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MAJ Howard E. Schloss, AN

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92941-5800

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Pre-Admission Patient Treatment Times

in The Emergency Room

Silas Beach Hays Army Community Hospital

Fort Ord, California

A Graduate Management Project

Submitted to the Faculty of

Baylor University

In Partial Fulfillment of the

Requirements for the Degree

of

Master of Health Administration

by

Major Howard E. Schloss, AN

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Acknowledgments

Everyone I have been in contact with during my enrollment in the U.S. Army-Baylor University Graduate Program in Healthcare Administration deserves acknowledgment for their contributions toward this Graduate Management Project (GMP). Fellow students, faculty members, facility staff members, and especially my family have contributed mightily and have earned my sincere gratitude. Four individuals deserve particular recognition.

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Dr. Donald R. Barr, Mathematics Professor, Naval Postgraduate School, Monterey, California cordially agreed to review my research methodology and statistical analysis. He reinforced my confidence that the data I was collecting would provide answers to the questions I was asking.

Ms. Elizabeth M. Harris, Information Management Specialist in the Fort Ord MEDDAC's Information Management Division was invaluable in helping me gather the equipment and the skill level needed to produce the final document.

Finally, Colonel John E. Matt, Deputy Commander for Administration at the Fort Ord MEDDAC has displayed true leadership by example in his mentoring role as my preceptor. His advice in the selection and execution of this GMP emphasized his vision that this academic endeavor should also have practical application. To that end I believe I have met his challenge.

Abstract

The author conducted a retrospective study to identify variables that influence the length of the total time needed to admit patients via the Emergency Room (ER) at an Army medical treatment facility. Total time was an aggregate measurement that included all registration, triage, and diagnosis/treatment times. The dependent variable was the total time; fourteen independent variables were investigated. Three variables: the patient's triage category, the admitting service, and the ER census demonstrated statistically significant influences on the total time required for admission.

The author employed a retrospective chart audit of 895 admissions via the Level II ER at a 128-bed Army community hospital between July and December 1991. Objective data were abstracted from records of admitted patients. The ER Standard Forms were the main data source, augmented by administrative reports. Personal computers and statistical software were employed to build and analyze the database.

In addition to identifying variables of influence, the study also produced a detailed descriptive analysis of ER admissions during the study period. The study results have been submitted as the basis for the ER's standard of care with respect to preadmission treatment times. Finally, the study has demonstrated the broad potential of site-based data collection and will be used as a catalyst to automate some of the ER's documentation.

Introduction

One of the standard discussion items at the Commander's Morning Report at Silas Beach Hays Army Community Hospital (SBHACH), Fort Ord, CA is the issue of evaluation times in the Emergency Room (ER) for patients admitted during the prior twenty-four hours. As a participating member at this daily conference, I was struck from the very first meeting by the attention paid not only to the absolute times recorded but also to a critical four-hour distinction. It appeared that admitting a patient via the ER in four hours or less met an otherwise unspecified standard of care; taking longer failed to meet that standard.

Until now there has been no clear guidance regarding this ongoing scrutiny of ER treatment times at SBHACH. Per conversation with the Medical Department Activity (MEDDAC) commander, there was no known statistical basis for the four-hour rule; it is a vague but common guideline in the medical profession (P. Thompson, personal communication, December 2, 1991). The Information Management Division's (IMD) document index included a reference to an internal regulation (MEDDAC Memorandum 40-8) that specifically addresses evaluation times in the ER. Attempts to retrieve the memorandum from likely sources in the MEDDAC have been unsuccessful.

Through my own observations over the past eight months, I have discerned some possible characteristics of ER visits wherein the evaluation times tended to be longer than average. Variables that seemed to influence the length of evaluation times included: the patient's age and beneficiary status, whether the visit was on a weekday or weekend, the time of day of the visit, whether the attending ER physician was civilian or military, the particular service(s) consulted to actually admit the patient, and the overall hospital and ER census during the 24-hour period surrounding the time the patient presented. If these patterns of variables could be observed retrospectively, they might also demonstrate some predictive value.

The focus of this study was to evaluate variables in the ER course of treatment as they affected specifically the ER patients who were eventually admitted. These same variables could be studied with ER patients who were not admitted, e.g. discharged to home. However, this study concerned how these variables affected admissions only.

During this same observation period, SBHACH was moving forward with a plan to comply with its inclusion in the United States Department of Defense' Base Realignment and Closure (BRAC) list. From the MEDDAC's perspective, a key concern is how to best modify the template of clinical services which would minimize the negative impact to beneficiaries and staff alike.

In an early review of rural hospital closures (Schloss, 1990), I noted that as hospitals eliminate services in the process of gradually closing, affected patients often attempted to attain those discontinued services via the facilities' emergency departments.

Considering these issues together, I surmised that a detailed descriptive study of ER admissions would be valuable. First, such a study would demonstrate the capability to retrospectively analyze a large number of ER admissions and ascertain what variables may affect the time required to complete admissions. Second, there would be a statistical basis supporting the policy of reviewing ER admission times at morning report. Third, this study may produce the initiative to automate the ER's data collection which would enhance the staff's ability to monitor and improve patient care. Finally, another possible outcome of this study would be a predictive model of ER evaluation times.

As SBHACH moves further into the process of closing, we anticipate more patients using the ER as their primary avenue to access care. Precisely because these patients increase the overall ER volume, information gained from a recent, detailed analysis of ER admissions would be a significant management asset.

Statement of the Management Question

Are there any discernible factors, or patterns of factors, which influence the length of the total time required to admit an ER patient to an inpatient unit? The total evaluation time in this study began when the patient registered in the ER and ended when the patient departed the ER to be admitted to an inpatient nursing unit.

Review of the Literature

Presently there are numerous current references in the healthcare administration literature that address evaluation times in emergency departments (EDs). While the sources reviewed herein cover a range of ER or ED issues, the particular focus of this review will be on the total evaluation times of those patients who are eventually admitted. The literature review begins with an overview of the current overcrowding situation at ERs across the nation. Subsections within the review include patient flow studies, staffing issues, and observation or holding units.

General Emergency Room Overcrowding:

Nordberg (1990) reported on the breadth, depth, and duration of the overcrowding situation in ERs across the country. She observed that, after its

start in the urban centers in the East, ER overcrowding has spread to all regions of the country. She cited reports of increases in total treatment times in ERs by as much as threefold in four years. Over the same four years, one hospital - Harbor/UCLA Medical Center in Torrance, CA - showed treatment times from physician contact to admission, increased an average of 2-10 hours.

Three major issues were emphasized by Nordberg (1990) as affecting ER overcrowding: nursing shortage, increasing diversion activities by Emergency Medical Services personnel, and growing acceptance - even expectation - of long term capability to hold patients when open beds for admission were not available. Lastly, healthcare economics were discussed. Nordberg further argues the slowness to develop the ambulatory equivalent to Diagnosis Related Groups (DRGs) as indicative of the secondary status ER services have traditionally held. Also the failure to apply sound economic rules perpetuates the problem of continued access and use by those without private funds, government support, or other third party coverage.

Eastaugh & Eastaugh (1990) explored many of the economic forces contributing to the ER's overcrowding crisis. They report the rise, by 40% to 46% in most inner city hospitals, of ER patient volume since 1984 while inpatient volume decreased by at least 10% over the same time. They propose that typically-salaried ER physicians are less profit driven, thereby also less

efficiency-conscious, than most private practice colleagues.

Eastaugh & Eastaugh (1990) also point to legislative directions: the Consolidated Omnibus Budget Reconciliation Act (COBRA) of 1986 and subsequent updates clearly mandate the responsibility of ERs to treat patients regardless of ability to pay. The growth of the uninsured has been partly a function of MEDICAID changes. During the 1980s, the MEDICAID-eligible population shrank to 31 percent of the nation's poor. These patients who have no ability to pay often use the ER as their sole health care access point.

Eastaugh & Eastaugh (1990) clarify that even those with health care coverage are not problem-free. They describe increasing restrictions by managed care firms' pre-authorization agents that can challenge the clinical judgment of the ER physician. Eastaugh & Eastaugh reported a 1989 American Hospital Association (AHA) study that concluded ER based care is three times as expensive to the third party payer as the equivalent provided in an office or clinic setting.

The bottom line in the entire economic discussion is the collectability of ER charges. Eastaugh and Eastaugh (1990) cite American College of Emergency Physicians' (ACEP) surveys from 1989 stating that less than 65 percent of ER charges are collected. A 1991 study by Baraff, Cameron, & Sekhon listed the reimbursement rate for ER billings as less than 50 percent.

Andrulis, Kellerman, Hintz, Hackman, & Weslowski (1991) conducted a
major study of 239 U.S. teaching hospitals to investigate the ER overcrowding
issue. They found the overall mean proportion of hospitals' inpatients that are
admitted via the ER is 38.5%, a figure they noted rose significantly over the
course of the study. The operational definition for holding times as defined by
the researchers was, "the delay from the time an emergency patient is
completely evaluated and the orders are written for admission to a ward or floor
bed until the patient actually leaves the emergency department." (p.982) The
mean holding times they recorded were 3.5 hours for a ward bed and 2.9 hours
for intensive care.

In their efforts to establish standard definitions for holding times, Andrulis et
al. (1991) reported one of their chief difficulties was the rarity of computerized
or other objective methods for documenting crucial time phases in ERs.
Precisely because this operational subjectivity exists in ERs across the nation,
more objective and detailed data collection involving time periods is indicated.
Management responses to the lengthening of holding times included preventing
ER access to specific patient categories, active transport of patients to other
facilities, refusal to accept transfer from others, and total ambulance diversion.

Lynn & Kellerman (1991) studied the increasing use of the ER as a route of
admission. Similar to Andrulis et al.'s 1991 findings, Lynn & Kellerman

observed the vast underutilization of two key data collection instruments - the

log of admitted patients and the ER census reports. The researchers

advocated much better data collection in both the ER and in the hospital at-

large before pursuing broader management changes. Lynn & Kellerman

encourage the use of statistical methods to first identify acceptable ranges of

productivity and subsequently to reduce variance from those baselines.

The extent of ER overcrowding prompted the ACEP position paper, The

Emergency Overcrowding Task Force in 1990 (Staff). This task force drafted a

policy statement that was immediately approved by the ACEP's Board of

Directors. The statement's strongest language was directed at drastically

reducing the practice of "holding" patients in the ER. The ACEP position is that

when the ER functions as an inpatient unit, whether electively or reluctantly, its

ability to receive, stabilize, and promptly admit new patients is greatly impaired.

Patient Flow Studies:

A number of researchers are studying the dynamics of patient flow through

the ER. Their approaches include time and motion studies, operations research

studies, large volume computerized chart audits, diagnosis-specific patient flow

patterns, the ER admission source as an indicator of hospital death, and the

growing number of patients who leave without being seen (LWOBS).

Saunders (1987) made a continual observation study of the impact on the different segments of ER waiting times as they were affected by patient acuity levels. In a Level I, university hospital ER, Saunders separated the patient's course through the ER into four distinct phases and he monitored the relative lengths of each of those phases as functions of which of the four triage categories the ER nurse had assigned to each patient.

Saunders (1987) found that the most critical patients were moved most quickly through each level of the ER process. Saunders reported an inverse relation of the waiting times to the level of patient acuity. At the point of direct treatment, however, the most acute patients received very aggressive, concentrated attention and were promptly admitted. While the least acute patients waited the longest, they also enjoyed longer treatment times. These times were suspected of being protracted due to the lack of urgency and the extra time required for more involved, discretionary tests.

Saunders (1987) concluded that any assessment of ER time phases must be considered in light of patient acuity. Acceptable waiting times and treatment times are different between acuity levels. He urged tracking the turnaround of ancillary support services and separating low acuity, episodic primary care ER patients from those needing aggressive, truly emergent care.

Holbrook & Aghababian (1990) conducted an automated audit of over 15,000 ER patient records. Their specific purpose was to determine whether the format for recording the clinical data (handwritten, voice recorded for later transcription, or voice recognition word processing) was associated with detecting or missing certain trigger diagnoses. These trigger diagnoses are vital in directing a clinician to clusters of serious conditions, all of which are high volume malpractice areas. The staff used the different recording methods at each of the two separate hospitals where 500 of the records were randomly selected for the study.

Four observations were of particular note. First, the records for all admissions at one of the hospitals were recorded by hand, as a matter of physician choice. Second, the highest degree of automation - the voice activation system - was most successful at prompting the use of trigger diagnoses. Third, the wide variability in handwritten charts, i.e. being complete and clear versus being incomplete and illegible, rendered a conclusion that soon this manner of recording will be abandoned as an overwhelming liability. A final, overarching conclusion concerned the growing need for automated chart auditing as a quality assurance instrument.

Lupfer, Altieri, Sheridan, & Lilly (1991) conducted a prospective study of the flow patterns of 245 chest pain patients through an ER. The three dependent

variables were the delineated time phases in the process: total time spent in the

ER, time required to fully register and undergo emergency physician triage, and

time from physician triage to disposition. The independent variables were the

time of day the patient presented to the ER, their manner of presentation (e.g.,

stable ambulatory, unstable ambulatory, or Emergency Medical Service

transport) and eventual disposition to either critical or noncritical inpatient units.

Lupfer et al. (1991) highlighted significantly longer triage-to-disposition times

for critical admissions. The mean overall time spent in the ER was 3.5 hours

for critical admissions and 3 hours for noncritical. The difference was attributed

to delays in ICU bed availability and delays in waiting for residents to consult

with the ER physician about the admissions. The researchers reported that a

serious limitation in their study was their inability to track turnaround times for

both pathology and radiology support. A strongly emphasized observation, but

one not quite borne out by the data, was the value of the triage nurse in

determining which ambulatory patients were stable or unstable.

Pell & Miller (1990) also contributed evidence about the value of monitoring

treatment times. Their retrospective study included chart reviews of 408

patients admitted to a critical care unit, 207 of those with a final diagnosis of

acute myocardial infarction. These particular researchers' time focus is

explained by the clinical indication to initiate the treatment of choice,

thrombolytic therapy, as soon as possible following onset of symptoms. The time phases in this study (again, the dependent variables) were: the time of symptom onset to presentation to the ER, time from arrival in ER to arrival in critical care, and the time from admission to administration of thrombolytic agents. The independent variable was whether the patient was self- or physician referred to the ER.

Pell & Miller (1990) compared their data to a similar study done in the same facility in 1972. Over the intervening 18 years, the median time for cardiac patients to present to the ER improved (shortened) significantly, especially for self-referred patients. However the transfer time from ER to critical care lengthened. The researchers reported that the delay rarely disqualified patients from the treatment protocol but it likely had deleterious impact on the therapy's efficacy. In explaining the delays, Pell and Miller suggested that great improvements in diagnosing and maintaining patients lessened the traditional need to rush patients through the ER to the ICU.

Pell & Miller's (1990) research resulted in a significant policy change at the hospital which hosted the research. Rather than forcing the contraction of reasonable delays in the ER, they began initiating thrombolytic treatment in the ER. This allows thorough, controlled evaluation without delaying definitive care.

Escarce & Kelley (1990) compared the ER with other sources of critical care admissions as a possible predictor of hospital death in conjunction with the widely used Acute Physiology and Chronic Health Evaluation (APACHE) model. An ER admission was a more accurate predictor of patient death than were transfers from either non-acute inpatient units, the intermediate care unit, or from other hospitals. Predicted death rates for patients from these other sources of critical care admissions were all underestimated.

Escarce & Kelley (1990) were cautious about the validity of the ER source of admissions versus other clinics, for example, as a reliable predictor of eventual outcome. They warn others not to use their findings to support too-readily admitting patients from the ER to the critical care units. In this case, a utilization management problem could result from failing to discriminate and rushing even marginally complicated cases to the units. More thorough, and more discriminating, evaluations in the ER necessarily take more time.

A group of researchers at Harbor-UCLA Medical Center described an increasing frequency of patients who leave without being seen (LWOBS). Baker, Stevens, & Brook (1991) compared LWOBS patients with patients who did wait until they were seen. Both groups were interviewed soon after registering with the triage nurse, they completed a health self-assessment, and all consented to a follow-up interview one week later.

The mean waiting time for the LWOBS group was 6.2 hours, only slightly less than the 6.4 hour mean for patients who were seen. Neither was a significant difference found between the two groups in terms of chief complaint, triage category, acuity ratings, or self-assessment scores. Eleven percent of the LWOBS group were hospitalized within one week of their initial visit compared with a nine percent admission rate among those who waited to be seen. The main conclusion was that overcrowding might be indiscriminately crowding out some patients needing care more urgently than those who wait.

Pierce, Kellerman, & Oster (1990) conducted a retrospective, computerized audit of ER patients who returned for another visit within 48 hours. Dubbed "Bounces" by the researchers, these returns were categorized into patient-, physician-, disease-, or system-related reasons.

Pierce et al. (1990) chose to focus on the patient-related and physician-related returns which constituted 53% and 18% of all bounces respectively. One third of the bounces labelled patient-related had initially left either without being seen or against medical advice. Upon their return, 21% of those patients required immediate admission, an admission rate twice as high as the overall ER population.

Pierce et al. (1990) strongly encouraged readers to appreciate the risk management opportunities in these observations. They advise tracking the

separate time phases involved in the ER process. Only with such baseline performance data can a facility accurately track progress towards improvement, increasingly required by accrediting agencies and third party payers.

Physician/Nurse Staffing:

Several researchers addressed specific staffing issues as the best management approaches to deal with ER overcrowding. Among these issues are dedicated emergency physician staffs, registered nurse (RN) staffing requirement indicators, the impact of using nurse practitioners in trauma units, and the impact of poorly staffed inpatient beds on patient flow through the ER.

In an Air Force Medical Center study Howell, Torma, Teneyck, Burrow, & Huang (1990) investigated the impact of a dedicated staff of emergency trained physicians versus the use of more generalized house officers. According to Howell et al., emergency-trained physicians achieved shorter patient waiting times until first seen, higher percentages of positive radiographic tests, fewer incomplete medical records, and fewer patients leaving without being seen. The individual patient's Standard Form 558 (SF558) was the principle data source. Howell et al. concluded the gains of such a staffing system in an ER were improved quality of care, enhanced patient satisfaction, better quality assurance documentation, and reduced active duty man-hour losses.

Helmer, Freitas, & Onaha (1988) studied optimal RN staffing patterns using computer modeling techniques. At Kapiolani Medical Center in Honolulu, Helmer et al. studied ER patient waiting times after initial triage as a function of the number of RNs staffed. They employed the ER visit log as the source for their retrospective data collection of six months' of visits. By categorizing 14 diagnosis/symptom groups, recording individual patient waiting times, and plotting known RN staffing records, Helmer et al. established a historical pattern for ER admissions at Kapiolani.

By projecting that pattern via linear regression techniques, Helmer et al. (1988) were able to predict what future waiting times for patients would be, given different RN staffing levels. The management at Kapiolani then employed decision rules of acceptable waiting times in order to determine their most cost-effective staffing. The net staffing change as a result of the study was a reduction of one staff RN per shift. The researchers emphasized that the change was statistically based and involved the RNs in the research which vastly aided in its implementation.

Employment of registered nurse practitioners (RNPs) was an approach to ease ER overcrowding used by Spisso, O'Callaghan, McKennan, & Holcroft (1990). They investigated the impact of augmenting physician staff with RNPs in a medical center trauma unit. Spisso et al. conducted a three-part study

considering cost-benefit analyses, quality assurance implications, and the overall impact on the interdisciplinary trauma team. They collected data from two years before and two years after implementation of RNP staffing.

Spisso et al. (1990) concluded that RNPs were a positive influence in all areas under study. Cost benefit ratios were improved in terms of both decreased length of stay for trauma patients and lower litigation rates for the post-implementation period. Clinic waiting times, patient complaint rates, and completeness of documentation all improved markedly. Indices of team functioning were noted in terms of staff time saved. RNPs demonstrated more thorough discharge planning, improved clinic management, and better patient/family support than that provided by the trauma physicians. Overall the study supported the expanded role of the RNPs in this particular unit.

Observation Units:

Yealy, DeHart, Ellis, & Wolfson (1989) conducted a survey of U.S. hospitals' use of the observation unit. They describe the observation unit as a compromise resolution of the treatment of patients neither quite ill enough to admit nor well enough to discharge. This unit allows the ER staff prolonged evaluation time while not interrupting the more routine ER patient flow.

Yealy et al. (1989) employed a telephone survey of urban teaching, urban nonteaching, and rural hospitals. This sample of hospitals was stratified to resemble proportions that are representative of the overall U.S. hospital population, according to the American Hospital Association (AHA). The researchers discovered that 27% of their sample had actively functioning observation units while 16% more planned to open one within one year. Significantly fewer teaching hospitals employed these units than did the other types. Yealy et al. proposed one explanation that the incentive to control ER costs was not as strong in the teaching hospital segment of the study sample.

Yealy et al. (1989) found that distinctions between observation units and the newer model of holding units have become largely artificial. Holding units are used to maintain patients who clearly require admission but must await an available bed. Since either type unit tended to provide both services, the researchers used the terms observation and holding units interchangeably for the course of their study. Another blurred distinction noted by the researchers concerns separate staffing. While the American College of Emergency Physicians (1986) recommends staffing nurses for the observation/holding units separately from the ER, 80% of the sample's nurses were dually assigned.

In summary, all of the studies in this review addressed hospital admissions via the ER and emphasized the value of data collection. Some included all ER

visits while others included all ER admissions of specific diagnoses or to particular units. LWOBS and staffing studies addressed the issue of long waits from consumer and provider perspectives. However, none of the studies reviewed factors or patterns of factors affecting all ER admissions to all inpatient units.

Purpose

The purpose of this study was to determine whether the total time required to admit patients via the ER, the dependent variable, was a function of fourteen independent variables: triage time, waiting time, diagnosis/treatment time, patient age, gender, beneficiary status, time of day, weekday versus weekend visit, triage category, military or civilian physician, military or civilian nurse, admitting service, and both ER and hospital census during the 24-hour period around patient presentation.

Methods and Procedures

Study Design

I employed a non-experimental research design using pre-recorded data to investigate relationships between these variables. Soeken (1985) recommended non-experimental designs when studying systematic relationships between variables without requiring the active control of those

variables. In a 1991 study about forming a diagnosis-based, case mix system for ERs, Baraff, Cameron, & Sekhon advocated using a limited number of variables that could be easily abstracted from the medical record.

The population for this study was comprised of all patient visits to the SBHACH Emergency Room that resulted in admissions during the period between 1 July 1991 and 31 December 1991. The plan included 100% of the admissions during the study period to preclude sampling error.

The main data source for this study was the ER's retained record of patient visits, Standard Form 558s (SF558). The SF558 is a pre-printed form manually recorded by the ER physicians and nurses during the course of an ER visit. I designed the study as an abstracting of data that were already routinely collected but underutilized. The data set was built using the Microstat statistical software package. Once the data set was complete, the file was exported to another computer employing statistical software with the capability to calculate inferential statistics despite unequal sample sizes.

In the process of data collection, individual ER admissions that were not retrievable as SF558s were briefly reviewed from a secondary source. This was done to detect whether missing admissions were systematically excluded due to long total evaluation times.

ER physicians and nurses contributed to this study by identifying the most uniformly recorded data elements. Considering the staff's guidance and following a preliminary review of numerous ER admission records, I anticipated that a considerable number of the records in the sample may not have all applicable data elements recorded on the SF558s. In cases where a particular patient record did not include one or more of the data elements, the Microstat software afforded the annotation of those cases which were missing data.

Names, Social Security numbers, and other data identifying either patients or staff were omitted, thus protecting the subjects' anonymity. Throughout the entire study, I required no direct subject contact. By using a retrospective data collection approach, I greatly reduced the bias that otherwise can be infused by staff who know their actions are being monitored.

Validity, reliability, and practicality were considered in the construction of the data set used in this study. By abstracting data that was already recorded, I adopted the content validity of the SF558 as an accepted instrument. By serving as the sole data collector and using a strict abstracting process, I attempted to ensure intra-rater reliability. The third measurement consideration was practicality. According to Kerlinger (1986), a tool should also be evaluated in practical terms of convenience, economy, and interpretability. As the sole researcher, I found the SF558 readily available, free, and understandable.

Data Collection

The plan for data collection was to include the records of all admissions during the study period. There were 1036 patients admitted via the ER at SBHACH during the period between 1 July 1991 and 31 December 1991. The F558s were retrieved from the ER's storage areas. However, only 895 records were retrievable, an 86% records-retrieved rate.

The data collection process involved reviewing each SF558 in the sample as well as six months' worth of DA 3586s, Report of Professional Officer of the Day, and the MEDDAC's Department of Nursing (DON) Reports, both published daily. The DA 3586 reported all ER admissions by name for each day in the study period and it included the total time required for each admission. The DON report provided the inpatient census for each day in the study period. When hardcopy SF558 records were not retrievable for an admission reported on the DA 3586, I reviewed the total time for admission noted on the DA 3586 to ensure that total times for those admissions were not extreme. Satisfied that this potential for bias was unfounded, I elected not to research more detailed files, e.g. inpatient records. The study sample thus included all admissions whose SF558s were retrievable (N=895).

I obtained one month's worth of SF558s at a time and sorted those records into groups of daily admissions. The data from these admissions were entered

into the data set in chronological order. I abstracted each SF558 by entering the appropriate information by keystroke directly to a Microstat statistics software package loaded onto a Unisys 386 personal computer. The data for the study sample were entered during a two week period of time with each case averaging two minutes, exclusive of sorting. Approximately 30 hours were spent on the data entry process.

The single dependent variable and 14 independent variables were expanded to 25 total data entries per case in order to build the data set for this study, (see Table 1). Each time period, the patient's age, and the two census measures were all continuous variables. The patient's beneficiary category, the triage categories and the clinical service responsible for the admission each involved mutually exclusive and categorically exhaustive, grouped data. All other data were dichotomous and were recorded by binary notation.

The time measures in this study were recorded as one aggregate period and three subtotals. The total time, measured in minutes, was the inclusive time from when a patient registered in the ER until that patient departed the ER enroute to an inpatient unit for admission. Triage time spanned registration and initial vital signs and chief complaint recording by the ER's corpsmen. Waiting times and diagnosis-treatment times denoted triage to the time between first physician contact and from first contact to admission, respectively.

Patients' ages were recorded as whole numbers with infants' ages less than one year old rounded up to one. Gender was entered as "1" when male and "0" when female. All five beneficiary status queries were recorded as "1" when yes, "0" otherwise.

The day and time of patient registration were determined for the next two fields. The first was entered as a "1" if the registration time fell on a Monday through Friday, not counting holidays, and "0" otherwise. ER visits that occurred on the following holidays were considered weekend visits: Fourth of July, Labor Day, Veterans Day, Thanksgiving Day, the Friday following Thanksgiving, and Christmas Day. To record the time of day when an ER visit occurred, a "1" was entered when the time of registration moment fell between 0600 and 1800 and a "0" between 1801 and 0559.

The assignment of each patient's acuity level, as assessed by the ER's staff RN, was captured using the emergent, urgent, and non-urgent dichotomous queries. Since only one could be answered yes, the entry was "1" for the affirmative response and "0" for the others.

The civilian or military status of the treating physician and nurse each was recorded by a dichotomous entry, "1" if military, "0" otherwise.

The admitting service issue was addressed with five dichotomous data queries for medical, surgical, obstetrical/gynecological, pediatrics, or psychiatric. As a registered nurse, I made the primary decision for this assignment. In cases where the admitting service was unclear, the Chief of the Emergency Medical Service agreed to make the determination.

Emergency Room and hospital census figures were obtained from the Professional Officer of the Day and Department of Nursing reports. These reports included the daily ER admissions and the beds-occupied, inpatient volume for the 24-hour day as of the time of patient registration.

RESULTS

First, descriptive statistics were calculated for all independent and dependent variables. Variations in case size (N) from 895 for each variable reflected the number of cases where that particular data element was missing from the SF558. Second, a general linear model was estimated to calculate the collective and individual influence of the independent variables on the total time variable. Finally, distinctions between grouped variables were explored.

The data collected in this study surpass all previously available data in describing ER admissions at SBHACH despite the fact that the anticipated incompleteness of the individual SF558s was borne out in the data collection.

Table 1

Descriptive Statistics

No.	Variable	N	Mean	Std.Dev.	Min	Max
1	Total time	861	183.0000	101.1154	10	625
2	Triage time	869	10.0886	12.0029	0	90
3	Waiting time	839	22.3552	38.7441	0	295
4	Diagnosis/Treat.	819	149.6679	88.0631	5	614
5	Patient Age	895	37.5631	25.3645	1	89
6	Patient Gender	895	.5419	.4985	0	1
7	Active Duty (AD)	895	.2637	.4409	0	1
8	Dependent of AD	895	.3743	.4842	0	1
9	Retired (Ret'd)	895	.2134	.4099	0	1
10	Dependent of Ret'd	895	.1341	.3409	0	1
11	Other	895	.0190	.1366	0	1
12	Weekday/End	895	.6514	.4768	0	1
13	Day/Night	895	.5419	.4985	0	1
14	Emergent	847	.1877	.3907	0	1
15	Urgent	847	.7355	.4413	0	1
16	Non-Urgent	847	.0803	.2719	0	1
17	MD Status	889	.5568	.4970	0	1
18	RN Status	795	.9333	.2496	0	1
19	Medical	895	.5542	.4973	0	1
20	Surgical	895	.1374	.3445	0	1
21	Obstetrics/Gyn.	895	.0905	.2871	0	1
22	Pediatrics	895	.1598	.3666	0	1
23	Psychiatry	895	.0570	.2319	0	1
24	ER Census	895	93.3564	20.4562	55	159
25	Hospital Census	895	90.8626	13.0844	60	119

In Table 1 the means, standard deviations, and ranges for total time and for each subtotal time group are shown in minutes. The mean for total time for the sample was 183 minutes; the standard deviation was 101 minutes. Standard deviations and ranges for all time variables were large relative to their means.

The total time variable is more meaningful when displayed via frequency

distributions, Figure 1.

Figure 1
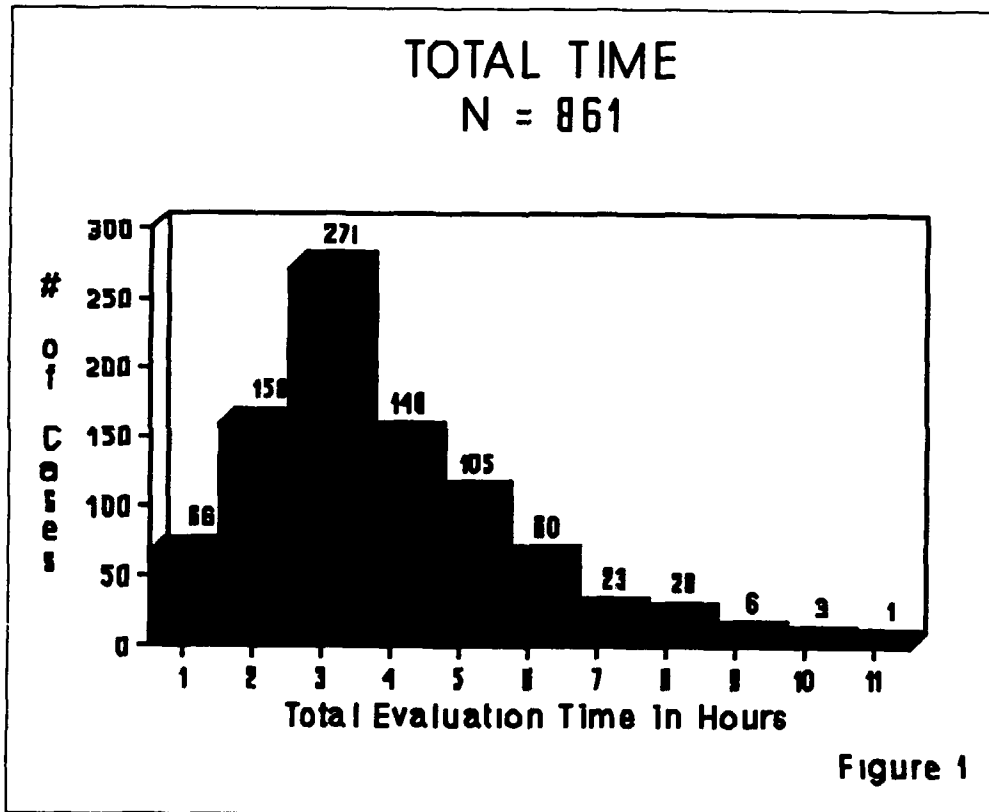
The modal distribution demonstrates 271 cases, 31% of the sample, were

admitted in three hours. Adding one-hour, two-hour, and four-hour admissions

shows 643 cases, 75% of the sample, were admitted in under four hours, the

current "standard".

The subtotal variable, triage time, likewise is more instructive when viewed
graphically, Figure 2.

Figure 2
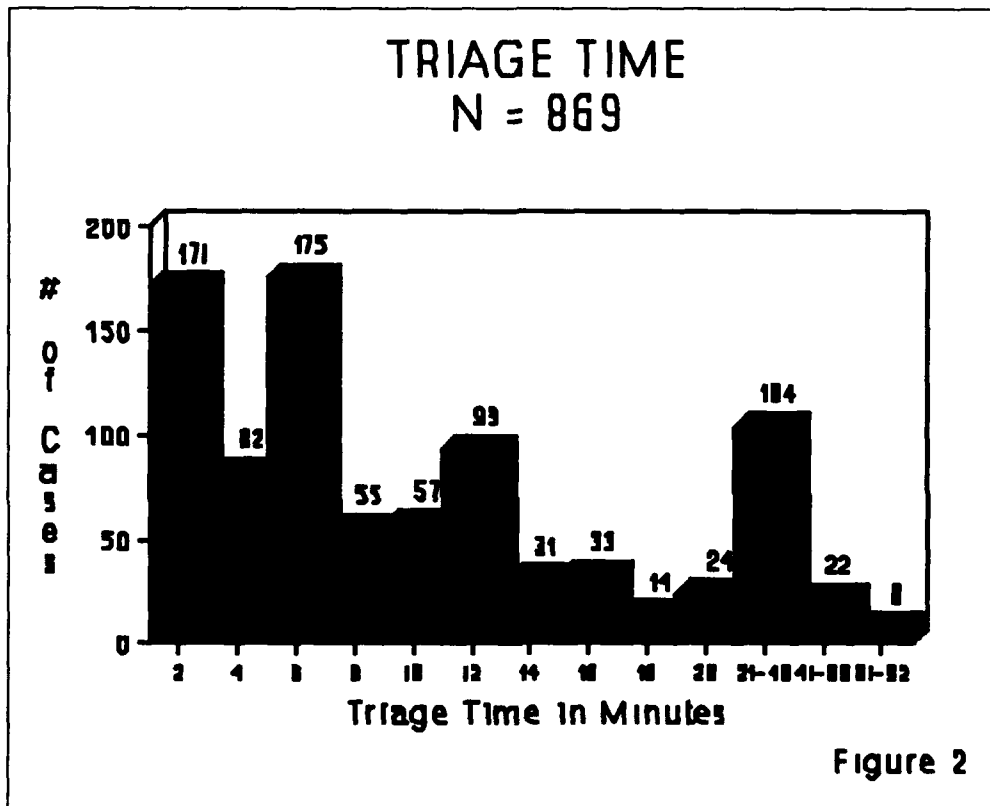
The triage time variable demonstrates a multimodal distribution. Of
particular note are the 329 cases, 38% of the sample, that have not been
triaged within ten minutes of registration. The last three intervals are grouped
in 20 minute segments to capture single cases of extreme values.

The waiting time variable, Figure 3, shows that 455 cases, 54% of the sample, were seen by the ER physician within ten minutes of having their vital signs and chief complaint recorded. There is a steep reduction of frequency in the next ten minute time span and more gradual decreases through the balance of the ten minute intervals thereafter until the two final grouped intervals of 100 minutes each.

Figure 3
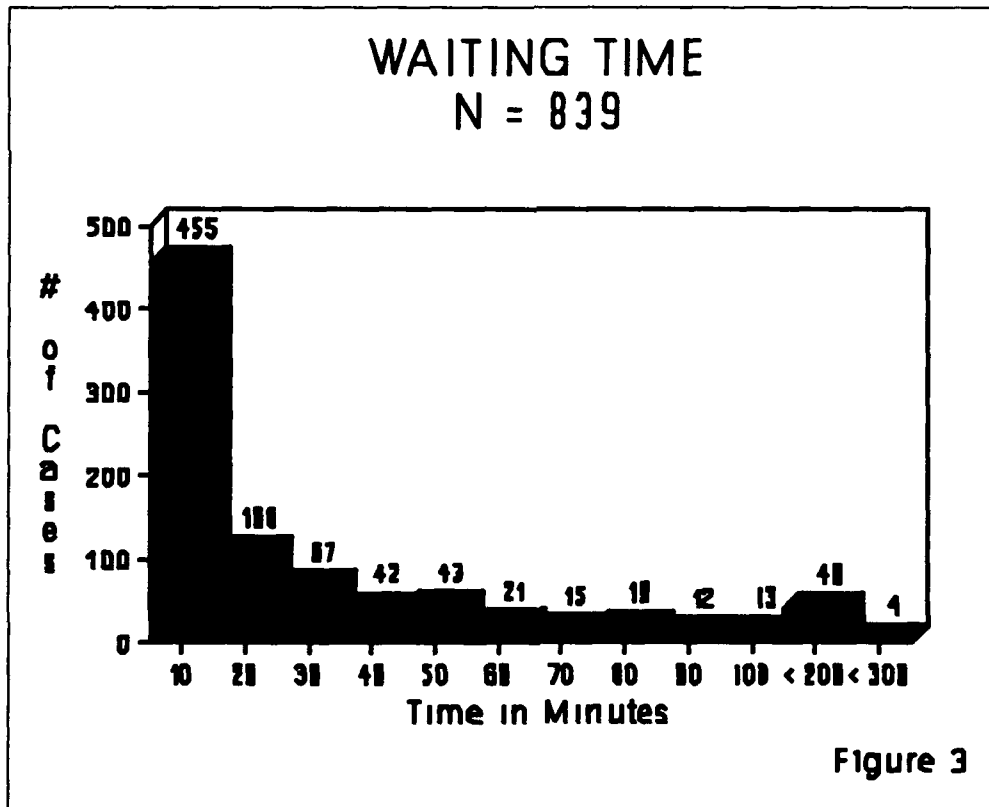
The diagnosis/treatment time variable measures the time, in hours, required

beyond the patient's initial interaction with the physician until admission. The

first time span frequency interval of one hour was sufficient to admit 103 cases,

13% of the sample, followed by steep increases in frequency in the two and

three hour increments. Thereafter a steady decrease in mean diagnosis-

treatment times is apparent.
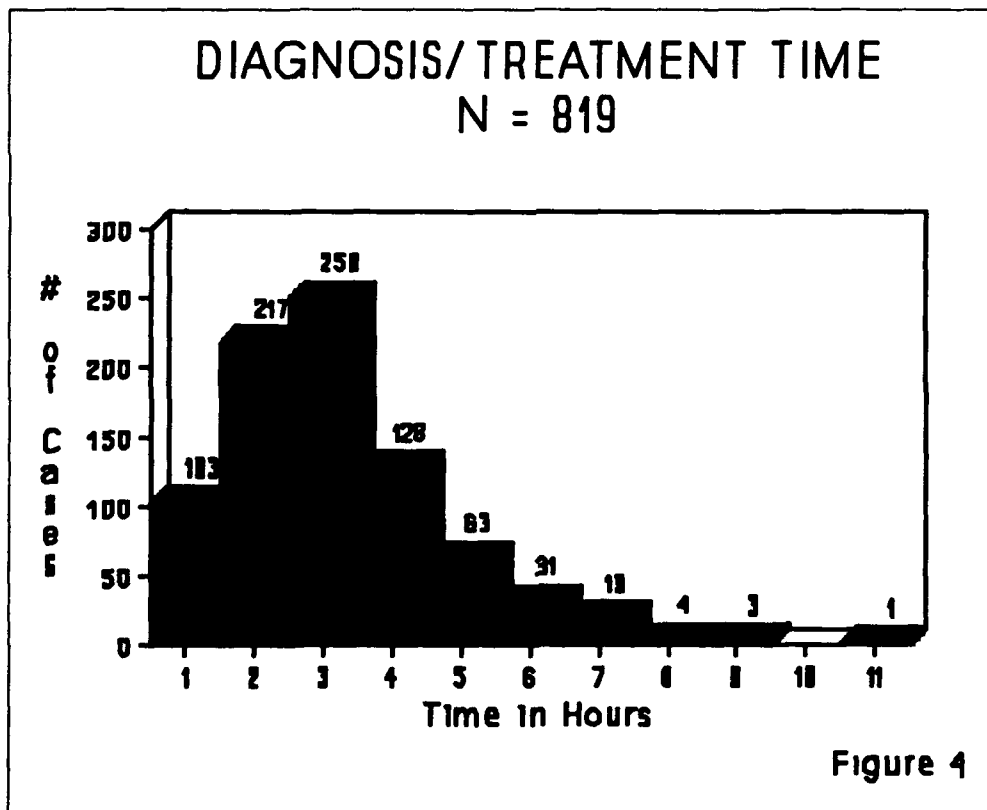
Figure 4

Patient age, gender and beneficiary status were easily obtained from

records. The mean age among the study sample was 37.56 years; the

distribution of patient ages is shown in ten-year increments, Figure 5.

Figure 5
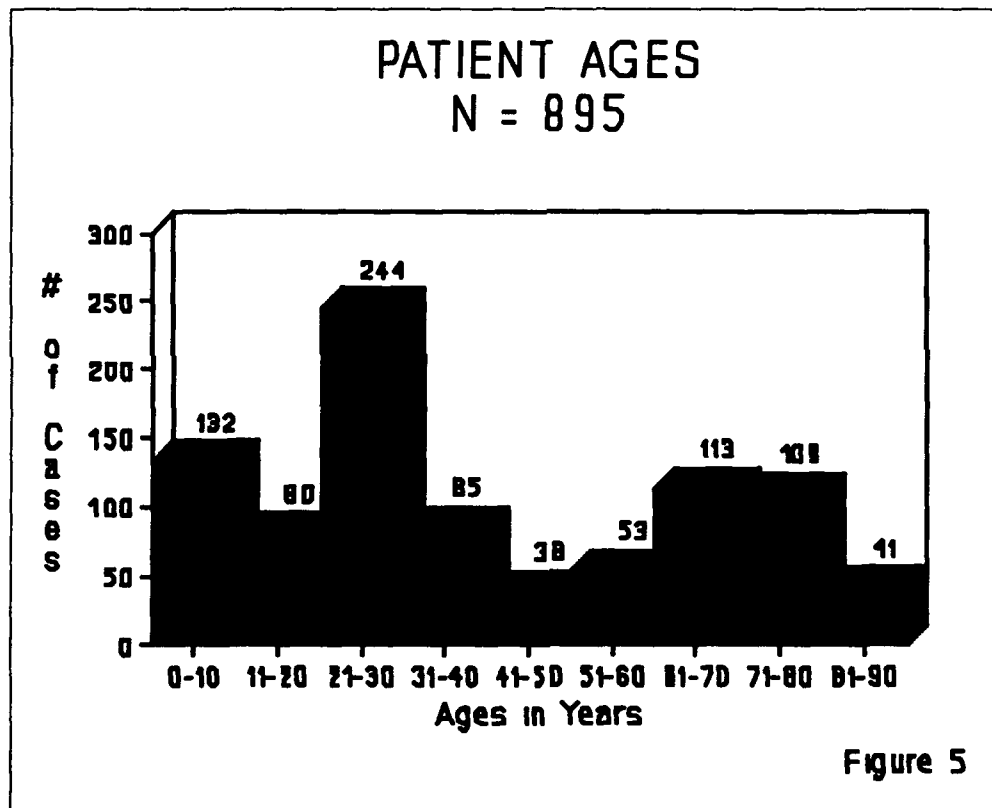
Further manipulation of the data set allowed me to identify the over-65,

CHAMPUS ineligible portion of the sample as 208 cases or 23% of the sample.

The gender mean in Table 1 showed 54% of ER admissions were male.

The first of the grouped variables, beneficiary status, showed 27% of the sample were active duty, 37% were dependents of active duty, 21% were retired, 13% were dependents of retired, and 2% were "other".

Among the ER admissions in this study, 65% were seen in the ER during a weekday, versus a weekend or holiday. Fifty-four percent were seen during the hours of 0600 to 1800, the remainder were seen between 1800 and 0600.

The second grouped variable, triage status, showed 19% of those cases that were triaged by the staff RN were labelled as "Emergent" while 74% and 8% were "Urgent" and "Non-urgent" respectively. However, 48 cases, 5% of the available SF558s for all ER admissions in this study, did not document patients' triage status.

Physician status variables showed 56% of the cases were treated by a military physician. Nurse status variables showed 93% were treated by a military nurse. The differences between the mean total times for military or civilian providers were not statistically significant. Six records in the study did not indicate the physician of record; the nurse of record was missing from 100.

The last of the grouped, independent variables was the admitting service of record. The medical service was responsible for admitting 55% of the study sample. The remaining proportions were 14% by surgery, 9% by obstetrics-gynecology, 16% by pediatrics, and 6% by psychiatry service.

The last two variables, ER census and hospital census during the same calendar day of admission for each case, produced admission-weighted means. The distinction from true means is that they were calculated as the average census among all 895 admissions in the study. This should not be confused with the average censuses for each of the 182 days of the study period.

The General Linear Technique (GLT) is a form of multiple linear regression. It afforded the regression of a large number of independent variables upon the single dependent variable, the total time required to admit an ER patient. Through its estimation of a full model using all independent variables, the GLT evaluated the predictive efficiency of the entire model, Table 2.

Table 2

General Linear Technique: Full Model

Dependent Variable: Total time

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	18	1055495.8346	58638.6575	6.25	0.0001
Error	695	6520675.1303	9382.2664		
Corrected Total	713	7576170.9650			

R-Square = 0.139318

Three components of the total time variable: triage, waiting, and diagnosis/treatment time were excluded from the GLT. It was obvious that total time for each ER admission would increase as each component increased. Input from those variables would not be helpful in a predictive model.

The GLT demonstrated a very strong correlation (df = 18, F = 6.25, alpha .0001) between the 11 remaining independent variables and the total time variable. However, the full model demonstrated a very weak predictive efficiency overall, as shown by an R-Square = 0 14. R-Square as the coefficient of multiple determination measured the correlation of a collection of variables. In summary, the full model justified rejection of the null hypothesis but there was not much predictive value in this collection of variables.

A second technique was employed to test the multiple hypotheses that each of the 11 variables that had been included in the full model estimation had no independent influence on the single dependent variable, total time, (Table 3). This technique allowed the estimation of each individual variable as a separate influence while holding the affects of all other variables temporarily constant.

The three grouped variables (beneficiary status, triage category, and admitting service) were each entered as single variables, i.e. as factors, each at several levels. This allowed consideration of the significance of beneficiary status, for example, as a separate yet grouped influence on the total time.

Table 3

General Linear Technique: Individual Variable Correlation

Dependent Variable: Total time

Source	DF	Mean Square	F Value	Pr > F
Patient Age	1	20795.97014	2.22	0.1370
Patient Gender	1	268.34645	0.03	0.8658
Beneficiary Status	4	4779.81651	0.51	0.7288
Weekday/End	1	24338.26685	2.59	0.1077
Day/Night	1	6991.82815	0.75	0.3883
Triage Category	2	212903.81867	22.69	0.0001
MD Status	1	26482.66742	2.82	0.0934
RN Status	1	3383.39937	0.36	0.5484
Admitting Service	4	80718.54116	8.60	0.0001
ER Census	1	145802.43090	15.54	0.0001
Hospital Census	1	632.40627	0.07	0.7952

The triage (df = 2, F = 22.69) and admitting (df = 4, F = 8.60) categories demonstrated very strong associations with ER admission total times, as did the ER census (df = 1, F = 15.54), all at the .0001 alpha level. According to this result, an individual patient's triage category, the admitting service needed for consultation, and the ER census at the time the individual presents to the ER each has a statistically significant affect on the total time required for that individual to be admitted. For example, increases and decreases in the ER census correlate with increases or decreases in the expected total time, irrespective of other variables.

Two of the three grouped variables, triage and admitting service, were also significant, each with several nominal levels. A Duncan's Multiple Range Test was conducted for each of these factors to examine any contrasts among their levels. Triage levels are shown in Table 3, admitting services in Table 4. Duncan groupings show groups with significant differences. The subjects triaged as "Emergent", had the lowest mean total time for admission while subjects triaged as "Non-urgent" upon presentation to the ER, had the highest. The means for each individual triage category were significantly different from each other.

Table 4

Duncan's Multiple Range Test for Variable: Totaltime

Alpha= 0.05 df=695 MSE=9382.266

Number of Means   2   3

Critical Range 25.57 26.89

Same letter means are not significantly different.

Duncan Grouping	Mean	N	Triage Category
A	233.40	57	Non-Urgent
B	192.82	514	Urgent
C	143.52	143	Emergent

Levels of the admitting service variable were not so well differentiated (Table 5). The mean total time for psychiatric admissions was significantly lower than all others. Medical admissions were the next longest but were grouped by the Duncan procedure with pediatrics, because of proximity of their mean total times. Pediatric admissions were grouped with the next longest admitting services, obstetrics-gynecology and surgery. The Duncan Procedure thus yielded three separate groups with some overlap: psychiatric admissions alone; medical and pediatrics; and pediatrics, surgery, and obstetrics-gynecology.

Table 5

Duncan's Multiple Range Test for Variable: Totaltime

Alpha= 0.05 df=694 MSE=9382.328

Number of Means	2	3	4	5
Critical Range	31.20	32.81	33.85	34.62

Same letter means are not significantly different.

Duncan Grouping			Mean	N	Admitting Service
A			216.19	59	Obstetrics-Gynecology
A			214.79	94	Surgical
A	B		193.25	106	Pediatrics
	B		180.35	417	Medical
		C	113.16	38	Psychiatry

Discussion

Elaboration on Results

The results of this study are divided into three main areas. First the statistical findings address the direct question of the study: whether there is a relationship between the independent variables and the total time required to admit ER patients. Second, the detailed information about each component of time and the total time variable constitute an important baseline assessment about patient flow through the ER and possible obstacles to that flow. Third, the most general results concern irretrievable or incomplete ER patient records.

Three of the independent variables under study were shown to have a powerful influence on the total time required to admit ER patients. Among the 11 independent variables in the study (not including the components of total time), the triage category and admitting service variables, and the ER census, demonstrated the strongest statistically significant relationships with the total time required for ER admissions.

The triage variable finding reinforces Saunders' (1987) conclusion that ER treatment time measures must be considered in light of patient acuity. The SBHACH study reproduced Saunders' inverse relationship between patient acuity and total time required for admission. The finding that the longest total times occurred with the lowest acuity patients suggests that a separate

admission pathway for low acuity patients is indicated. Valuable ER personnel

resources could be conserved by not having them preoccupied with low acuity,

high time-consuming patients.

The admitting service also demonstrated a significant relationship with total

time as a grouped variable and, to a lesser degree, with distinctions between its

levels. The one completely distinct service with the lowest mean total time for

admissions was psychiatry. This service can admit patients on the basis of

brief interviews and seldom requires any ancillary support. In ascending order

of mean total times, medical and pediatric services are grouped as being

similar. Their evaluations are largely cognitive and rely on differential diagnosis

methods involving prolonged observations. Finally, pediatrics, surgery, and

obstetrics-gynecology services were grouped as generating the highest mean

total times for ER admissions. These services heavily utilize ancillary services

and professional consultation; both activities require significant time.

Considerable coordination is required between the ER and the various

admitting services to complete an admission. The ER at SBHACH follows an

American College of Emergency Physicians (ACEP) policy statement that

assigned responsibility to the various services for hospital admissions (Staff,

1990). The policy statement emphasized that facilities must ensure that ER

patients are seen by these consultants in an expeditious manner.

Lynn and Kellerman (1991) proposed that, "EDs are organized around the goals of rapid patient assessment, stabilization, and prompt admission to the hospital." (p. 287) However, the results of this study indicate that the performance of the ER staff at SBHACH, with respect to admission times, was significantly affected by the different mean total times specific to each of the admitting services. Some mechanisms already existed to monitor this activity. First, an EMS representative reports to the hospital commander daily to explain any admission delays, heretofore based on no statistical standard. Second, numerous SF558s reviewed during this study had been stamped with an overprint block allowing notation of the time the consultant had been called, the time the consultant arrived, and the time of final disposition of the patient. In none of these cases was the stamp completely filled out.

Lynn and Kellerman (1991) suggested two management strategies to deal with the impact of consultants on ER time-related performance measures. First they recommended ongoing data collection to establish norms of performance by diagnosis, service, and individual physician. Variance from these norms must be tracked, analyzed, and reported by the EMS chief. Second, if ER admissions become delayed routinely, the facility must explore whether its fundamental mission is to rapidly admit patients on an emergency basis or whether that service should evolve toward a broader, primary care function.

The ER census, i.e., the total number of visits during the same day of an

ER admission, was also found to be highly correlated with total times for

admissions. The overall hospital census, on the other hand, was not

statistically significant. This suggests that influences on total time were specific

to activities within the ER and were not a function of the overall hospital activity.

While numerous researchers (Saunders, 1987; Lynn & Kellerman, 1991; Lupfer

et al., 1991; Friedman, 1992) cite the impact of the nonavailability of inpatient

beds as a serious impediment to rapid admission of ER patients, the data for

this study did not indicate such is the case at SBHACH.

Perhaps the most valuable result from this study was the information

derived from analyzing the various time phases measured for ER admissions.

This initial analysis provided detailed insight about the time phases of the

admission process. This insight reinforced conclusions by Saunders (1987),

Andrulis et al. (1991), and Pierce et al. (1990), about the rarity of and the gain

to be derived from recording the crucial time phases in ER patient flow.

The mean total time for ER admissions in this study was 183 minutes; that

compared very favorably with mean times reported by Pell and Miller (1990),

Lupfer et al. (1991), and Friedman (1992). However, the standard deviation of

101 minutes indicated broad variation within the sample and the range, whose

maximum exceeded 10 hours, are two areas badly needing attention.

Among the observations about the time phases in this study, the delays in triage and the failure to triage some patients at all were very powerful findings. Most important perhaps, from a risk management perspective, was the observation that 48 cases, or 5% of the sample, were not triaged at all according to available documentation. Among those that were triaged, almost 38% were not screened until more than 10 minutes following registration, 15% were not yet triaged by 20 minutes after registering. This incidence of delay between patient registration until vital sign recording is unsatisfactory. Such a delay represents a danger to a patient who is obviously attempting to access the health care system and poses a serious malpractice liability to the facility. Again, these findings were achieved according to the available documentation; there was no mechanism to determine when patients might have been triaged clinically by the RNs without such interventions being recorded.

The waiting time phase demonstrated an acceptable distribution with the highest volume of patients being seen by a physician quite soon after their vital signs were recorded. The diagnosis/treatment time phase displayed a normal two-tailed distribution pattern, similar to the total time variable. In all time phases except initial triage, some delay may be acceptable under the assumption that patients have been screened and are being monitored.

A number of time based observations were important for not being well correlated. The variables of patient's age, gender, and beneficiary status were all noteworthy for failing to demonstrate a significant relationship with the total time required to admit ER patients. During the study, several staff members expressed strongly held perceptions that more time was required to admit patients of certain characteristic profiles. Typically, the staff associated older patients, for example, with more lengthy evaluations prior to admission. The data did not support this view. While no statistical significance was demonstrated between an age, gender, and beneficiary status profile and total admission times, future studies may find otherwise.

The timing of ER admissions, between weekday versus weekend and according to daytime versus evening or night, likewise failed to support a correlation. Two-thirds of all ER admissions during the study period occurred between Monday and Friday and slightly more than half presented between 0600 an 1800 hours. Future studies could more firmly establish trends of distributions by day of the week or time of day and would be valuable in determining staffing patterns following the example of Helmer et al. (1988).

Total times attributed to military or civilian provider status offered some interesting insights. The common perception that civilian contract physicians take longer to admit patients was not supported by the data. In fact, the mean

total time for admissions managed by the civilian physicians was 10 minutes

less than that for military physicians, although the difference was not

statistically significant. Both groups demonstrated large standard deviations

further indicating a need to monitor and evaluate the times dispersion.

Some of the most valuable results in this study identified problems in the

retrievability and completeness of ER patient records. Records for 14% of the

admissions during the study period were not retrievable for review. Data were

missing from numerous cases for each of the time phase variables. Records for

5% of the admissions did not annotate the triage status of the patient. From a

medical-legal standpoint, the most alarming omissions may have been the six

SF558s that did not include a physician's signature and the 100 records where

the RN of record was not identified.

Limitations of the Study

Several limitations of this study became apparent over the course of the

study as did some unanticipated findings. The main limitation of this study as

compared with the existing literature was that it was restricted to only those ER

patients who were admitted. Any observations or conclusions, therefore,

cannot be extrapolated to patients who were treated in the ER and were

subsequently discharged. Part of the intent in this research was to establish a

baseline of observations with a smaller number of ER visits, i.e., those who are admitted, with the potential to broaden the sample in subsequent studies to include all visits.

Some of the time measures may be suspect. In many cases in this study, the recorded measures for triage time and waiting time may have been under-reported. An inordinately large number of records had both the patient's time of triage and the time they were first seen by a physician recorded as "on arrival". This effectively reduces the time phase for each to zero minutes. Given the volume of records in which this occurred, I am skeptical that patients were actually seen "on arrival". The effect would be an under-reporting of the dependent variable total time and each of its components.

Several ER staff members urged me to include the turnaround times for laboratory tests and radiographic studies in addition to the aforementioned consultant response time. The study design identified only past ER admissions for the sample and in no cases were the turnaround times of ancillary support recorded in detail on the SF558s. Undoubtedly such concurrent data would be extremely helpful in further analyzing the time required for ER admissions.

In many of the ER admissions reviewed under this study, the total time could have been affected by the exact time of patient registration. When this occurred near the end of a duty shift, the staff might hasten an admission to

clear the ER before they left. Alternately, staff reporting for the next shift might take extra time to re-evaluate patient's already in the ER. Registration time and possible change of shift impact should be considered in future studies.

A Julian date code or data entry sequence number assigned to each case would have been helpful in building and sorting the database. While cases were entered sequentially, occasionally a missing case would be entered late and require review of the data set and hardcopy SF558s in order to insert the case in the proper order. A sequence code would make data management much simpler and would enable more discrete sorting by units of time.

Another limitation was the exclusive use of the total time variable as the only dependent variable. While the outcome variable in this study was clearly identified as the total time required, any future studies should explore the impact of the independent variables upon each of the identifiable time components as candidate dependent variables.

Finally, while measures were taken to prevent possible bias resulting from the 14% of admissions that were not retrievable from the study, such bias cannot be ruled out. In addition, the incompleteness of the records that were available will hamper future research efforts if not improved.

Conclusions

The Commander and other personnel at Silas Beach Hays Army Community Hospital now have much more detailed information about the Emergency Room's management of admissions. The ER staff now knows, more than just intuitively, its mean total time for admissions during the study period was 183 minutes, that they met the four hour "standard" in 75% of cases, and they now have some indicators for training requirements in documentation, triage, and in the process of managing consultants.

The fundamental management question about a possible relationship between a number of independent variables and the total time required to admit ER patients was answered with qualification. Three particular variables: triage category, admitting service, and the ER census each demonstrated a strong, direct statistical relationship with the total time variable. The latter two, both as grouped variables, displayed different degrees of distinctiveness within their groups. The statistical analysis of the full collection of all studied independent variables, however, did not yield an efficient predictive model.

The time phase focus of this study, utilizing data that was already available is a promising approach to monitoring ER performance. It was particularly valuable in establishing a benchmark against which to measure ongoing performance in a Quality Improvement (QI) application.

Finally, patient record (SF558) completion and storage/retrieval is a liability

and must be improved. Ironically, most of the variables that were identified for

this study were suggested by the staff as data that were consistently and

reliably recorded.

Recommendations

Data collection and analysis should continue at SBHACH in some fashion

similar to the approach employed in this study. I recommend adding

observations about laboratory and radiology services and expanding the sample

to include all ER visits. A new format for comparison would then be possible

showing relative effects of variables on ER admissions versus discharges.

Strong emphasis should be directed to the monitoring and evaluation of the

total time variable and its components. Especially valuable would be the

comparison of these performance areas as they are trended over time. A draft

of a proposed MEDDAC Memorandum 40-8 addressing Evaluation Times in the

Emergency Room is included as Appendix B. Within that memorandum is my

recommendation to apply a new three-hour standard, which was both the mean

and the mode in this study, as the upper limit goal for ER admissions.

The continuation and expansion of ER data collection will be vital in charting

the course of the Fort Ord MEDDAC's downsizing and possible closure. At

some point in the gradual decrement of clinical services available, a decision will be made to convert the ER to an Acute Care Clinic (ACC). The quality of that decision will benefit markedly from accurate ER performance data.

Consultant response times to the ER must be monitored. This study simply associated the admitting service with the total times for admissions. A more instructive and informative data collection should concurrently capture consultant-contact time, their response time, and time of patient disposition. When instituted, this will establish a baseline for future investigation.

The ER must make patient record completion and storage/retrieval a high priority QI issue. Availability, thoroughness, and clarity of the patient records that document patient care are in the best interest of the facility and the patient alike. With the degree of automation that is available at this facility, no one should ever again need to expend 30 hours to organize data that can be captured concurrently.

A fundamental change is indicated to improve the monitoring of the overall workload of the ER. I strongly recommend automating the ER registration log, at a minimum. The green, cloth-bound ledger format is still employed at the patient registration desk to log in all patients. Its degree of incompleteness and its illegibility convinced me to exclude it from this study even though it is the most central collection of patient information in the ER.

A linked, yet somewhat separate recommendation is to consider the automation of the main ER patient record, the SF558. Several facilities in Health Services Command utilize the SF558 module of the Automated Quality Control Evaluation Support System (AQCESS) to record patient registration information and to generate the SF558 (M.A. McCarthy, personal communication, February 14, 1991). Thereafter, AQCESS serves as a database that can retrieve and manipulate the data much more conveniently and accurately than the methodology in this study allowed. This system failed a trial use at SBHACH three years ago and has not been engaged since.

In order to actualize these recommendations, I suggest SBHACH employ the Process Action Team (PAT) approach. The membership of the PAT will include: the EMS Chief, the ER Nurse Manager, one representative each from Information Management Division and Quality Improvement Division, and the Administrative Resident. An interdisciplinary approach is advised in order to develop a convenient, meaningful solution to the ER's need for more detailed management information.

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Appendix A

Glossary of Terms

Acuity - A relative rating of clinical seriousness of patients, commonly used to direct the management of personnel and other resource utilization.

Clinic Visit - A patient visit to an ambulatory care setting, other than an emergency room, whether by appointment or walk-in basis.

Diversion - The practice by Emergency Medical Services (EMS) personnel, specifically ambulance drivers as directed by dispatchers, to purposely avoid specific ERs at certain hospitals. This is usually temporary and driven by the current waiting situation in the ER, the shortage of inpatient beds, or both.

Disposition - The eventual resolution of a particular episode of care. Choices of dispositions include admission, transfer, discharge, or death.

Emergency Room (ER) - An outpatient department of a hospital, operated on a 24-hour, non-appointment basis, treating patients in an acuity based, priority system. ERs treat a wide variety of patients within their capabilities. ERs are rated as Level I, II, or III departments with Level I staffed and equipped to treat the most seriously ill or injured patients; SBHACH's ER is a level II.

Emergent - A condition which requires immediate medical attention and for which delay is harmful to the patient; such a disorder is acute and potentially threatens life or function.

Evaluation Time - The time recorded on the SF558 from the initial registration until the patient departs the ER enroute to an inpatient unit. For this study, the evaluation time equals the total time.

Holding Time - The time between the decision to admit a patient and the physical movement of the patient to the inpatient room/unit.

Non-urgent - A condition which does not require the immediate resources of an emergency medical services system; such a disorder is minor or non-acute.

Observation/Holding Unit - An area where patients are purposely delayed for a more thorough observation or are awaiting admission pending bed availability. Such units may serve both functions and are commonly collocated within or near the ER.

Registration - The process of documenting the arrival of a patient at an ER. It must accommodate all patients regardless of level of consciousness and serves as the entry point to the ER system.

Total Time - The inclusive time of evaluation and treatment of ER patients as an aggregate of three subtotal, component times: triage time, waiting time, and diagnosis/treatment time. The total time begins when a patient is registered in the ER and ends when the patient departs the ER to be admitted to an inpatient nursing unit.

Triage - From the French term "to sort", triage is the process of initial assessment and assignment into, in this case, categories of emergent, urgent, and non-urgent.

Turnaround Times - The total response time for an element of ancillary support, e.g. a laboratory or radiology providing a test result.

Urgent - A condition which requires medical attention within a few hours or danger can ensue; such a disorder is acute but not necessarily severe.

Waiting Time - The time an ER patient waits to be seen by a physician, begins at the time of triage and ends at the time of initial physician contact.

Appendix B

HSXT-PC-EMS (25-30)   1 May 1992

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: MEDDAC Memorandum 40-8

1. Draft MEDDAC Memorandum 40-8, Evaluation Times is at enclosure.

2. Request addressees review MEDDAC Memorandum 40-8 for
concurrence/nonconcurrence and return NLT 30 May 1992 to Chief, Emergency
Medical Services. Addressees with concurrences may make additional
comments or suggestions. Addressees with nonconcurrence will add
statements of nonconcurrence as tabs and return to Chief, Emergency Medical
Services for resolution before forwarding to next addressee.

3. Upon completion of coordination, this action will be forwarded to DCCS for
approval.

Encl   JAMES I. STUBBLEFIELD
                                        MAJ, MC
                                        Chief, Emergency Medical Services

DISTRIBUTION:
DCCS   Concur/Nonconcur_____ Date_____
DCA   Concur/Nonconcur_____ Date_____
C, DOS   Concur/Nonconcur_____ Date_____
C, DOM   Concur/Nonconcur_____ Date_____
C,DFP/CM   Concur/Nonconcur_____ Date_____
C, PAD   Concur/Nonconcur_____ Date_____
C, CSD   Concur/Nonconcur_____ Date_____
C, QID   Concur/Nonconcur_____ Date_____

Appendix B

MEDDAC Memorandum 40-8

DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY MEDICAL DEPARTMENT ACTIVITY
Fort Ord, California 93941-5800

MEDDAC Memorandum
Number 40-8

Evaluation Time in the Emergency Room

1. PURPOSE. This memorandum establishes a facility-specific, statistically-based standard for reviewing the timeliness of patient admissions via the Emergency Room (ER) at Silas Beach Hays Army Community Hospital (SBHACH).

2. APPLICABILITY. This memorandum will apply daily to all ER admissions at SBHACH. When data for ER patients who are discharged are available, this memorandum will be updated to include all dispositions.

3. REFERENCES.

       a. MEDDAC Memorandum 40-3, Emergency Medical Services Mission Statement, dated 7 Dec 88.
       b. MEDDAC Memorandum 40-4, Back-up Physician Staffing for Emergency Medical Services, dated 22 Aug 89.
       c. American College of Emergency Physicians (ACEP) Position Statement: Writing Admission Orders, Annals of Emergency Medicine, May 1990; 19:599

4. DEFINITIONS.

       Total Time - The inclusive time of evaluation and treatment of ER patients as an aggregate of three subtotal, component times: triage time, waiting time, and diagnosis/treatment time. The total time begins when a patient is registered in the ER and ends when the patient departs the ER to be admitted to an inpatient nursing unit.

5. GENERAL. Based upon a study completed in April 1992 of ER admissions at SBHACH between July and December 1991, the total time goal for all ER admissions will be less than three (3) hours.

6. RESPONSIBILITIES:

ER Registration Clerk - Prompt registration of patients upon arrival to ER.

ER Corpsmen - Initial recording of Vital Signs, Chief Complaint, and History

Staff RN - Review of above, direct observation as needed, and assignment of triage category. Also coordinates patient transfers to inpatient units after admitting orders are written.

Staff ER Physician - Thorough documentation of all data on SF558s and contact with consultants for possible admissions.

Consultant - Prompt response to consultation for possible admission and writing admission orders.

Chief, EMS - Develops all policies and procedures regarding admissions and conducts ongoing analysis of ER admission treatment times and reporting to the Hospital Commander.

7. PROCEDURES. At the Commander's Morning Report, the Chief of EMS or his representative will report the following details for admissions whose total time exceeds the three-hour standard: the ER admission by name, beneficiary status, registration and disposition time, chief complaint, diagnosis, and the service consulted for admission.

The proponent of this is the EMS section, U.S. Army Medical Department Activity (USA MEDDAC) Fort Ord. Users are invited to send comments and suggested changes to Commander, USA MEDDAC (Fort Ord), ATTN: HSXT-PC-EMS, Fort Ord, California 93941-5800.

HSXT-PC-EMS/2-2020

FOR THE COMMANDER

OFFICIAL: JOHN E MATT
                                             COL, MS
                                             Deputy Commander
                                              for Administration