepted into the computer were
incorrect clinic codes and incorrect patient cateogires
as this information is required for the medical summary
report. The cards that contain either of these types of
errors are sent from MISO to the Medical Statistics Section
for correction as med stats is utlimately responsible for

The Medical Summary Report. Routinely the error cards
returned to the clinics are returned to MISO late if they
are returned at all; with the desire to submit all workload
data in a timely manner, the decision was made to have all
the patient category and clinic code errors corrected by
medical statistics personnel and not to worry with correcting
the other errors.

During some of the early interviews with personnel from
PAD and MISO, an opinion frequently expressed was that the
error list was extensive, increasing and as a result, there
were many cards that had to be randomly distributed to
various clinics using questionable patient categories. These
fears were not verified by the data collected during the
study of this system. The error rate was within a narrow
range, 3.62% to 8.83%, with no detectable trend; the error
rate average was almost identical for the two categories of
clinics. The computer program now in use requires the computer
to identify those cards with incorrect clinic codes as an
unidentifiable clinic and print it on the error listing.
There were only eleven of these cards designated by the
computer during the project. The overwhelming majority of
the errors then were in locations other than the patient

category or clinic code. While data was not available on
the summary of the types of errors, it was observed that
many errors were redundant, inconsequential ones such as
the date missing or no primary care clinic indicated. Since
most errors were made in areas that were not critical and
the error rate was constant at approximately 5.4% for all
clinics, this low error rate is remarkable; particularly
so when it is realized that the clinics are not receiving
any extra workload credit or benefit for entering the doctor,
diagnosis and procedure codes. A 94.6% accuracy rate must
be considered very good for non-critical requirements.

The Future

The future for hospital information systems in general
and TAMC in particular will be dynamic. Hospitals are far
behind industry in the use of computers and information
systems. The Army is no exception to this observation and
is in many instances hampered by bureaucratic agencies such
as TRIMIS.

The Army health care delivery system has the same reason
to computerize as the rest of industry. It is a labor
intensive industry that uses copious amounts of data from a

variety of resources. The regulatory requirements placed
upon the private sector are equally demanding within the
federal arena and will continue to increase. With the present
emphasis on the quality and consistency of care, medical
documentation through use of the computer will increase
timeliness of care by improving feedback to physicians,
reduction of errors and provide automatic follow-up reporting
to assist compliance with prescribed care. The emphasis
on planning within health care delivery is also supported
well through computerization; this becomes particularly
important when it is realized that health care planning is
essential to comply with cost containment incentives and
increasing regulatory requirements. Lastly, during the past
decade, the cost for computer hardware has dropped sharply
while the data processing capability has increased just as
precipitously. Complimenting this economy have been
dramatically improved software applications. A 1975 AHA
survey showed that 80% of all hospitals at that time had
at least one function that was computer assisted. While
most programs were in the traditional business functions,
a 1976 survey by the Hospital Financial Managers Association
indicated that more than half of U.S. hospitals would be

using *some type* of on-line information system in the very
near future.[22]

Within large hospitals, most administrative functions
that are profitable to computerize have already been automated.
The future benefit of the computer lies within the clinical
and ancillary systems of hospitals. With rising labor costs
in a labor intensive industry, the cost effectiveness of
hardware and availability of good software, the logical step
is for hospitals to computerize with interactive, on-line,
data-base systems. The computers in hospitals of the
immediate future will facilitate a hospital-wide communica-
tion system to provide accurate and rapid order entry,
results reporting, patient preparation and scheduling, and
inventory control. In the pharmacy a computer can print
labels, maintain a formulary, keep a patient drug profile,
generate automatic reorders or stop-orders and analyze and
report dangerous drug reactions. In radiology, a computer
will be able to schedule patients, equipment and personnel,
control film locations and recall a patient's x-ray history.
In the laboratory, a computer can label specimens, schedule
workload, maintain patient test results and laboratory
statistics and provide quality control. Computers are
already used in physiological monitoring in intensive care

areas, operating rooms, cardiac catheterization laboratories,
pulmonary functions, radiation therapy and nuclear medicine.
In the laboratory a computer is already combined with sophis-
ticated electronic instruments such as the SMAC. Computers
assist in diagnostic treatment and interpretation in nuclear
medicine, radiation therapy and ECG clinics. A hospital
wide data base system can eliminate redundant data, costly
files and manpower and provide health care personnel with
a comprehensive and current summary of all the various
computer assisted programs such as those mentioned above
on each patient.[23]

In Honolulu, The Queen's Medical Center, a public,
non-profit, richly endowed institution is installing such
a system. Photographs of the computer room of this facility
appear at Annex 5. This system is on-line, data-base and
hospital wide. As can be seen from the photographs, most
of the hardware, of which the centerpiece is an IBM 3031
computer, is presently in place and supporting most of the
business and finance functions, the outpatient clinics,
admitting and some of the ancillary services. The programs
to bring in the rest of the ancillary systems and clinical
departments are being designed and implemented; the entire

system will be in operation by mid 1982. The staff at the
hospital plan to incorporate the computer services at a
time in the future and sell services to other local facilities,
even further reducing the costs per patient day. At Queen's,
the computerized programs of the future are present and
operating now.

At TAMC, a Burrough's Model 1800, which is a large
versitle, reliable, forth generation computer will be
installed this summer. It is capable of providing central
processing capabilities for virtually any system TAMC decides
to implement. TRIMISS personnel toured TAMC and briefed
various staff members during November 1979 and indicated
that several systems would be offered in the next one to
five years; these packages include Pharmacy, Admissions and
Dispositions, Food Service Division, the laboratory and
others. Many of these functions can be accomplished through
a data base, on-line system and the TAMC hardware is certainly
capable of handling these and other applications.

Returning to outpatient workloads, the demand for out-
patient visits as opposed to inpatient care will certainly
increase and even more inpatient functions will be offered
on an outpatient basis. To best utilize professional time
and talent, obtain maximum benefit of limited facilities

in the most economical manner possible, it will become
more and more prudent to examine the scheduling of outpatients
and subsequent collection of workload data through the use
of a computerized system. The demand for data, such as
presently collected at TAMC CAS appointments will certainly
increase. The use of outpatient diagnosis and procedure
indices were discussed at the 1980 ACHA Conference and are
a distinct possibility for a future JCAH requirements. Tripler
is fortunate to have the rediments of such a system already
operational. The collection on the present data extended
to all outpatient encounters would be a valuable teaching
tool, an asset to research and valuable in epidemiological
studies. As far as could be determined TAMC is the only Army
hospital with a system capable of collecting this data
already in use. The problem becomes how to collect the data
for all outpatients in an environment of limited resources
and at the same time be flexible enough to interface with
the proposed TRIMIS information system.

Analysis of Alternatives

To extend the present manual CAS to the approximate
65,000 outpatient visits recorded each month will require
the following resources.

The present CAS appointment clerks perform approximately 70 appointments per work day or 1,540 appointments per month. Dividing the 1,540 appointments per clerk into the average total monthly appointments of 65,000 and a requirement of 42.2 appointment clerks is recognized. The average annual gross salary of a GS-4/5 is $12,812.63; per month the average gross salary becomes $\frac{\$12,812.63}{12}$ = $1,068.00. Multiplying the number of appointment clerks by the monthly salary, 42.2 X $1,068.00 and the cost per month is $45,069.60 with a gross annual salary expense of $540,835.20.

Looking at the second alternative, to automate the CAS system, a linear programing technique was used to minimize the cost(Z) through the best combination of scarce resources, namely personnel (P) and interactional computer terminals(T).

The cost to lease a Burrough's terminal that will perform the desired functions and interact with the new computer is $235.00 per month. The new Burrough's 1800 is capable of serving 40 of these terminals. It is estimated that with the new terminals an appointment clerk normally capable of making 1,540 appointments per month would be able to make 3,080 appointments per month. Furthermore, during the survey of the clinics it was estimated that there are approximately 35 personnel involved each month in making

appointments under the present system. With this back-
ground, limits and constraints, the problem set up as follows:

The object was to minimize cost

$$Z = \$1,068P + \$235T$$

Where: P = appointment clerks

T = computer terminals

Z = cost

Constraints

(1) $1,540P + 3,080T = 65,000$

$$T \leqslant 40$$

$$P \leqslant 35$$

(2) $P = T$

$$P > 0$$

$$T > 0$$

(1) $1,540P + 3,080T = 65,000$

Set $3,080T = 0$

$\therefore 1,540P = 65,000$

$$P = 42.2$$

Set $1,540P = 0$

$\therefore 3,080T = 65,000$

$$T = 21.1$$

(2) $P = T$

$\therefore 5P = 5T$

$$10P = 10T$$

$$40P = 40T$$

P

50

42.2

40

30

20

10

0,0   5   10   15   20 21.1   25   30   35   40 T

A (35,4)

42.2 P + 21.1 T = 65,000

C (14,14)
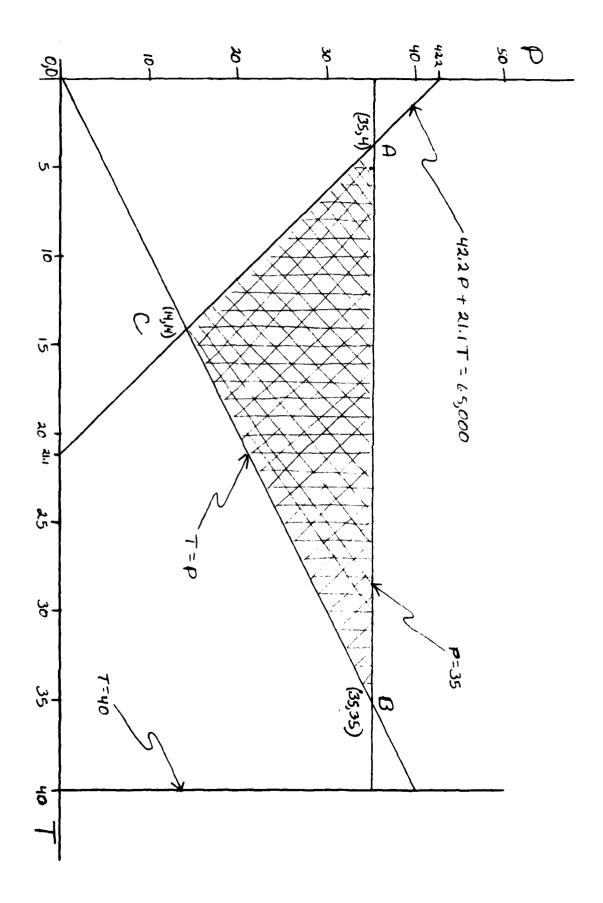
T = P

P = 35

B (35,35)

T = 40

From the graph, the following coordinates for the three corners were obtained:

    AT   A (35,4)   Z = 1,068(35) + 235(4) = $38,320

    AT   B (35,35)   Z = 1,068(35) + 235(35) = $45,605.00

    AT   C (14,14)   Z = 1,068(14) + 235(14) = $18,242.00

Therefore, the most cost effective method of automating all 65,000 appointments per month is to choose method C, which consists of fourteen appointment clerks and 14 computer terminals. This has an annual cost of $218,904.00 or less than half of the cost associated with a manual system and it satisfies all constraints of this situation.

III.   CONCLUSIONS

Having examined the present system, the problems
of the present system, needs of the organization and the
future it becomes obvious that TAMC should automate the CAS
system for the following reasons.

1.   More than twice the amount of work can be done
at approximately one half of the cost of maintaining
the present system.

2.   The hardware is being installed that will accommo-
date this system and supporting software is available.

3.   All indications point to increased regulatory
requirements for much of the data that would be captured
using an automated system.

4.   This would defuse the complaints against the present
CAS while at the same time maintaining the desirable
features.

5.   The data collected would be accurate, standardized
and eliminate manual cybernetic functions presently
performed by CAS and Medical Statistics Section. This
data would lend itself to teaching, research and
epidemiology studies.

6. Since more work would be performed by fewer
personnel at a cheaper cost, there is a lost opportunity
cost incurred by not implementing this sytem. There
would be personnel spaces generated that could be used
in other critically short areas of the hospital.

7. This system will be a part of hospital wide informa-
tion systems that will be a part of this facility in
the not to distant future.

Returning to the original problem statement, it is
concluded that the CAS system adequately supports the approxi-
mate one-fourth of the total outpatient visits that it
appoints using the criteria of accuracy and timeliness. It
is obvious however, that it is both possible and prudent
support all TAMC outpatient encounters by an on-line data
base computer system that will standardize all data gathered,
require fewer personnel and be less costly to operate.

FOOTNOTES

[1] John Cochran "On Managing" <u>Hospital Forum</u> (19/1) (June 1976): p.21.

[2] Virgil D. Guthrie "An Easy, Painless Way To Computerize" <u>Hospital Financial Management</u> 32/4 (April 1978): p.34.

[3] Meta Parker et. al. "The New York Crisis" <u>Hospital Financial Management</u> 33/1 (January 1979): p.38.

[4] Larry D. Shuman, et. al. <u>Operations Research In Health Care</u>. Baltimore: The Johns Hopkins University Press, 1975: p.264.

[5] William W. Holder. "Use Flowcharting To Define Control Procedures." <u>Hospital Financial Management</u> 32/7 (July 1978): p.9.

[6] "A Minnesota Hospital Management Information System Proves Itself." <u>The Office</u> 90/4 (October 1979): p.120.

[7] Jean-Claude Martin "The Need For A National Framework For Hospital Management Information Systems." <u>Dimensions In Health Service</u> 56/3 (March 1979): p.6.

[8] William E. Bowen, et.a. "Computers and Hospital Management: Prescription For Survival" <u>The Journal of Medical Systems</u> 1/2 (February 1977): p.27.

[9] Ibid.

[10] Marion J. Ball and Thomas M. Boyle, Jr. "Hospital Information Systems: Past, Present and Future." <u>Hospital Financial Management</u> 34/2 (February 1980): p.12.

[11] Ibid., p.24.

[12] Ibid., p.14.

[13] Bowen, p.17.

[14] Ibid.

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[15]Richard L. Nolan, "Computer Data Bases: The Future is Now." Harvard Business Review (September-October 1973): p.46.

[16]Ralph Fennesy, IBM Lecture on Data Base Concepts, Honolulu, Hawaii, April 2, 1980.

[17]Nolan, Survival, p.28.

[18]Ibid, p.21.

[19]Ibid, p.29.

[20]Gary S. Whitted, "What To Expect From Electronic Data Processing In Medical Centers," Health Care Management Review 3/1 (Winter 1978): p.57.

[21]Western Viewpoint "What Would You Like To Have the Computer Do For You That It Is Not Now Doing?" Hospital Forum 22/6 (September-October 1979): p.23.

[22]A. G. Battle and David A. Rey "Current Status and Trends of Hospital Information Systems." Topics In Health Care Financing 4/4 (Summer 1978): p.15.

[23]Myron G. Odell "Clinical and Ancillary Systems" Topics in Health Care Financing 4/4 (Summer 1978): p.33.

APPENDIX A

WORKFLOW MODEL OF CAS

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APPENDIX B

INTERVIEW QUESTIONS

1. Do you trust the computer and MISO to provide accurate summaries of your workload?

2. Have you met or do you know any of the MISO personnel?

3. Do your numbers and the computer numbers normally agree?

4. How would you improve the system?

APPENDIX C

CAS FORMS AND CLINIC LIST

CLINIC			DAY		MONTH		DOCTOR'S CODE				TIME				VISIT	VIS	CANCEL	CAN	ICDA DIAGNOSIS			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	NIT - 1	8	DR 1	9	22	23	24
																RET - 2		PAT 2				
																TEL - 3		NS - 3				

ICDA PROC			NAME (LAST NAME SPACE FIRST NAME SPACE MIDDLE INITIAL)																		GRADE	
25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50

FMP		SPONSOR'S SSAN									TELEPHONE NUMBER							CATEGORY			AGE			APPT
51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73		74

PCFC		SEX	SEX REC	XRAY	MULTI	ICDA #2 DIAG	ICDA #2 PROC	MULTI	ICDA #3 DIAG	ICDA #3 PROC	
75	76	MALE - M	77 78	79	21 22 23 24	25 26 27			22 23 24	25 26 27	80
		FILM - F									M

CAS CLINICS

Pulmonary Clinic	GYN Pap Smear Clinic
Cardiology Clinic	GYN Cervical Clinic
Internal Medicine	GYN Oncology Clinic
Gastroenterology Clinic	Optometry Clinic
Pediatric Gen. Sick Baby	Opthalmology Clinic
Pediatric Allergy Clinic	Thoracic Surgery Clinic
Pediatric Cardiology	Urology Clinic
Pediatric Infectious Disease	IVP/XU Clinic
Pediatric Dermatology	Retrograde Cystogram
Pediatric Endocrine	Cystometrogram Clinic
Pediatric Hematology	Cystoscopy Clinic
Pediatric Neurology	Vasectomy Clinic
Pediatric Renal Clinic	Circumcision Clinic
Hematology-Oncology Clinic	General Surgery Clinic
Nephrology Clinic	Surgical Proctology Clinic
Adolescent Pediatrics	Vascular Surgical Clinic
Allergy Clinic	Neurology Clinic
Dermatology Clinic	Peds Well Baby Clinic
New OB Conference Clinic	Peds Newborn Spec. Care
Return OB Clinic	Peds A/D Army Dependents
Complicated OB Clinic	Diet. Consult-Individual
Postpartum OB Clinic	Diet Consult-TAMC
OB-Kaneohe MNAS	Diet Consult-Weight Reduct.
OB-Schofield Barracks	Diet.-OB Conference
OB-Barbers Point NAS	Diet HLP Type II B Class
OB-Ultrasound	Diet-Diabetes Class
GYN-Routine Clinic	Diet.-Gestational Disbetes
GYN-ASAP Clinic	Complete Physical-P. Exam.
Infertility Clinic	Complete Physical-Gen. Med.
GYN Pre-Op.	Complete Physical-Peds
GYN Post-Op.	Complete Phys.-Adol. Peds

APPENDIX D

NON-CAS FORMS AND CLINIC LIST

CLINICAL APPOINTMENT WORKSHEET - Mornings

When completed, this form contains privacy act protected personnel data
handle and destroy in accordance with applicable directives.

CLINIC 1-3   DATE 4   JULIAN CODE /3 -   12 71 PCF /5-76
                                                2 1 1

TIME	V I S	C A T	ICDA DIAGNOSIS 21 - 24	ICDA PROC 25 - 27		NAME (LAST NAME SPACE FIRST NAME MIDDLE INITIAL) 28	GRADE 48 49-50	FMP 51-52	SPON SSAN (LAST 4) 58 - 61	CAT 59 - 71	AGE 72-73	S E X 77
16 18 19					MULTI ICDA 1							
0 8	1 5				MULTI ICDA 2 CC=80 M							
0 8	3 0				MULTI ICDA 2 · M							
0 8	4 5				MULTI ICDA 2 CC=80 M							
0 9	0 0				MULTI ICDA 2 CC=80 M							
0 9	1 5				MULTI ICDA 2 CC=80 M							
0 9	3 0				MULTI ICDA 2 · CC=80 M							
0 9	4 5				MULTI ICDA 2 CC=80 M							
1 0	0 0				MULTI ICDA 2 CC=80 M							
1 0	1 5				MULTI ICDA 2 CC=80 M							
1 0	3 0				MULTI ICDA 2 · CC=80 M							
1 0	4 5				MULTI ICDA 2 CC=80 M							
1 1	1 5				MULTI ICDA 2 CC=80 M							

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CLINICAL APPOINTMENT WORKSHEET — Afternoons

When completed, this form contains privacy act protected personnel data handle and destroy in accordance with applicable directives.

CLINIC	DATE	DOCTOR CODE	A	PCF

TIME	V C I A S N	ICDA DIAGNOSIS	ICDA PROC	NAME (LAST NAME SPACE FIRST NAME SPACE MIDDLE INITIAL)	GRADE	FMP	SPON SSAN (LAST 4)	CAT	AGE	S E X

MULTI ICDA 1   MULTI ICDA 2   CC=80   M

MULTI ICDA 1   MULTI ICDA 2   CC=80   M

MULTI ICDA 1   MULTI ICDA 2   CC=80   M

MULTI ICDA 1   MULTI ICDA 2   CC=80   M

MULTI ICDA 1   MULTI ICDA 2   CC=80   M

MULTI ICDA 1   MULTI ICDA 2   CC=80   M

MULTI ICDA 1   MULTI ICDA 2   CC=80   M

MULTI ICDA 1   MULTI ICDA 2   CC=80   M

MULTI ICDA 1   MULTI ICDA 2   CC=80   M

MULTI ICDA 1   MULTI ICDA 2   CC=80   M

MULTI ICDA 1   MULTI ICDA 2   CC=80   M

CLINICAL APPOINTMENT WORKSHEET

When completed, this form contains Privacy Act protected personnel data
Handle and destroy in accordance with applicable directives.

CLINIC	DATE	DOCTOR CODE	D C
1 - 3	4 - 7	8 - 12	17

TIME	V I S	C A N	ICDA DIAGNOSIS	ICDA PROC	NAME (LAST NAME SPACE FIRST NAME MIDDLE INITIAL)	GRADE	FMP	SPON SSAN (LAST 4)	CAT	AGE	A	PCF
13 - 16	18	19	21 - 24	25 - 27	28	48 49-50	51-52	58 - 61	69 - 71	72-73	74	75-7

MULTI ICDA #2   MULTI ICDA #3   CC=80   M

MULTI ICDA #2   MULTI ICDA #3   CC=80   M

MULTI ICDA #2   MULTI ICDA #3   CC=80   M

MULTI ICDA #2   MULTI ICDA #3   CC=80   M

MULTI ICDA #2   MULTI ICDA #3   CC=80   M

MULTI ICDA #2   MULTI ICDA #3   CC=80   M

MULTI ICDA #2   MULTI ICDA #3   CC=80   M

MULTI ICDA #2   MULTI ICDA #3   CC=80   M

MULTI ICDA #2   MULTI ICDA #3   CC=80   M

MULTI ICDA #2   MULTI ICDA #3   CC=80   M

MULTI ICDA #2   MULTI ICDA #3   CC=80   M

MULTI ICDA #2   MULTI ICDA #3   CC=80   M

MULTI ICDA #2

WALK-IN VISIT WORKSHEET

CLINIC			DAY	MONTH			DOCTOR'S CODE					TIME					VISIT	CANCEL		DIAGNOSIS				PROC		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		21	22	23	24	25	26	27
																	INIT-1 RET-2 TEL-3	DR.-1 PAT-2 NS-3								

NAME (LAST NAME SPACE FIRST NAME SPACE MIDDLE INITIAL)

28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48

SPONSOR'S SSAN									TELEPHONE NUMBER							CATEGORY			GRADE		FMP		AGE		APPOINT
53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	49	50	51	52	72	73	74
																									INPAT-1 OUT P-2

PCFC		SEX	REC	XRAY	MULTI#2	DIAG #2 PROC								MULTI#3	DIAG #3 PROC						
75	76	77	78	79		21	22	23	24	25	26	27	80 M		21	22	23	24	25	26	27	90 M

NON-CAS CLINICS

G.I. Diagnostic Clinic

Medical Proctology Clinic

Medical Consult Clinic

Rheumatology Clinic

Diabetes Clinic

Endocrine Clinic

OB Stress Clinic

Neurosurgery Clinic

Plastic Surgery Clinic

CMHA, TAMC

Hale Nui, Fort Shafter

Child-Adolescent Psych.

CMHA, SB

Psych. Nursing, SB

Psychology Clinic, SB

CMHA, Social Work, SB

Psychology, TAMC

Psychology Testing

Occupational Health, SB

Occupational Health, TAMC

Physical Med Clinic

Podiatry Clinic

Family Practice, TAMC

Immunology Therapy Clinic

Family Planning Clinic

Minor Surgery Clinic

Army Health Nsg, TAMC

Army Health Nsg, SB
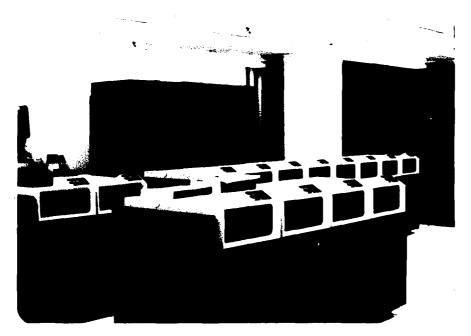
Peds-Breastfeeding Clinic

APPENDIX E

GRAPHICAL DISPLAY
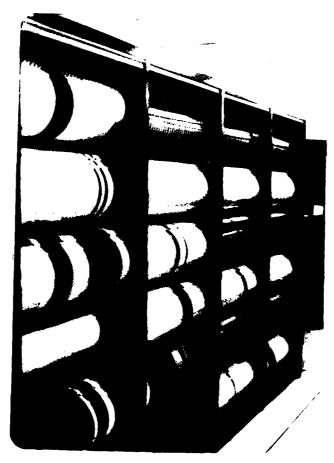
IBM 3031 COMPUTER IS CONTROLLED BY

CENTRAL CONTROL CONSOLE

ALL PATIENT DATA IS PLACED ON DISK PACKS INITIALLY

AND LATER TRANSFERRED TO MAGNETIC TAPE FOR

PERMANENT STORAGE

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